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Social Networks and Job Design:

Merging Relational and Proactive Perspectives

par

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présentée par

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RÉSUMÉ

Bien que la recherche en design d'emploi ait prospéré dans les années 70 et 80, cette dernière a subi un déclin significatif dans les années 90 et au début des années 2000. Toutefois, nous avons récemment assisté au développement de deux perspectives basées sur de nouveaux arguments théoriques qui ont permis de stimuler la recherche en design d'emploi. La première perspective est celle dite relationnelle et elle pose l'attention sur le rôle joué par le contexte social des emplois. La seconde, la perspective proactive, pose l'attention sur la manière dont les individus modifient leurs tâches exécutées au travail. Ces deux nouveaux champs de recherche empirique ont évolué en parallèle et cette thèse propose de les fusionner. L'objectif de cette thèse est d'examiner le lien entre le contexte des tâches et le contexte social des emplois.

Le contexte social est conceptualisé comme le réseau des relations sociales que les individus développent dans une organisation. Le contexte des tâches est conceptualisé comme la structure des emplois et le processus de structuration des emplois. La structure des emplois est mesurée par les caractéristiques d'emploi prédéterminées. Le processus de structuration des emplois est quant à lui mesuré par les comportements de *job crafting*, à travers lesquels les individus altèrent de façon proactive la nature de leurs tâches. Les différents liens entre le design des emplois et les réseaux sociaux sont examinés, en illustrant de quelle manière les réseaux sociaux influencent les emplois, sont influencés par les emplois, et interagissent avec les emplois pour déterminer la performance. Ces différentes notions théoriques sont développées dans trois papiers empiriques basés sur les données de deux organisations dissimilaires – une compagnie pharmaceutique et une compagnie de jeux vidéo. Les données sur les réseaux de 290 individus parmi 50 groupes différents collectées grâce à des questionnaires ont été étudiées en relation avec les caractéristiques des emplois, les comportements de *job crafting*, et les évaluations de la performance, mesurée par les responsables.

Le premier papier examine le lien entre la structure des emplois et les réseaux sociaux. Il met l'accent sur le rôle des *structural holes*, c'est-à-dire des positions du

réseau où un individu met en relation des employés qui ne sont pas directement connectés l'un l'autre. Le papier met en évidence la relation mutuelle et ambivalente qui existe entre le contexte des tâches et le contexte social. Cette relation est mutuelle parce qu'elle est caractérisée par des effets à la fois positifs et négatifs. Bien que de précédentes études aient soutenu que les caractéristiques d'emploi exercent des effets convergents et positifs, je montre que ces mêmes caractéristiques d'emploi exercent des effets divergents, tant positifs que négatifs, sur la formation des *structural holes*. Bien que de précédentes études aient également soutenu les effets positifs des *structural holes*, je montre qu'ils exercent des effets divergents, positifs et négatifs, sur les comportements de *job crafting*.

Dans le deuxième papier, une théorie du contexte social du job crafting est élaborée. Plus précisément, le papier met l'accent sur la façon dont le *job crafting* est influencé par les réseaux sociaux et influence la performance individuelle. L'article souligne l'ambivalence des réseaux. Bien que de précédentes études avancent que les indicateurs de centralité dans un réseau ont des effets convergents et positifs sur les comportements individuels, ce papier montre que les indicateurs de centralité exercent des effets divergents, positifs ou bien négatifs, sur les comportements de *job crafting*. Bien que de précédentes études soutiennent que les caractéristiques d'emploi exercent un effet convergent et positif sur les comportements individuels, cet article montre que les caractéristiques d'emploi des contacts du réseau exercent des effets divergents, positifs, négatifs et curvilinéaires, sur les comportements de *job crafting*. Dernièrement, bien que de précédentes études affirment que les comportements proactifs sont favorables à la performance, je montre dans ce papier que le *job crafting* peut avoir un effet positif ou négatif dépendamment de l'interaction avec la centralité dans les réseaux sociaux.

Dans le troisième papier, une théorie multi-niveaux du « côté obscur » des structural holes est développée. Bien que de précédentes études aient souligné qu'au niveau individuel les structural holes sont bénéfiques aux employés, ce papier examine les effets négatifs causés par la moyenne et la variance des *structural holes* au niveau du groupe. L'argument principal est que les comportements individualistes, compétitifs, manipulateurs, et orientés vers le pouvoir des individus qui occupent des positions

structural holes pourraient être favorables à un seul individu, mais génèrent des frictions et tensions au niveau du groupe, où les individus sont supposés de collaborer ensemble. Les effets des variables des réseaux au niveau du groupe sont testés sur le *job crafting*, la satisfaction et la performance.

Cette thèse offre des contributions à six champs de recherche émergents. Premièrement, elle contribue à la recherche sur le design d'emploi proactif, puisqu'elle élabore et opérationnalise le construit du *job crafting*, en illustrant ses antécédents et conséquences et en soulignant ses différences avec des construits similaires. Deuxièmement, elle contribue à la recherche sur la perspective sociale du design d'emploi, parce qu'elle applique l'approche réseau à l'étude du contexte des tâches, et établit les différents rôles que les réseaux sociaux peuvent jouer en relation avec les emplois. Troisièmement, elle contribue à la recherche sur les déterminants des réseaux puisqu'elle introduit une nouvelle classe d'antécédents, les caractéristiques d'emploi, qui peuvent être manœuvrées directement par les gestionnaires pour améliorer les réseaux de communications dans l'organisation. Quatrièmement, elle contribue à la recherche sur le côté obscur des réseaux parce qu'elle fait valoir que les relations sociales n'exercent pas toujours un effet bénéfique mais elles peuvent aussi activer des mécanismes nocifs qui contraignent les comportements des individus. Cinquièmement, elle contribue à la recherche sur la composition des réseaux parce qu'elle explique que non seulement la position dans les réseaux sociaux, mais aussi les attributs des contacts dans les réseaux peuvent influencer les comportements individuels. Dernièrement, cette thèse offre des recommandations pratiques pour les gestionnaires, parce qu'elle suggère une nouvelle approche pour les design d'emploi qui reconnaisse l'importance du contexte social et de l'initiative proactive des individus.

Mots clés : design d'emploi, *job crafting*, caractéristiques d'emploi, réseaux sociaux, *structural holes*, centralité dans les réseaux, recherche multi-niveau

ABSTRACT

Although research in job design flourished in the '70s and '80s, it experienced a significant decline in the '90s and in early 2000s. Yet, two new perspectives have recently arisen, developing new theoretical arguments which have reinvigorated research in job design. The first perspective is the relational perspective that draws attention to the role that the social context plays for jobs. The second perspective is the proactive perspective, drawing attention to the role that individuals play in the crafting of tasks performed on the job. While these two emerging fields of empirical investigation have been evolving in parallel, this thesis proposes to merge them. The topic of this thesis is to investigate the interplay between the task context which characterizes jobs and the social context in which jobs are embedded.

The social context is conceptualized as the network of social relationships individuals develop in an organization. The task context of jobs is conceptualized as both the structure of jobs, represented by pre-existing job characteristics, and the structuring of jobs, captured by the job crafting behaviors through which individuals proactively alter their tasks. The different ways in which job design and social networks combine are addressed, showing how social networks are predicted by jobs, predict jobs and interact with jobs in the determination of performance. These different theoretical positions are investigated in three empirical papers built on data from two dissimilar organizations – a pharmaceutical company and a videogame company. Network data on 290 individuals in 50 groups were collected through a network survey and studied in relation to job characteristic measures from multiple sources, self-report indicators of job crafting behaviors and supervisory assessments of performance.

The first paper examines the interplay between job structure and social networks. I specifically focus on structural holes, which are network positions in which individuals bridge unconnected others. The paper theorizes that the task context of jobs and the social context are associated through a mutual and ambivalent relationship. This relationship is mutual because job characteristics influence structural holes while structural holes simultaneously influence job crafting. This relationship is ambivalent because it is characterized by both positive and negative predictive effects. Although

previous research supported that job characteristics exercise convergent and positive effects on individual outcomes, I show that job characteristics exercise divergent, either positive or negative, effects on structural holes. Although previous research supported the positive effects of structural holes, I show that structural holes exercise divergent, either positive or negative, effects on job crafting.

The second paper elaborates a theory of the social context of job crafting. More specifically, it focuses on social network antecedents and on the performance consequences of job crafting. The paper highlights the ambivalent role of networks, according to which social relations are likely to exercise both an enabling and a constraining force. Although previous research hypothesized that network centrality indicators exercise positive and convergent effects on individual outcomes, the paper shows that centrality indicators exercise divergent, either positive or negative, effects on job crafting. Although previous research hypothesized that job characteristics exercise positive and convergent effects on individual outcomes, the paper shows that the job characteristics of network contacts exercise divergent, positive, negative or curvilinear, predictive effects on job crafting. Last, while previous research assumed that proactive behaviors are beneficial for performance, this paper shows that job crafting can be either positive or negative for performance as a function of the interaction with network centrality.

The third paper elaborates a multi-level theory of the dark side of structural holes. While previous research has mostly hypothesized that individual structural holes are beneficial for individual outcomes, this paper investigates the deleterious effects of group-level mean and group-level variance in structural holes on individual outcomes. The core argument is that the individualistic, competitive, manipulative and power-oriented nature of individuals spanning structural holes may be beneficial considering a single individual but that this creates problems when we consider group dynamics where individuals should collaborate together. The effects of group-level network variables on job crafting are explored along with the effects on satisfaction and performance.

The present thesis offers contributions to six emerging research streams. First, it contributes to research in proactive job design, because it elaborates and operationalizes the job crafting construct, showing its unique antecedents and consequences and

highlighting its differences with similar concepts. Second, it contributes to research in social job design by applying the social network approach to the study of the task context and showing the different roles that networks can play in relation to jobs. Third, it contributes to research in network antecedents because it introduces a new class of network predictors, job characteristics, which can be directly manipulated by managers to empower social networks in organizations. Fourth, it contributes to research on the dark side of networks because it shows that social relationships do not always exercise a beneficial effect but could also trigger deleterious mechanisms, which constrain rather than enable individuals' behaviors. Fifth, it contributes to research in network composition because it shows that not only the position occupied in the network of relationships but also the characteristics of network contacts explain individual behaviors. Sixth, it contributes to research in multi-level network research because it suggests possible non-isomorphic effects of networks across levels of analysis. Last, this research offers practical indications to managers, suggesting a new approach to the design of jobs which acknowledges the important empowering role of the social context and individual proactive initiatives.

Keywords: job design, job crafting, job characteristics, social networks, structural holes, network centrality, multi-level research

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To My Father and My Mother

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Chapter 1:

INTRODUCTION

1.1. The Topic of the Thesis

One of the research areas that have traditionally attracted the interest of organizations is job design. Job design research developed from the practical imperative of concretely helping managers design tasks and organizations in order to improve performance (Hackman & Oldham, 1975, 1976). Although this research stream was very prolific in the `70s and `80s, the interest of scholars declined in the '90s and 2000s as there seemed to be fewer new ideas (Humphrey, Nahrgang and Morgeson, 2007). Yet, although scholarship remained in abeyance for many years, companies kept on evolving and changing the ways in which they designed jobs as well as the priorities given to job design. Changes in the job environment opened up new opportunities for scholars and the field of job design is currently witnessing a resurgence (Grant, Fried, Parker, & Frese, 2010; Oldham & Hackman, 2010). More specifically, there are two emerging approaches to job design research which have been developed in recent years as a result of changes in the business environment and which can foster the renaissance of job design research: the proactive perspective and the relational perspective (Grant & Parker, 2009).

The proactive perspective highlights that individuals do not necessarily passively execute the tasks they are assigned, but also proactively construct their own jobs, altering the nature of tasks they perform (Wrzesniewski & Dutton, 2001). Ranson, Hinings & Greenwood (1980) suggest that the structure of job activities in an organization constitutes and at the same time is constituted by the behaviors of individuals. Jobs are no longer to be seen as static entities but as dynamically evolving and changing over time due to the mutual and reciprocal influences of structure and structuring behaviors (Clegg & Spencer, 2007). In contrast, according to the views of recent works (Kilduff & Brass, 2010; Oldham & Hackman, 2010), the relational

perspective builds on the observation that jobs are not necessarily isolated but inexorably intertwined and scholars should focus on studying the social context in which jobs are embedded.

While the two new streams of investigation have been evolving in parallel, the present thesis proposes to offer a contribution to extant literature in job design by creating a bridge between them. The objective of this thesis is to consider how the task context interplays with the social context in organizations. In order to address this topic, the thesis adopts the lens of social network theory. Social network theory offers a theoretical approach to systematically describing social relationships in organizations and can be particularly useful to study the social context of jobs (Kilduff & Brass, 2010). On the one hand, appealing to research in social networks, the social context of jobs is described in terms of the networks linking individuals and groups in the organization. On the other hand, the task context is described both in terms of the structure of jobs and in terms of the structuring behaviors of individuals who proactively change their jobs. The present research specifies the different ways in which the task context combines and interacts with the social context of jobs, developing three papers which address the core research topic using different angles and contributing to fill specific research gaps highlighted by previous scholars. The investigation of the interplay between jobs and the social context can be highly relevant to practitioners and help re-create the solid bridge between academia and managers that job design research attempted to build years ago. Furthermore, managers are becoming more and more interested in understanding networks and in using social network analyses in organizations (Cross & Parker, 2004). The study of the association between task context and social context can help managers understand how to empower networks in organizations and boost performance.

This introductory chapter of the thesis is structured as follows. Research in both job design and in social networks is reviewed, justifying the need for the present thesis and highlighting the possible contributions which will be developed in the three papers. The chapter is divided in three parts. Part 1 focuses on job design research. A brief introduction to traditional job design research is proposed, reviewing the evolution of extant literature. Then, the new perspectives in job design are reviewed identifying

specific underdeveloped areas with opportunities to build significant contributions. Part 2 focuses on social network research. Symmetrically to part one, the evolution of the network literature is briefly introduced and the new perspectives in network research are illustrated, again allowing the identification of specific research areas which are underdeveloped and could lead to a potential contribution. Part 3 merges job design and network research, introducing the thesis and briefly illustrating the theoretical positions developed in the papers. The ways in which each paper contributes to exploration of the core research topic are anticipated, explaining how the proposed theoretical arguments contribute to each of the new research perspectives previously explained.

1.2. New Perspectives in Job Design

1.2.1. Evolution of Research in Job Design

Management theorists began studying job design at the very inception of research in organizations. According to Nadler and Tushman (2003), at the beginning of the 20th century, organizations appeared to be relatively simple, facing a moderately stable environment with little competition and a poorly educated workforce. In these conditions, the main challenge for management was to improve efficiency and to minimize imperfections in the execution of tasks. These conditions inspired scientific management (Taylor, 1911), in which organizations were urged to strive for efficiency through centralized structures, using standardized procedures, minimizing subunit relationships and rigidly planning the jobs individuals had to perform. Consequently jobs were simplified and highly controlled, facilitating the vertical flow of information. The assumption behind the early theorizations of job design was that individuals are a source of "mistakes" and simplifying jobs while taking discretion away from individuals would decrease the margin of error while increasing management control (Alder & Borys, 1996).

However, this perspective on efficiency in job design attracted much criticism from several scholars. As the context of work in organizations evolved, the negative implications of job design theories based on efficiency started to emerge and

organizations experienced deleterious consequences such as absenteeism, turnover and poor performance due to the alienating and dissatisfying effects of the job design principles suggested by scientific management (Hackman & Lawler, 1971). In order to address the limitations of the scientific management approach, the motivational approach to job design was established as a dominating school of thought. The motivation approach to job design derives its roots from the human relations school (Mayo, 1933; 1945; Roethlisberger & Dickson, 1939), which openly criticized the focus on efficiency and argued for the importance of making employees satisfied to improve organizational outcomes. The pioneering work by Hackman and Oldham (1975) identified the five main job characteristics which are believed to trigger positive psychological states and beneficially affect the satisfaction and performance of individuals. The job characteristics model became one of the most cited theories in management research and collected over 2,000 citations in over 30 years, as noted by Humphrey et al. (2007). However, the authors also acknowledge that the strong success of the theory contributed to the decline of job design research. As the job characteristics model cumulated strong empirical evidence, the academic debate on job design started narrowing down and eventually the case for job design research appeared to be closed.

Yet, while job design research declined during the last decade of the previous century, the nature of jobs kept evolving and mutating, suggesting a need for reassessment of the previous assumptions on which traditional job design research had been built and opening up new opportunities for the investigation of empirical issues in job design. Grant and Parker (2009) highlight two major changes in the nature of jobs, which opened up new research opportunities for scholars and created two new perspectives in job design. The first major change concerns the proactive nature of jobs. While traditional job design research was built on the assumption that jobs are defined *a priori* by management (Hackman & Oldham, 1975), the dynamic nature of the current business environment makes it impossible for management to strictly define jobs *a priori*. A proactive perspective in job design arose (Morrison & Phelps, 1999; Parker & Collins, 2010; Parker, Wall & Cordery, 2001; Wrzesniewski & Dutton, 2001), proposing that individuals do not simply react to the jobs designed by management but proactively construct their own jobs, defining their content and tasks. The second major

change identified by Grant and Parker (2009) concerns the intertwined nature of jobs which cannot in fact be considered in isolation. Jobs have always been relatively intertwined in organizations but in early job design research, scholars did not pay sufficient attention to the interrelations among jobs, preferring to focus on each job as a separate entity. However, the evolution of jobs in recent decades made it more salient to consider jobs in association with the social environment in which they are embedded. A relational job design perspective arose (Devaro, 2010; Grandey & Diamond, 2010; Grant, 2007, 2008; Grant & Sonnentag, 2010; Humphrey et al., 2007), studying either new job characteristics which shape *a priori* the social environment in which individuals execute their work or the association between jobs and social relations.

1.2.2. New Perspectives in Job Design Research: Job Crafting Behaviors

The first new perspective in job design research focuses on proactive job behaviors, which can be captured by the concept of job crafting. This concept is discussed here in some detail, since it represents the core construct that this thesis contributes to theoretically developing. This is a central construct present in all three papers of this thesis and it is the only construct for which the thesis develops a specific measurement scale. The concept of job crafting was originally developed by Wrzesniewski and Dutton (2001). The authors start from the premise that jobs cannot be entirely defined by management and by human resource departments, and that individuals play an active role in defining the nature of the work they perform. More specifically, individuals proactively change the task activities they perform, altering the number of tasks performed or the type of tasks performed, beyond what is expected following formal in-role job specifications. In other words, according to the definition of the authors, jobs are not only defined *a priori* by management but individuals construct their own jobs, developing personal initiatives in which they become the active crafters rather than the passive recipients of their jobs.

According to the authors, individuals can alter their jobs expanding, simplifying or substituting task activities. Individuals can expand their jobs by including new activities because they are inherently motivated to increase the meaningfulness of what they do and to enrich their work activities (Berg, Wrzesniewski, & Dutton 2010).

Individuals may also simplify their tasks or remove some unnecessary tasks because they may want to focus only on the activities which they believe contribute to the creation of value or to their personal gratification (Wrzesniewski, Berg & Dutton, 2010). Last, individuals may not increase or decrease their tasks, but may substitute or change current task activities. To engage in proactive behaviors individuals do not need to include brand new tasks but they might simply alter and improve current tasks (Staw & Boettger, 1990). The logic for the substitution of task activities is related to the idea that individuals have limited resources, such as time and effort, and they cannot continuously expand their activities, but, once their time is saturated, they will need to substitute or change task activities (Bergeron, 2007).

An important element of job crafting, which justifies the value of the construct, is related to the diffusion of such behaviors among employees. The construct captures relatively simple task change behaviors and not grand changes which entail consequences for the whole organization and hence, although there are variations across individuals, ideally any individual in the organization performs some sort of crafting behaviors. In their paper, Wrzesniewski and Dutton (2001) report examples of hospital cleaners and hairdressers and show that, although their prescribed job activities are quite simple and standardized, they engage in crafting behaviors. The fact that every individual engages to a certain extent in job crafting behaviors does not decrease the likelihood of substantial variance across individuals, but provides evidence of the widespread diffusion of such behaviors and the consequent importance of studying them.

Observing the specificities of the construct as compared to similar constructs, five core distinctive characteristics emerge. These distinctive features differentiate job crafting from similar constructs which are presented below. First, the construct of job crafting has a specific focus on the individual *job*. It does not focus on behaviors which are oriented towards the unit, the department or the organization. Second, the construct relates to actual *changes* in the nature of task activities performed in the job. It does not measure the intention to change tasks, the behaviors aimed at facilitating the process of changing tasks (for instance, discussing ideas about task changes with others), or the attempts to change tasks. Third, the construct of job crafting relates to *extra-role*

behaviors. Extra-role behaviors are behaviors which are not specified in advance by role prescriptions, are not recognized in the formal reward system and are not a source of punishment if not performed by individuals (Van Dyne & LePine, 1998). Fourth, the construct of job crafting relates to *proactive* and not reactive behaviors. It belongs to the family of behaviors in which individuals develop their own initiative and do not adapt their activities as a reaction to exogenous demands, external requests or pressures (Grant & Ashford, 2008). Fifth, the construct of job crafting, as all extra-role and proactive behaviors, refers to a set of behaviors which are aimed at improving the work, for the individual or for the organization. In fact, proactive behaviors are fundamentally different from counter-productive behaviors, in which the individual could change the tasks but for sabotaging or deleterious purposes. In the argument of Wrzesniewski and Dutton (2001), individuals could simplify tasks because they believe they are unnecessary and lead to waste of resources, not because they are lazy and do not want to do what they know they should do or because they want to damage the working environment. Sixth, the construct of job crafting refers to *independent* and *discretionary* behaviors of individuals. Individuals that perform job crafting behaviors can initiate and implement the change activity on their own. This factor does not mean that other individuals cannot help in the generation or the implementation of job crafting ideas or that the actor cannot benefit from exchanging ideas or tasks with others. This factor means that job crafting behaviors do not *need* interaction with others to be defined as such. For instance, certain other proactive change behaviors, such as role-making or idiosyncratic deals, require by definition dyadic interaction with the supervisor and management for the definition of new tasks (Hornung, Rousseau, & Glaser, 2008). Job crafting behaviors are indeed facilitated or constrained by social relations but social relations are exogenous to the construct. This characteristic is fundamental because some proactive behaviors incorporate elements of interaction with others, such as communicating with others about new ideas (Van Dyne & LePine, 1998), and the inclusion of social behaviors in the construct can artificially affect the correlations with social variables.

It is important to specify that the original conceptualization of job crafting intended by Wrzesniewski and Dutton (2001) did not focus only on the behaviors of

alteration in job activities, but also on the cognitive boundaries and relational boundaries of jobs. The authors mentioned that individuals can change the cognitive boundaries of their jobs, altering the view and the whole meaning of their work. Furthermore, individuals also alter the relational boundaries of their jobs, changing the persons with whom they interact at work and changing the contents of interactions with others at work.

The present thesis focuses on job crafting behaviors of individuals in which people craft the job activities involved in their jobs. This core and simplified conceptualization of job crafting has been mostly followed by other authors who have extended and contributed to the literature in job crafting (Berg, Grant & Johnson, 2010; Berg, Wrzesniewski, & Dutton, 2010; Hornung, Rousseau, Glaser, Angerer and Weigl, 2010; Leana, Appelbaum and Schevchuk, 2009). Although the other forms of crafting may be interesting to study, for the purposes of the current thesis, it is believed that a focus on task alteration may be particularly relevant. First of all, this thesis is concerned with exploring the actual behaviors of individuals instead of cognitions. The construct of job crafting when intended as a proactive behavior of individuals can be assimilated and compared to the class of proactive behaviors in which individuals develop their own initiative on the job and which represent one of the core new ideas in job design research (Grant & Parker, 2009). The literature on cognitions about the job was developed building on Salancik and Preffer's (1978) idea of social information processing, in which job cognitions are viewed as dependent on the context in which individuals are embedded. Although individuals' cognitions about the job may be relevant, this thesis focuses rather on actual behaviors, since there appears to be potential for a novel contribution to job design research from exploring the behaviors through which individuals influence the nature of tasks they perform (Grant, Fried, Parker, & Frese, 2010; Oldham & Hackman, 2010). There is also a methodological concern related to the choice of focusing on actual behaviors rather than cognitions. The job change behaviors of individuals, as Wrzesniewski and Dutton (2001) pointed out, relate to the *physical* nature of tasks, so that activities are objectively and visibly altered. Given the nature of this research, this thesis adopts questionnaire surveys: the behavioral component may be more easily measured through questionnaires and through the development of a scale,

while as Wrzesniewski, Dutton and Debebe (2003) point out, cognitive changes in the meaning of jobs deal with deep job identity and relate to complex constructive and interpretive dynamics. The cognitive component of crafting could perhaps better be addressed through rich, qualitative investigation rather than through questionnaire surveys.

The other dimension of job crafting initially introduced by Wrzesniewski and Dutton (2001), the relational change in boundaries, has been less developed by job design scholars. The original idea of the authors is that individuals can influence the frequency of interactions, the number of individuals they interact with and the quality of interactions with others. The relational form of crafting relates to behaviors, like the task form. However, such behaviors may substantially overlap with networking behaviors, being therefore less meaningful to study in a theory of the association between crafting and networks. As Wrzesniewski and Dutton (2001: 185) mention, "employees often can decide how frequently they wish to interact with others on the job and can also help determine the quality of those interactions". In network research, the individuals someone interact with are captured by the network structure, the frequency of interactions is captured by the tie intensity and the quality of interactions is captured by the tie content and is a function of the specific type of tie considered. The interaction behaviors described by the authors are already captured by network variables that form part of the second key orientation of this thesis and for this reason, they are not explicitly included in the definition of job crafting, which focuses on the task dimension.

1.2.3. Differences between Job Crafting and Similar Constructs

Taking Charge: The taking charge construct (Morrison & Phelps, 1999) shows many similarities with job crafting. For Morrison and Phelps (1999: 401), "taking charge entails voluntary and constructive efforts, by individual employees, to effect organizationally functional change with respect to bow work is executed within the contexts of their jobs, work units, or organizations." The construct is similar to job crafting because it entails extra-role and discretionary behaviors stemming from the independent initiative of individuals in the organization. The construct is also related to change in the execution of work in the organization. However the construct and the

scale developed by the authors present some fundamental differences with job crafting. First of all, the construct does not only focus on proactive initiatives to change the job of the individual, but also on initiatives to change the work in the unit or to change the entire processes in the organization. The construct therefore is broader in focus than job crafting. Second, the construct entails both proactive and reactive behaviors. An example of a reactive item is "the person often tries to implement solutions to pressing organizational problems". Third, the construct does not measure actual behaviors but intentions and attempts to engage in initiatives. The items of the scale are worded as "this person often tries to…" Despite the overall differences between the constructs, some items of the taking charge scale measure behaviors similar to those captured by job crafting. Hence, the scale adopted in this paper, as well as the job crafting scale developed by Leana et al. (2009), employs some items adapted from the taking charge scale.

Role-Making: the concept of role-making, which appeals to role theory, starts from premises similar to those of job crafting but it incorporates different aspects. Like job crafting, role-making entails changing the characteristics of the job an individual is performing. Differently from job crafting, though, role-making is a reactive behavior instead of a proactive behavior. It is true that individuals do "make" their own role alone and through their individual activities. However, in role theory as developed by Katz and Kahn (1966; 1978), individuals define what they have to do on the basis of the behavioral expectations that "role senders" give them. "Role behavior" is what individuals do in response to pressures perceived by people who have a stake in and hold expectations about individuals' performance (Fondas & Steward, 1994; Levinson, 1959). It is fundamental to notice that even in the theory of job crafting, individuals receive pressures from others and their proactive behaviors are indeed influenced by such pressures. Nevertheless, the concept of job crafting and its operationalization do not incorporate elements that describe such interaction and the concept is not constituted by such interactive behaviors between senders and takers. Social pressures constrain job crafting behaviors but do not constitute them. In other words, social pressures or behavioral expectations sent by others can be predictors of proactive behaviors, but

proactive behaviors do not need the presence of social pressures to be considered as such.

This point can be well illustrated in the case of the role-making conceptualization developed by Graen and colleagues (Graen, 1976; Graen & Cashman, 1975; Graen & Scandura, 1987). The authors realized that tasks are not defined exclusively by managers and proposed a role-making model in which employees are actively involved. Yet, their theory describes and measures a leader-member exchange process, in which individual tasks are defined in a dyadic relationship between a superior and a subordinate: the superior generally initiates the process offering a role, with clear expected tasks, resources and rewards. The offered role is received by the subordinate, evaluated, modified according to his or her needs and possibilities, and sent back as a counter-offer (Graen & Scandura, 1987). This model describes joint planned behavior which does not really capture the emergent, independent and improvisional nature of task crafting (Wrzesniewski & Dutton, 2001). The interaction with the supervisor constitutes the construct: if there is no such interaction, there is no role-making process. Differently, job crafting behaviors can be influenced by interactions with superiors, but these interactions are predictors.

Idiosyncratic Deals: Idiosyncratic deals refer to the definition of employment terms that individuals negotiate for themselves, taking different forms such as flexible schedules or career development (Hornung et al. 2008; Rousseau, 2001, 2005). The concept borrows from the original idea of idiosyncratic jobs proposed by Miner (1985; 1987). Although idiosyncratic deals relate to the change of job tasks and often stem from the proactive initiative of individuals, there are fundamental differences with job crafting, as underlined by Hornung, Rousseau, Glaser, Angerer and Weigl (2010). Both constructs, differently from others, relate to bottom-up initiatives to change jobs. However, in idiosyncratic deals the individual does not take charge to independently and tacitly change his or her tasks. The individual begins a discussion with the supervisor and formally asks them to revise the prescribed tasks assigned. The discussion then involves the human resource department and is formally approved so that job changes get included in the job description of the individual. Hence, idiosyncratic deals do not

involve extra-role behaviors but they are requests to management to change the nature of in-role behaviors. A fundamental difference with job crafting related to this point is the dynamic nature of behaviors: while job crafting behaviors are ongoing, idiosyncratic deals are episodic and performed only occasionally, specifically because they require the formal recognition of changes by management (Hornung et al., 2010).

Voice: another concept which belongs to the family of constructs close to job crafting is *voice*, introduced by Van Dyne and LePine (1998). The construct refers to extra-role, proactive and independent individual behaviors initiated by the individual and aimed at altering the nature of work performed. However, the construct has fundamental differences with job crafting. First of all, the focus refers mostly to issues that affect the work and task activities of the group, rather than the task activities of the individual job. Second, and most important, the construct does not really measure actual behaviors of changing tasks but speaking up behaviors in which individuals communicate their intention to group members about changing task activities. Voice items in the scale developed by Van Dyne and LePine (1998: 112) measure communication activities rather than change in tasks. For instance "this particular co-worker speaks up in this group with ideas, for new projects or changes in procedures" or "this particular co-worker communicates his/her opinions about work issues to others in this group even if his/her opinion is different and others in the group disagree with him/her".

Task Revision: another construct which shows some similarities with job crafting is task revision (Staw & Boettger, 1990). "Task revision is action taken to correct a faulty procedure, an inaccurate job description, or a role expectation that is dysfunctional for an organization" (Staw & Boettger, 1990: 534). The construct entails changes in the job and is an extra-role behavior. However, the construct has a fundamentally reactive nature in which individuals respond to faulty procedures or to specific problems in their tasks and propose a solution to such problems. Job crafting behaviors do not start as a reaction to the problems in the task environment and are not triggered by exogenous reasons which provide the necessary justification for the behaviors to be performed.

Personal Initiative: another construct similar to job crafting is personal initiative. "Personal initiative is a behavior syndrome resulting in an individual's taking an active and self-starting approach to work and going beyond what is formally required in a given job" (Frese, Fay, Hilburger, Leng, & Tag, 1997). The construct is related to proactive and independent initiative in the workplace and it deals with extra-role behaviors. Nevertheless, the active and self-starting approach to work has a larger and more general focus and does not specifically relate to change in the individual's job. More specifically, the items of the scale developed by Frese et al. (2001) measure general initiatives which do not specifically relate to the job the individual is performing, such as "Whenever something goes wrong, I search for a solution immediately" or "I take initiative immediately even when others don't" or again "Whenever there is a chance to get actively involved, I take it." The proactive initiative is more a behavioral orientation and it does not capture the actual changes and modifications performed in the job. Furthermore, Frese, Kring, Soose and Zempel (1996) specify some clear conceptual characteristics of the construct which reveal other fundamental differences with job crafting. First, personal initiative focuses on behaviors which are consistent with the organization's mission, while individuals may perform crafting behaviors simply for their own interest. Second, personal initiative focuses on behaviors which have a long term focus, while there is no long term focus on crafting behaviors.

1.2.4. New Perspectives in Job Design Research: Relational Job Design

The second important new approach to job design research is the relational perspective. The relational perspective starts from the premise that jobs are not isolated but that they are highly intertwined, making the study of social contexts of jobs fundamental for the evolution of research in job design (Grant & Parker, 2009). The relational approach is composed of two main streams of investigation. One stream of investigation relates to the identification of new job characteristic variables such as social job characteristics. Social job characteristics are variables that relate to the prescribed nature of the job and describe its social environment. Hackman and Oldham (1975) initially also explored the possibility of considering social characteristics of the

job, such as the social opportunities that could be associated with each job, but eventually decided to focus on the task characteristics only. In another pioneering contribution to job design, Turner and Lawrence (1965) identified two core social job characteristics: interaction requirements and interaction opportunities, which are intended to describe variations across jobs. Oldhman and Hackman (2010) explicitly mention those two variables as important social job characteristics to be studied in the future. Parker et al. (2001) recognize the role of social contact as salient job characteristic in the modern job context. However, perhaps the strongest contribution to the identification of social job characteristics comes from the work of Morgeson and Humphrey (2006) and Humphrey et al. (2007), who identify five new social job characteristics and compare them with the task characteristics studied by the traditional literature.

The identification of new social characteristics represents an interesting new venue for relational job design, but it is not immune to criticism. More specifically, while it is clear how task activities can be attributed to a job, it is less clear whether the social job characteristics really depend on the job itself or on exogenous factors. The early version of the job diagnostic survey (Hackman & Oldham, 1975) included variables such as *dealing with others* and *feedback from others*, but Hackman and Oldham (1976) abandoned the social characteristics because they mention that the characteristics of the job, which can be purposefully designed by management, differ from the characteristics of the people, related to these two variables and that also impact outcomes through motivational mechanisms. While task autonomy is visibly a characteristic of the job, a large portion of variance in the degree to which individuals receive feedback from others may depend on the personal characteristics of others or on the personal characteristics of the individual, rather than on the job itself. Morgeson and Humphrey's feedback from others scale includes items such as "I receive a great deal of information from my manager and my coworkers about my job performance". It could be that the information from managers depends on the type of job. However, research in leader-member exchange does not see feedback from the manager as a characteristic of the job but as a function of the dyadic relationship between a subordinate and a supervisor (Wing, Xu & Snape, 2007) or as a function of the supervisor (Wilson, Sin, &

Conlon, 2010). Morgeson and Humphrey (2006) also include a variable labeled *social support*, recognizing that the variable has been studied before but not in relation with jobs. The variable includes items such as "My supervisor is concerned about the welfare of the people that work for him/her", "People I work with take a personal interest on me" and "People I work with are friendly". The friendliness of coworkers or the personal interest of others in the person, and not on his or her job, could not depend on the job itself but on personality variables.

Another stream of investigation that contributes to the relational approach to job design relates to the investigation of the interplay between jobs and social relations, (Grant & Parker, 2009). Differently from the previous approach, the social context is not assumed to be part of the job itself, but it is conceptualized as being associated with it. There are no social job design variables to explore, but job design variables are studied in relation to social antecedents or consequences instead. For instance, Kilduff and Brass (2010) argue that the job characteristics interplay with social relations. Grant (2007; 2008) argues that task significance, a characteristic of the job, creates the possibility of and opportunity for interacting with others. Grant and Sonnentag (2010) explore how social impact interacts with task significance and how it compensates for negative task and self-evaluations. Gittell (2001) found that the span of control of supervisors predicts the capacity to relate to others. Grandey and Diamond (2010) build on emotional labor perspectives and derive a theoretical model addressing how job design relates to interactions with the public. The present thesis builds on this second perspective on relational job design to explore how the social context interplays with the task context. While the task context is conceptualized as both the structure of jobs – the job characteristics – and the structuring of job behavior – job crafting – the social context is conceptualized in terms of the social networks in which individuals are embedded as described in Part 2 below.

1.3. New Perspectives in Social Networks

1.3.1. The Evolution of Research in Social Networks

Management theorists have always been interested in studying the role of social relations in organization. At the very beginning of research in organizations, George Homans (1950) recognized the importance of individual relations for the performance of work activities in an organization. Several theoretical insights that social network scholars adopted and built on decades later were initially developed by this author. He pioneered the systematic study of interaction among individuals in groups to observe how patterns and dynamics of relationships explain the emergence of affective states and the emergence of leadership behaviors in some individuals. Furthermore, he also initially explored how social interactions influence the nature of job activities performed in the group, theorizing how activities get specialized and differentiated as a function of relationships and specifying the role that social norms can play in the choice of task activities to execute. As a whole, the original work of Homans (1950) started providing some evidence on the role social relations play in the creation of sentiments, leadership, performance, satisfaction, and job activities.

Since most of the core tenets of network scholars were actually theoretically developed over sixty years ago, the question that arises is: what has the network approach added to the study of social relations? Salancik (1995) indeed presented a strong critique to network research, claiming that it had not delivered its promise and arguing that several papers on social networks were actually replicating ideas that traditional scholars had already acknowledged decades ahead. As the author noticed, although the term *network research* had become very handy and was used by many scholars to appeal to a vast academic audience, several papers claimed to be network papers despite the fact that they did not build on the core premises of network theory.

Network theory differs from any other perspective on social relations for one main reason: it specifically focuses on the structure or composition of relationships among individuals. As Kilduff and Tsai (2003) note, the network perspective was originally borrowed from other scientific disciplines, such as mathematics and graph theory, biology, neurology or artificial intelligence, and later introduced into sociology

where scholars were interested in exploring the patterns of social relations among individuals and among groups. From sociology the discipline then entered the field of organizational studies, gaining increasing recognition. The network approach to organizational research did not borrow from mathematics and the other sciences any theoretical justification, but it mobilized its methodological apparatus. The network approach enabled researchers to systematically study the variation in patterns and structure of ties linking different nodes, be they individuals, cells, or neurotransmitters. Social network analysis developed as a research methodology to mathematically describe the positions nodes occupy in a network. Sociometry and social algebra were developed as mathematical applications of network theory in the field of sociology.

However, is the social network approach a proper "theory" or just a new methodology to represent the structure of social relations? The social network approach can be interpreted as a new methodology as well as a new theory. In fact, there are solid theoretical implications behind the idea that the structure of relations, and not merely the general extent of social relations, is relevant for individuals. Figure 1 offers an illustration of this idea. In the figure every node has four contacts. A simple anonymous survey could ask respondents to report the number of relations and one might conclude that everyone is similar. However, through a network approach the relations identified by a person are matched with the relations identified by others leading to the construction of a whole "network" perspective. Observing the whole structure of relations we can see that there is a very strong difference in the positions occupied by individuals. The figure shows that one individual is substantially more central than others because of the way in which relations are combined. There is variance in the positions occupied by individuals in the network structure, which network research assumed to be important to explain relevant outcomes. Therefore, looking separately at the relations of each single individual and looking at the position of individuals in the structure of relationships leads to different conclusions and to the observation of different phenomena which do have theoretical relevance and distinct explanatory power.

FIGURE 1 – Example of a Social Network
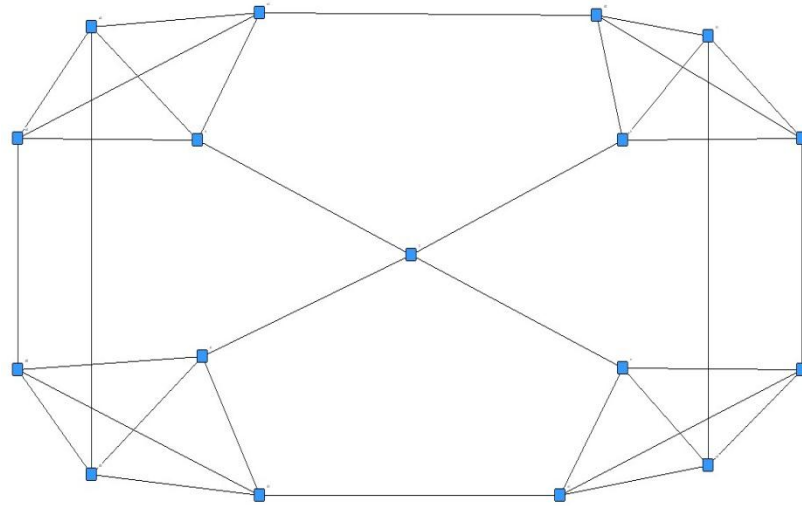
It is the focus on the patterns of relationships, on the structure of connections, on the composition of networks and on the characteristics of network contacts which offers a distinct and unique perspective on social relationships and which allows a better and more systematic understanding of the role of relationships in organizations. For instance, network scholars employed the concept of centrality, which reflects the extent to which someone is positioned at the center of a network. More specifically, scholars adopted the concept of betweenness centrality, which measures the extent to which individuals fall in the shortest paths connecting all other actors in a network (Freeman, 1979). Network scholars have also used the concept of eigenvector centrality, according to which it does not just matter to consider the amount of relations someone has, but it matters to see how well connected or peripheral are those individuals someone is tied to (Bonacich, 1987). Alternatively, scholars have examined the role of structural hole positions, in which individuals bridge unconnected others (Burt, 1992).

Building on the insights from network research, previous scholars have provided strong evidence of the role of individual networks in organizations. Perhaps the most important theoretical link that scholars have considered is the relationships between networks and performance, according to which the network position is believed to grant access to important information and control benefits which allow better performance of assigned tasks (Baldwin, Bedell, & Johnson, 1997; Burt, 2007; Mehra, Kilduff & Brass,

2001; Soda, Usai & Zaheer, 2004). Another stream of investigation highly linked with that of performance is the stream examining the relationship between networks and innovation or creativity, according to which network relations may affect performance mainly because they empower innovative behaviors in individuals (Burt, 2004; Fleming, Mingo & Chen, 2007; Jing, Shung, Brass, Jaepil, Zhi-Xue, 2008; Obstfeld, 2005; Perry-Smith, 2006).

Besides the association with performance and innovation, there are also other relevant outcomes which have been examined in network research, A substantial stream of research has developed around the beneficial role of networks for finding a job or for getting a promotion, based on the premise that the market for career opportunities is very imperfect and uncertain, making relationships the most important resource enabling individuals to obtain a job or to advance in the organization (Gabbay & Zuckerman, 1998; Granovetter, 1974; Podolny & Baron, 1997; Wolff & Moser, 2009). Another important stream of investigation explored the emotional and affective responses to network relations and looked at how networks and feelings are strongly intertwined (Baldwin et al., 2007; Chua, Ingram & Morris, 2008; Morrison, 2002; Tottendell, Wall, Holman, Diamond, & Epitropaki, 2004). An important stream of investigation examined how individuals can use networks to derive influence, to become powerful, to emerge as informal leaders and to construct a base of consensus which can be used in the organization (Balkundi, Kilduff & Hanison, 2011). Last, networks have also been associated with turnover, specifically building on the idea that networks can reduce withdrawal cognitions but can also create snowball or domino effects in the organization (Felps, Mitchell, Hekman, Lee, Holtom, & Harman, 2009; Krackhardt & Porter, 1985; 1986; Mitchell, Holtom, Lee, Sablynski, & Erez, 2001; Mossholder, Settoon, & Henagan, 2005). The empirical evidence cumulated through multiple network studies shows the extensiveness of network effects for individuals in organizations and provides a solid justification to the importance of studying relations through the lens of social networks. However, there are still several research gaps in the study of network relations and some authors have highlighted the possible new perspectives that could be followed by network theorists in order to contribute to the advancement of knowledge in intra-organizational networks.

1.3.2. New Perspectives in Social Network Research: Network Antecedents

Reviewing previous empirical research in networks, Brass, Galaskiewicz, Greve and Tsai (2004) notice that network theorists have been mostly concerned with studying the consequences of social networks to legitimize the relevance of network research, and that future research should devote more attention to understanding the antecedents of network positions. The main stream of investigation that these authors have followed is to examine the possible antecedents of network positions focusing in particular on the role of personality. A relevant personality trait which is believed to explain differences in network positions is self-monitoring which, describes the extent to which individuals are capable of adapting their behaviors to social expectations in different environments. Self-monitoring is hypothesized to explain how individuals become capable of networking with others and of positioning themselves in advantageous network positions (Mehra et al., 2001; Oh & Kilduff, 2008; Sasovova, Mehra, Borgatti & Schippers, 2010). Klein, Lim, Saltz, and Mayer (2004) supported the important role that neuroticism plays in the prediction of network centrality. Balkundi et al. (2008) argue that charisma may be a possible antecedent of network centrality, as individuals have a natural predisposition towards being seen by others as leaders and developing a circle of followers. Anderson (2008) posits that a personality variable, that he labelled need for cognition, explains why managers are motivated to obtain information from multiple sources, influencing networking behaviors. Kalish and Robins (2006) found that people's degree of individualism and locus of control predict the formation of structural hole positions. Last, Burt, Jannotta, & Mahoney (1998) found that an entrepreneurial orientation and predisposition towards accepting uncertainty and risk correlate with structural hole positions. The perspective on personality led to some interesting insights but the study of antecedents may be open to different classes of predictors which could be more directly manipulated by management. The present thesis will contribute to research in network antecedents exploring how the structure of relationships is explained by the structure of jobs.

1.3.3. New Perspectives in Social Network Research: Dark Side and Ambivalence

Kilduff and Tsai (2003) note that most research in social networks is characterized by a positive perspective, according to which network relations are assumed to be generally good for individuals and for organizations, but future research should devote more attention to the exploration of a possible dark side of networks and of the existence of both positive and negative influences stemming from network relationships. Brass, Butterfield and Skaggs (1998) developed a theory of networks and unethical behaviors. Although they did not argue that networks directly affect unethical behaviors, they state that networks interact with individual and contextual factors in the prediction of unethical behaviors. Hansen (1999) argued that network relationships do not only give benefits, but they also entail costs in terms of time and effort because they need to be maintained in order to maintain expectations of reciprocity. Sparrowe, Liden, Wayne, and Kraimer (2001) posit that network relationships may not only facilitate but also hinder behaviors of individuals imposing expectations that limit the behavioral possibilities of contacts. Xiao and Tsui (2007) argue that, depending on the cultural context, opportunistic networking behaviors and keeping relationships with individuals in different groups may be perceived as negative and lead to deleterious consequences. The simultaneous existence of both positive and negative effects associated with networks may explain the ambivalent nature of network structures. These can be isolated to explore the opposing mediating mechanisms that link networks to outcomes (Reagans & McEvily, 2003; Reagans, Zuckerman & McEvily, 2003). Differently, Lechner, Frankenberger, and Floyd (2010) argued that the ambivalent effects of social structure create curvilinear relationships with performance, according to which initially, network structures are beneficial but at a certain point they become constraining and they trigger negative effects that reduce performance. Research on the dark side and ambivalence of networks constitutes a recent development with considerable potential for contribution that will be one focus of the present thesis.

1.3.4. New Perspectives in Social Network Research: Network Composition

One of the major critiques raised against network theory is that the structural approach to examining relationships was thought to reveal several new constructs that

could have led to unique theoretical insights, but in the end the arguments developed were relatively thin (Salancik, 1995). In fact, although measures derived from social network analysis are assumed to capture distinct latent constructs with hypothesized unique explanatory value (Freeman, 1979), researchers have mostly focused on two constructs: centrality and on structural holes. An alternative and relatively unexplored way to observe relationships involves considering the *attributes* of individuals in a network, deriving measures of network composition (Wasserman & Faust, 1994). In other words, instead of observing the structure of relationships someone is embedded in, it could be relevant to observe the aggregate characteristics of alters (i.e., other people) an individual is connected to. Although there are some studies which have explored network composition at different levels of analysis (Baum, Calabrese, & Silverman, 2000; Lincoln, Gerlach, & Ahmadjian, 2000; Reagans & McEvily, 2003; Shaner & Maznevski, 2011; Soda & Bizzi, 2012; Zaheer & Soda, 2009) the study of network composition is still underdeveloped and the possibilities for studying characteristics of network contacts remain unexploited. For this reason, the present thesis will focus on network composition in order to offer a contribution to our understanding of networks.

1.3.5. New Perspectives in Social Network Research: Multilevel Networks

Moliterno and Mahony (2011) and Brass et al. (2004) argued that most network research is either at the individual or at the group level but that future research should attempt to build multilevel bridges between the individual and the group level and observe multilevel models associated with networks. In the multilevel approach to network research, the individual level could be conceptualized as the ego-network while the aggregate level could be conceptualized as the aggregated whole network structure of individuals at the group level (Ibarra et al., 2005). In other words, a whole network describes the nested nature of network relationships constructing the characteristics of a network at a higher level of analysis on the basis of aggregate characteristics of networks at the lower level of analysis (Provan, Fish, and Sydow, 2007). Oh, Labianca and Chung (2006) developed a multilevel model of group networks, in which they start explaining how individual networks combine to create whole group network structures which are hypothesized to exercise effects both at the individual and at the aggregate

group level. Previous scholars examined the predictive role of group network density and network centralization. The former measures the group-mean in the number of connections over the number of possible connections within a group and the latter measures the group-variance in the number of connections within the group. Balkundi and Harrison (2006) performed a meta-analytical study and supported that density in both instrumental and affective networks relates to aggregate performance. Reagans and Zuckerman (2001) found that group density in the communication network positively predicts productivity. Parise and Rollag (2010) performed a simulation and found that work and friendship density at the group level relates to the initial performance of the group. Sparrowe et al. (2001) and Cummings and Cross (2003) found evidence that centralization negatively relates to group performance. However, although these papers studied the multilevel nature of networks in terms of their nested characteristics, they did not develop strict multilevel models testing cross-level relationships at different levels of analysis (Klein & Kozlowski, 2000) as we will do in this thesis.

1.4. Merging New Perspectives on Job Design and on Social Networks

The present thesis merges the new perspectives on job design and the new perspectives on social network research to derive a set of theoretical propositions which aims to contribute by filling research gaps in both job design and in social network research. The thesis does not specify a unique way in which the social context and the task context combine, but it identifies four main ways in which jobs and networks may be related. The four different specifications of the relationships between jobs and networks are presented below. The three papers of the thesis will elaborate in detail the theoretical arguments that justify each of the different specifications. It is important to clarify that each paper does not address a unique specification of the relationship between jobs and networks. The reason for this choice is that each paper constructs its problematization around a specific research gap highlighted by previous scholars. However, each paper in its theoretical development contributes to the explanation of one

or more of the four different specifications which generally describe the association between jobs and social networks.

1.4.1. Networks Influence Jobs

The first way to specify the relationship between jobs and networks is through a model in which we can assume that networks are antecedents and jobs are consequences. More specifically, it is hypothesized that networks influence the proactive structuring of jobs, enabling or constraining individuals' job crafting behaviors. The idea that networks affect job crafting is the strongest argument present in this thesis and it is developed in **Paper 1**, **Paper 2** and **Paper 3**. There are different reasons which justify a possible association between networks and job crafting. A main argument of network research is that the structural position influences access to information and to opportunities (Brass et al. 2004) and job crafting behaviors need access to information and opportunities in order to be executed (Grant & Parker, 2009). Another argument is that the network position may facilitate the possibility of exchanging task activities and resources with contacts (Seibert, Kraimer & Liden, 2001) and job crafting behaviors are executed through negotiation and mutual exchanges of tasks among individuals in the organization (Wrzesniewski & Dutton, 2001). A further argument is that the network position can be associated with resistance to the execution of job crafting behaviors because contacts an individual has may oppose the crafting initiative of an individual if such initiative requires unwanted changes in the jobs of contacts (Wrzesniewski and Dutton, 2001). A last argument is that network position may influence the motivation to pursue innovative behavioral opportunities (Burt, 2004; Cross & Parker, 2004), which is a core reason behind the choice of engaging in crafting behaviors (Wrzesniewski, Dutton & Debebe, 2003). The three papers in the thesis elaborate the general argument of the association between networks and job crafting focusing on different variables and at different levels of analysis. More specifically, Paper 1 focuses on structural hole positions and it shows how such positions influence job crafting behaviors depending on the characteristics of alters bridged by the focal individual. Paper 2 focuses on two centrality measures, betweenness and eigenvector, and on network composition variables built on the aggregate job characteristics of alters

in the network. Paper 3 observes the relationship between networks and job crafting through a multilevel model.

The argument that networks influence jobs contributes to organizational research extending the new perspectives in job design and network research previously introduced. It contributes to both new streams of investigation in job design, relational job design and proactive job design, creating a bridge between them and exploring their intersection, as advocated by Grant and Parker (2009). It contributes to research on ambiguity in networks because it shows the ambivalent predictive role of networks on job crafting. Specifically, Paper 2 focuses on showing how the different forms of centrality and other network variables exercise divergent predictive effects on job crafting and trigger both a constraining and an enabling force. It contributes to research in network composition as it shows that job crafting does not only depend on the structure of relationships per se but it is a function of the characteristics of alters. Specifically, Paper 2 illustrates that the job characteristics of alters influence individuals' crafting behaviors.

1.4.2. Jobs Influence Networks

The second way to specify the relationship between jobs and networks is through a model in which we can assume that jobs are antecedents and networks are consequences. This theoretical argument is developed in **Paper 1**, where it is hypothesized that the structure of jobs, described by the individual's job characteristics, explains the structure of individual networks. The association between job characteristics and network structure is justified by the fact that the structure of activities individuals perform regulates the need for obtaining information from others (Galbraith, 1977; Tushman, 1978). For instance, individuals with high feedback from the job may have less informational requirements that need to be provided by others, because the job already gives them information about what to do in order to perform well (Kluger & DeNisi, 1996). It is therefore possible to assume that feedback from the job decreases the need to obtain feedback from social sources, making them relatively unnecessary.

Furthermore, job characteristics may regulate the possibility of providing valuable information to others, so that networks will be formed not because of the focal

individual's needs, but because other individuals in the organization may want to relate to the focal person (Nebus, 2006). For instance, an individual with high task variety may provide valuable information to individuals in different units and in different social groups, because having knowledge about different tasks is the precondition for being sought by others (Druksat & Wheeler, 2003). Beside the need for accessing information, job characteristics may also allow the possibility of networking with others. For instance, task autonomy may be beneficial to networking because it allows the behavioral discretion which is fundamental to engage in social behaviors with individuals in different units (Marrone, Tesluk, & Carson, 2007). Regulating the need and possibility to network, for the focal individual as well as for the contacts in the social environment, job characteristics are therefore likely to influence the formation and maintenance of network ties, contributing to the development of structural positions in the network of relationships. Paper 1 specifically focuses on structural hole positions both because the literature on the antecedents of structural hole positions is scanty and because structural hole positions may be relevant in showing the important ambivalent effects of job characteristics.

The argument that jobs influence networks contributes to organizational research extending the new perspectives in job design and network research previously introduced. It contributes to research in the social perspective of job design because it addresses the unanswered question of how the characteristics of the jobs influence the social behaviors of individuals (Grant & Parker, 2009). It contributes to research in social network antecedents because it introduces a new class of predictors that could be valuable to understand the relation with networks. Differently from personality traits, in fact, job characteristics can be directly influenced by management and therefore the association between job design and networks can be valuable in helping management understand how to empower social relationships in organizations. The argument also somehow contributes to examining the ambivalence associated with networks. Although the idea of ambivalence in networks relates to the consequences of networks, this argument shows the existence of ambivalent relationships between job characteristics and network structure. In other words, as will be shown in the paper, job characteristics are not only likely to enable networks but they can also constrain them. This idea creates

a new perspective in job design because previous research mostlygenerally assumed that the job characteristics exercise positive and convergent effects on individual outcomes (Humphrey et al., 2007).

1.4.3. Jobs Interact with Networks

The third way to specify the relationship between jobs and networks is through a model in which we can assume that jobs and networks interact with each other in the prediction of individual outcomes. This argument is developed in **Paper 2**, in which it is hypothesized that job crafting interacts with network centrality in the prediction of individual performance. An alternative but similar argument is developed in **Paper 3**, in which it is hypothesized that the combination of structural holes and alters' job crafting predicts individual's job crafting. The argument that jobs interact with networks in the prediction of individual outcomes may be seen as a competing argument with respect to the argument that networks and jobs are causally related, although, as shown in Paper 2 of the thesis, both arguments may coexist and find simultaneous support. In Paper 2, I focus on the performance outcomes of job crafting and I hypothesize that job crafting does not linearly relate to performance but it interacts with network centrality, tracing a non-monotonic association in which the relationship between crafting and performance is positive for high levels of centrality and negative for low levels of centrality. The logic behind this idea is developed from a contingency perspective on the relationship between task activities and performance, according to which task activities are associated with specific information requirements and higher performance is achieved when information requirements from tasks are matched with information access (Donaldson, 2001; Galbraith, 1977; Tushman, 1978). Given that networks are a major source of information access (Inkpen, & Tsang, 2005) the argument about the contingency theory of task activities is elaborated by considering job crafting and network centrality. Paper 3 presents a slightly different argument. In this paper, the focus is still on the predictive effect of networks on job crafting, but the effect of networks is hypothesized to vary as a function of the job crafting characteristics of alters. In other words, for engaging in crafting behaviors it is not important to occupy a

specific network position, but it also matters to see how the network position combines with the characteristics of alters.

The argument that jobs interact with networks contributes to organizational research extending the new perspectives in job design and network research previously introduced. It contributes to research in job crafting because it shows its ambivalent nature, as it can either positively or negatively affect performance as a function of the degree of networks. This feature is important to identify job crafting as a unique construct which differentiates itself from innovative or creative behaviors, which are generally assumed to be beneficial to individuals. This argument also contributes to the relational perspective of job design, developing an alternative explanation for the interplay between jobs and social relations. Social relations can be seen as the context which empowers or constrains job change behaviors. This argument also contributes to research in network composition. Paper 1 shows that the job crafting of network contacts interacts with structural hole positions in determining the job crafting of individuals. The paper not only proposes new theoretical insights but also offers a new way to operationalize the interaction between structure and alters' characteristics, extracting sub-networks from the general ego-network of the individual.

1.4.4. Jobs and Networks at Multiple Levels of Analysis

There is a last way in which the present thesis specifies the interplay between jobs and networks. More specifically, the combination between networks and jobs could be examined through a multilevel lens. This theoretical approach is developed in **Paper 3**, in which the relationship between networks and job crafting is illustrated through a multilevel model proposing that the group-level network structure explains individual job crafting. This specification can be seen as a special case of the first model, studying how networks affect jobs, but shifting the focus from the individual to group-individual relationships. The paper focuses on the multilevel nature of network relationships and reveals a dark side of structural holes. More specifically, while at the individual level most previous research has assumed that structural holes are beneficial (Burt, 2000), it is hypothesized here that the competitive and not collaborative orientation of individuals who occupy structural holes (Obstfeld, 2005), their opportunistic and potentially

manipulative behaviors (Buskens & van de Rijt, 2008), and their orientation toward power (Rodan & Galunic, 2004; Seibert et al. 2001) may create problems at the group level generating non-isomorphic relationships across levels of analysis. The paper's main contribution is to highlight the dark side of structural holes at the group level and, in order to show that such dark side is not only specific to job crafting behaviors, the manuscript also focuses on other dependent variables, such as performance and satisfaction.

This argument contributes to organizational research extending the new perspectives in job design and network research previously introduced. It contributes to research in job crafting because it explores the aggregate group dynamics that lead to crafting behaviors, following the invitation by Leana et al. (2009) to bring the study of job crafting to the aggregate group level beyond the individual level. It contributes to multilevel research in social networks, which has been called for in recent reviews (Brass et al. 2004) and although network papers regularly use the term multilevel research when they observe nested network relationships, they rarely focused on examining cross level models in which dependent and independent variables have different levels of analysis (Moliterno & Mahony, 2011). This argument also contributes to the exploration of ambivalence in networks. In fact, the dark side of structural holes at the group level reveals a double-edged nature of network structure and invites researchers to explore possible non-isomorphic relationships between networks and outcomes across levels of analysis.

Although the thesis is structured following a three paper approach, in which the manuscripts are relatively independent and the theoretical reasoning in each of the papers is autonomous, it is possible to integrate the different specifications of the relationships among variables in order to portray an overarching framework. The overarching framework is presented in Figure 2. In synthetic terms, the figure represents the main relationships involved in the interplay between proactive job design and social job design. Following the arguments that we specified before, the prescribed structure of jobs, measured through the job characteristics affects social networks. Social networks in turn affect the emergent structure of jobs, captured through the concept of job crafting. Then job crafting affects performance through the interaction with social

networks. As mentioned before, the relationships between social structure and job structure manifest both at the individual level of analysis and at the group level of analysis.

FIGURE 2 – An overarching framework
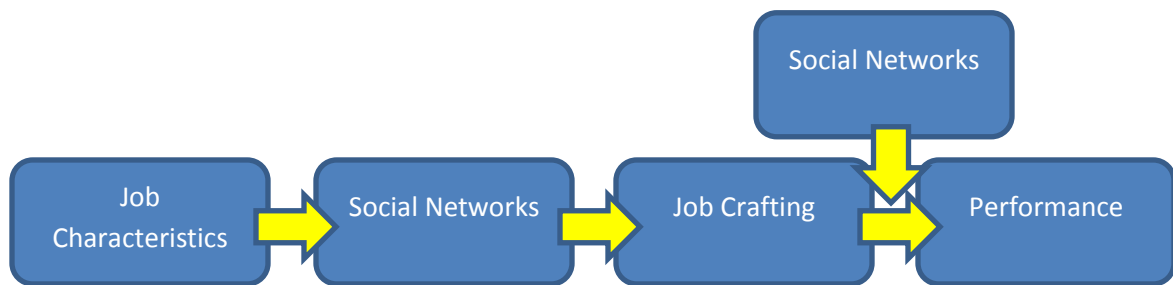
1.5. Practical Implications

The arguments developed so far and the research topic of this thesis not only contribute to academic research but they have important implications for practice. First, the clarification of the role and dynamics of job crafting can be important for management to evaluate the function and priorities of job design in the organization. Understanding the presence of job crafting behaviors in a company enables management to understand the effectiveness of job design activities performed in the company. Management could spend a great deal of effort and resources to design jobs which offer little guidance to individuals and have little role in affecting what individuals actually do, given that individuals are involved in the proactive construction of their jobs. Management could also redefine the priorities of job design. Instead of thinking of job design as a rigid process in which task requirements and specifications have to be structured, management could think about designing jobs which facilitate good job crafting practices, while ensuring that deleterious job crafting behaviors are avoided. If management recognizes the active role of individuals in shaping task activities, it could adopt a new approach to designing jobs, in which individuals instead of external job analysts are the main source of information for understanding task priorities and requirements. Management could learn from employees how to design jobs. Companies also often have difficulties recognizing and rewarding good crafting activities (Grant,

Parker & Collins, 2009). Understanding the mechanisms of crafting and the conditions under which it is beneficial or deleterious may be important to define procedures and systems for assessing crafting efforts and eventually rewarding them. Furthermore, crafting behaviors are extra-role behaviors but the recognition of crafting could make such behaviors become in-role. As crafting practices become formally recognized the new tasks could be diffused to other employees facilitating the dynamic adaptation of work activities in the organization.

The theoretical arguments developed with respect to social network research can also be important for practice. Cross and Parker (2004) acknowledge that companies are more and more interested in employing social network analyses to systematically assess relationships in organizations, to see whether there are imperfections in the flow of communication and to empower individual, group and organizational effectiveness. The relationship between job design and social networks can be very important to management because it offers clear indications of variables which can be manipulated by management to influence the flow of information in organizations. Research on network antecedents focused mostly on personality predictors of networks, which cannot be altered or directly influenced by management. Differently, jobs could be directly influenced by management decisions and executives have the possibility of designing jobs in a way that can empower networks and consequently effectiveness. This research is also important because it addresses the possible dark side of networks and the ensuing ambivalence associated with social relationships. Ibarra and Hunter (2007) acknowledge that human resource departments in organizations have often the general objective of increasing coordination and communication practices under the assumption that the higher the connectivity the better for the organization. However, the authors also notice that managers may be reluctant to develop relationships and that relationships could be a waste of time or limit individuals' initiative. Shedding light on the ambivalence of network relationships can help management develop a focused and tailored approach to improve relationships in organizations instead of across-the-board policies to improve communication between individuals and units.

1.6. Conclusion

Building on the new perspectives in job design and on the new perspectives in social network research, the present thesis investigates the interplay between the task context and the social context. The thesis specifies different ways in which the social context combines with the task context. More specifically, the theory of job crafting is enriched, extending the conceptualization of the construct and exploring its antecedents, outcomes and contingent conditions. The job antecedents and job consequences of networks are explored, contributing to the literature by exploring networks' ambivalent nature. The investigation of the association between social context and task context is then explored though a multilevel study. In synthesis, the thesis exploits research opportunities linked to new perspectives in job design and in social networks, proposing a set of contributions which aim to concretely advance both literatures. The present thesis is structured following a three paper format and the manuscripts are relatively independent. Hence, the theoretical models of the three papers cannot be integrated in a single full model characterized by internal consistency and a comprehensive set of variables. Nevertheless, all papers contribute in merging the social and the proactive job design approaches highlighting a new venue for academic inquiry.

Chapter 2:

METHODOLOGY

2.1. Introduction

The present chapter of the thesis provides a general description of the methodology used to collect data for the thesis. The general sampling strategy and the measures used to operationalize the constructs in the thesis will be presented. Each of the three papers presented has its own methodological section because the papers are structured as academic articles and because each paper discusses in detail the constructs and specific methodology used. In order to obtain a complete understanding of the methodological instruments employed in this thesis, the general information presented in this chapter should be combined with the information contained in the next chapter on the context of the two organizations studied, as well as the information in the methodology section of each paper. There are four main types of variables studied in this thesis: (1) *Job characteristics* variables describing the structure of jobs individuals perform; (2) *Social network* variables describing the social context in which individuals are embedded; (3) The *job crafting* variable, describing the proactive behavior of changing one's job and representing an intermediate behavioral outcome. This is the only variable studied in all three papers. (4) Attitudinal and behavioral outcome variables, such as satisfaction and performance. It is possible to find a copy of the questionnaire at the end of the thesis.

2.2. Strategy and Survey Administration

Two distinct organizations agreed to participate to the study. The two organizations exhibit important differences in terms of operations and markets making it possible to observe whether hypotheses are robust and replicated across dissimilar

organizational contexts. The first organization is a pharmaceutical company involved in producing and selling pharmaceuticals in North America. The company has 151 employees in total and usable answers were obtained for 138 of them (a response rate of 91%). The second organization is a videogame company with operations in North America involved in the development of videogames marketed all over the world. This organization has 191 employees and viable answers were collected for 152 of them (response rate 80%). The following chapter of the thesis, describing the context of the research, will provide more detail about the organizations and the jobs performed by respondents as well as the units in which individuals are grouped.

The sampling strategy for contacting the organizations was as follows. I first selected a pool of organizations in the local area with suitable characteristics for the study. Suitable characteristics included size over 100 employees, mature organizational age, and appropriate variance conditions in the jobs performed by employees. I also tried to sample organizations which were different from one another. I identified a pool of over 150 organizations and I contacted the human resources department or the top management by email with phone recall after two weeks. A dozen companies showed interest and I visited them presenting the research. Four companies initially agreed to participate: two videogame companies, a company involved in medical research, and a pharmaceutical company. Before launching the research projects, two companies decided to exit the partnership. Data were collected from the pharmaceutical company and from one of the videogame companies. Nevertheless, while administering the survey, the videogame company became involved in a wide set of organizational changes and a restructuring processes. The survey administration resulted in the collection of over 60 questionnaires. However, the response rate was too low to derive accurate network measures, such as structural holes and centrality measures. Therefore data from this company were excluded from the research. Afterwards, another videogame company agreed to participate and surveys were administered satisfactorily. The final sample is therefore composed of two organizations.

Questionnaire data were collected from two sources: employees and supervisors. Both surveys were structured in two parts: the first part is a network name generator survey asking respondents to report the contacts they are related to. The second part of

the survey assessed the core constructs of the study on a 5-point Likert scale with agreement-disagreement ratings. The supervisor survey also included a further part asking for evaluations of subordinates' performance. In addition to the survey, I carried out personal interviews with top management of both companies, which helped provide the information to derive alternate assessments of job characteristics. In each company, I carried out 3-4 preliminary interviews before the survey administration and 4 interviews after the survey administration. Surveys were administered online for all employees except for those working in the plant of the pharmaceutical company. In this case, the whole plant was shut down to collect data for the survey. Employees were gathered in a room and given one hour to complete the survey with my assistance. All employees working in the plant were gathered in the room but employees were free to choose not to complete the survey if they were uncomfortable with it. Management was not present so that the confidentiality of respondents could be assured. My assistance was important to clarify the wording of items in case employees needed help. In both companies, the research was formally presented to all employees before its administration, clarifying the research objectives, the conditions of confidentiality and the independence of the study.

2.3. Social Network Survey

Employees of both organizations were administered a network name generator survey in which individuals were asked to name the persons with whom they regularly exchange information. In this research, I focused on instrumental network relationships. The network variables were constructed from a network questionnaire asking respondents to report first and last names of persons with whom the respondent has been "regularly exchanging information about work-related issues". Individuals were free to name as many respondents as they wanted following a flexible-choice research design which is generally preferable to a fixed-choice research design which asks for the name, for instance, of only the top five contacts (Mehra, Kilduff, & Brass, 2001). The network survey, according to the generally acknowledged conceptualization of network ties

(Marsden & Campbell, 1984), measures only *stable* relationships, which involve regular exchanges of information. In order to decrease possible problems of recursive causation and endogeneity, only the ties formed at least six months before the survey were measured. I asked respondents to indicate individuals with whom they had been regularly exchanging information for at least six months. Several authors have reported that individuals are accurate in assessing the duration of their ties and can determine when a stable tie was formed (Granovetter, 1973; Marsden & Campbell, 1984; Perry-Smith, 2006).

In a second name generator survey, I also asked respondents to report ties which were formed *within* the most recent six months. These measures were collected in order to have the potential to explore network formation dynamics. Data on the frequencies of interaction were also collected. Individuals were invited to write down the name of each person they interacted with and to indicate the frequency of interaction. Frequencies of interaction ranged from 1 to 5 according to the following scoring format: 1) once a month or less; 2) once a week; 3) several times a week; 4) once a day; 5) several times a day. Distinct frequencies were used in each paper, depending on the threshold of intensity most appropriate for testing the specific hypotheses developed. The discussion chapter will show the different findings using multiple thresholds of intensity and will discuss the choice of using the specific thresholds in each paper.

Once relational data were collected through the network survey, I constructed network matrixes using the software UCINET VI (Borgatti, Everett, & Freeman, 2002). For each organization, I built adjacency matrixes "individual by individual" to calculate network variables. Following the standard default procedure suggested by the software, relational data were symmetrized through maximum match. In other words, if one individual A identified a contact B but the contact B did not identify the individual A, the relationship was included in the matrix. If both contact A and contact B identified the relationship, the highest value was chosen. The choice of the maximum match criterion for symmetrizing the data is justified by the fact that individuals are more likely to forget a relationship, rather than to invent a relationship which does not exist. Likewise, individuals are more likely to forget occasions in which they interact with

others and underestimate frequency, rather than inventing non-existent occasions of interactions and overestimating frequency. The choice of the average of frequencies reported could be a valuable alternative for measuring a tie when both actors identify it but it creates distorted results when only one actor identifies the relationship.

The concern for reliability of network measures is a delicate issue which is still under debate by scholars (Adams & Moody, 2007; Ferligoj & Hlebec1995, 1999; Zemljic & Hlebec, 2005). Very rarely have scholars provided estimates of reliabilities in network measures, which are often difficult to obtain. Generally, the reciprocity in the network names identified by respondents is not considered to be an indicator of reliability in network measures but it is considered to be an independent construct with theoretical meaning (Kilduff & Tsai, 2003; Wasserman & Faust, 1994). Individuals may have difficulty recalling all their ties or be unmotivated to report all of them in the questionnaire: for this reason it is assumed that combining the responses from both sides offers a more accurate indication of whole network ties an individual has. According to Zemljic & Hlebec (2005), the measures built from networks, for instance centrality measures, tend to be relatively stable in spite of the choice of using reciprocal ties, inward ties (received) or outward ties (declared) from the network questionnaire.

2.4. Measures

2.4.1. Structural Holes

Burt (1992) elaborated the idea of structural hole positions, in which individuals bridge unconnected others. The author proposes a series of network variables to capture structural holes and which are all calculated by the UCINET software. Perhaps, the two most used measures are the *Network Constraint Index* and *Effective Size*. The network constraint measure gives a general understanding of brokerage power, accounting for both the number of connections someone has and the lack of connections among those individuals. Network constraint measures the lack of brokerage and it is a reverse indicator of structural holes: network constraint in one person is high if the person's contacts are densely connected to one another directly, while it is low if the person's

contacts are not connected to one another. Effective size computes for each ego the number of alters minus the average number of ties of alters *within the ego-network*, not counting ties to ego. In others words, it does not consider how many ties ego has but it considers the extent to which ego has *relatively* more ties with his or her alters than alters themselves, hence providing an indicator of the extent to which alters are unconnected to one another. Both constraint and effective size are constructed on the basis of ego-networks. So not all ties of alters are considered when computing the measure of effective size, but only the ties alters have with other alters in the ego-network. Effective size is not a reverse indicator of structural holes. The two measures do not have a strong empirical difference and exhibit similar and very high correlation values for all the intensity thresholds considered (intensity 1 = -.73; intensity 2 = -.74; intensity 3 = -.75; intensity 4 = -.80; intensity 5 = -.83). Nevertheless, they capture slightly different aspects of structural holes and could be more or less adequate depending on the specific research context. Structural holes were measured in Paper 1 and in Paper 3. While Paper 1 adopts the Effective Size indicator, Paper 3 adopts the Constraint index. Justification for the choice is provided in the papers. In Paper 3, the measures at the individual level were used to construct group-level mean and group-level variance in structural holes, according to additive and dispersion logics of aggregation (Chan, 1998). More details on the theoretical and empirical justification for the aggregation logic will be provided in Paper 3.

2.4.2. Network Centrality

The extent to which individuals are positioned in a central or peripheral position in the whole network of relationships is captured by the concept of network centrality. Two measures of network centrality were examined in Paper 2. Both measures were calculated using the algorithms in UCINET VI. The first measure is *Betweenness Centrality* which accounts for the extent to which an individual falls in the shortest path connecting any two other nodes in the network. The algorithm in the software initially calculates shortest paths linking pairs of individuals in the network and then derives an overall estimate indicating the extent to which an individual falls in such shortest paths. The algorithm offers an approximate estimate and does not calculate the exact number

of times an individual falls in the shortest paths linking pairs of others because such calculation is computationally expensive. Structural holes too somehow measure the extent to which an individual falls between others. However the structural hole measure is derived from the local ego-network structure of the individual while betweenness centrality is derived looking at the whole network and does not focus on the network neighborhood. It could be, for instance, that the individual does not broker his or her immediate contacts, but still occupies a position on the shortest path linking far clusters of actors in the organization.

The second centrality measure calculated is *Eigenvector Centrality*. The eigenvector algorithm in UCINET VI calculates the centrality of a node on the basis of the centralities of its contacts according to a formula developed by Bonacich (1972). It is an indicator of the extent to which an individual is central because he or she is tied to individuals who are themselves well-connected. The score of a node is a function of the scores of its contacts, whose score is a function of the score of their own contacts and so on. A similar procedure is used by Google Rank to assign scores to webpages as a function of the connections among websites. This measure shows how the study of networks differs from the study of individual relationships. If a scholar studies relationships individually without a network perspective, it is not necessary to ask with whom someone is connected but it is sufficient to simply provide an indication in the survey of the number of contacts someone has. The eigenvector centrality measure suggests that it is insufficient to simply know how many contacts someone has. One also has to understand how important those contacts are in terms of their own networks. Details of the theoretical and empirical differences between the betweenness and the eigenvector measures of centrality will be provided in the next chapter as well as in Paper 2.

2.4.3. Network Composition

Beside the network variables which capture the position an individual occupies in the structure of relationships, the thesis also considers network composition variables, which are constructed from the attributes of contacts an individual has. Paper 2 develops

five network composition variables on the basis of the job characteristics of contacts. The job characteristics were measured through the Morgeson and Humphrey (2006) scale, whose details will be provided in the section of this chapter addressing job characteristics. In order to compute the five job characteristic variables, I constructed an asymmetric adjacency matrix "individual by contacts" in which the tie linking each individual to his or her contact was expressed as the score in each job characteristic of the contact. Five asymmetric matrixes were constructed, each one considering a separate job characteristic measure. Then, for each matrix, I calculated the average of the contacts' job characteristic. I computed the arithmetic mean of each job characteristic tie deriving an aggregated score for the job characteristics of the network contacts. I adopted an *additive* composition logic (Chan, 1998) to operationalize the job characteristics at the network level. The additive composition logic seems to be the most adequate option in this specific case. Paper 2 provides a detailed explanation of the reasons why an additive composition logic represents the simplest and most accurate way to operationalize the job characteristics of network contacts.

A second particular type of network composition variable was used in Paper 1. In this paper, I will show how the relationship between structural holes and job crafting is a function of the job crafting of alters. In other words, structural holes could be positive or negative depending on who the focal individual is bridging. I hence explore how the structural position of an individual combines with the characteristics of network alters to explain the behavior of the individual. I calculated the average degree of alters' job crafting, following the very same procedure adopted to calculate alters' job characteristics. However, I used this measure of alters' job crafting as a control variable, in order to better isolate the interacting effect of brokerage structure and the crafting of alters. To derive a better appreciation of the combination of structure and alters' characteristics in the prediction of behavioral outcomes, I did not create a multiplicative interaction term, which, as will be explained, does not allow testing the hypotheses developed. Following a procedure adopted by Soda and Bizzi (2012), I extracted sub-networks from the whole ego-network of each individual and calculated the structural hole positions in the specific sub-networks extracted. The algorithm to compute the global structural hole positions extracts from the whole organizational network the so

called ego-network, which is composed of the alters of the ego and the contacts among those alters. I extracted two special types of ego-networks, one considering only alters having above-the-median job crafting and another considering only alters having below-the-median job crafting. I then computed the structural hole positions in this subset of ego-networks. The procedure, its advantages and its limitations, will be explained in more detail the methodology section of Paper 1.

2.4.4. Job Crafting

Job crafting is the core new construct that this thesis contributes to theoretically developing and operationalizing. The literature has not yet developed an accepted scale to operationalize the construct of job crafting. Leana et al. (2009) developed a scale to measure the construct, although this scale had both generic items and items specific to the context of their research (childcare classrooms). Their scale borrows items from the Morrison and Phelps' (1999:410) *taking charge* scale. The taking charge construct, as explained before, has some similarities and some differences with the job crafting construct. While some items of the Morrison and Phelps's (1999) scale do not capture the same behaviors of job crafting, other items are appropriate to describe crafting behaviors. This paper adapts items from Leana et al. (2009) from Morrison and Phelps (1999) while also adding some items which mirror the definition of the construct by Wrzesniewski and Dutton (2001).

I developed a 9-item scale to measure the construct of job crafting. The items of the 9-item scale are represented in Table I. The job crafting behaviors were measured over a period of six months. Hornung, Rousseau, Glaser, Angerer and Weigl (2010) posit that job crafting behaviors are not episodic but tend to be displayed continuously. I was interested in choosing a time window capable of capturing the possibility of substantially altering tasks. At the same time, I did not want to choose a time window that was too wide because I wanted to have lagged measures of the networks and job crafting and because individuals may have difficulty recalling job change events that happened too far back. In order to choose an appropriate time window I had preliminary meetings with management of the two sampled companies and I discussed with them the

appropriateness of using a certain window of time to capture significant job crafting behaviors. In the end, I chose a window of six months and I asked individuals to report the behaviors that had occurred over the last six months.

TABLE I - Items for the Job Crafting Scale

Please, indicate the degree to which each of the statements below characterized your behavior over the last six months:

1. I introduced new approaches on my own to improve my work
2. I instituted on my own new tasks that are more effective
3. I chose on my own to do more tasks than prescribed in my formal job
4. I changed on my own how my job was executed to be more effective
5. I changed minor work tasks that I thought were not productive on my own
6. I chose on my own to do different tasks than prescribed in my formal job
7. On my own, I changed the way I do my job to make it easier to myself
8. On my own, I eliminated redundant or unnecessary tasks
9. I chose on my own to do more simplified tasks than prescribed in my formal job

The items of the scale have some properties which capture the unique construct of job crafting. First, following the indications of Leana et al. (2009) each item was phrased to include the words *on my own*. Job crafting captures the independent initiative of individuals, who can be influenced by others, but fundamentally carry out the change initiative on their own. Second, the items had specific and explicit reference to the *job* and to its *tasks*, rather than vague indications of change behaviors that could involve the whole unit or not be related to the job activities an individual performs. Third, the items capture concrete behaviors rather than attempts to engage in change behaviors or intentions to engage in change behaviors. Fourth, the items explicitly capture the aims of improvements in task interventions, accordingly to the explanation of the construct provided in the previous chapter of the thesis. The items often explicitly mention the aim for improvement. Although the mention of the improvement aim restricts the

spectrum of observable behaviors, it eliminates all change behaviors which could be motivated by counter-productive intentions.

The last feature of the items is that they capture the three types of job change behaviors that Wrzesniewski and Dutton (2001) discussed when they defined the construct of job crafting. Such behaviors include expanding job activities, reducing (or simplifying) job activities, and substituting (or changing) job activities. The three classes of behaviors were explained in the previous section of the thesis. In the argument of Wrzesniewski and Dutton (2001), the authors specify that the three behaviors should not be mutually exclusive but they tend to co-occur as individuals are involved in dynamic alteration of their job activities. Even Leana et al. (2009) measure different facets of the behaviors and they aggregate the job crafting items into a single latent construct. Aggregating the items into a single construct does have theoretical significance because, as we shall better see in the three papers, the determinants of job crafting are assumed to equally enable or constrain any of the three crafting facets. Likewise, each of the three crafting facets is assumed to equally affect the outcomes of job crafting behaviors, such as performance.

In order to explore the dimensionality of the job crafting scale I first performed an exploratory factor analysis. Given that the items are expected to load onto a common factor I opted for an oblimin rotation instead of the varimax rotation. The best solution extracted loads 8 of the 9 items under the same factor and only excludes one item which is loaded onto a separate factor. The item loaded on a separate factor is item number 9 in Table I. The 8 items loading on the common factor show very high eigenvalue (4.64) and the remaining item has an eigenvalue equal to 1.14. The extraction of sum of squared loadings for the 8-item factor explains 52% of variance, while the 9th item alone explains an additional 13% of variance. Rerunning the analysis without the 9th item results in a factor structure with a single factor, whose eigenvalue is 4.41 and which explains 55% of variance. Although the exploratory factor analysis extracts a solution with two factors and suggests excluding the 9th item, that item was kept for the following reasons. First of all, the item shows a high correlation with the common factor ($r = .45$) suggesting that it could be aggregated with the rest of the items. It is a just one

item, which means that it marginally affects the composite indicator of job crafting derived from the aggregation of all items. The 9-item measure of job crafting and the 8-item measure of job crafting have a correlation of .988. Reliability indicators are exactly the same with the two different options. Analyses were rerun with the two job crafting measures and no difference was observed in the results. Most importantly, including this item has theoretical meaning. In fact, this item is the one which best and directly captures the simplification facet of job crafting behaviors. It is the only item which mentions the execution of simplified tasks relatively to what has been prescribed to the individuals and it adds an important element to the global measure of crafting behaviors. The item helps capture the complexity and diversity of job crafting behaviors. Since the item has theoretical importance and it does not generate any observable difference in empirical results, it was kept in the scale.

I also performed reliability tests to assess the appropriateness of using the scale in the analyses. The overall reliability of the scale for the whole sample was adequate (α =.88). The reliability is exactly the same for the 9-item and the 8-item measures of job crafting, suggesting that the inclusion of all items in the scale does not affect its reliability, while entirely incorporating the whole complexity of the job crafting facets. The reliabilities were similar and appropriate also for each single organization. The pharmaceutical organization had a Cronbach's α equal to .89 and the videogame organization had a Cronbach's α equal to .86. I performed a series of exploratory analyses to see whether a solution with fewer items was capable of offering higher reliability but the analyses yielded negative results. The scale with 9 items is the scale with gives highest reliability in the whole sample as well as in each organizational subsample.

Following the same approach used in Leana et al. (2009) the job crafting scale is a self-rated scale and not a supervisory rated scale. Since it measures behaviors, the construct could have been tested also through supervisory ratings. There are different reasons why I did not use supervisory ratings to measure the construct. First, individuals are often better capable of assessing their job changes because supervisors are often unable to understand how the individual alters his or her job tasks or can understand it

too late (Grant, Parker & Collins, 2009). Adopting self-rated measures of job crafting is also more appropriate for the present thesis because it avoids possible common method variance problems with the supervisory rated measure of performance. The job crafting construct is unlikely to share common method variance with network measures because those network measures are constructed matching answers from multiple sources and not only from the individual. Network measures are also simply derived from asking respondents to write down the names of persons they interact with, and may be less affected by possible halo effects. Self-report measures of job crafting could share common method variance with self-report measures of job characteristics and for this reason alternative sources of ratings for job characteristics were collected.

2.4.5. Job Characteristics

Job characteristics were used in Paper 1 and in Paper 2. In Paper 1, the five job characteristics of the job characteristics model (Hackman & Oldham, 1975) are used as independent variables hypothesized to predict structural hole positions. In Paper 2, as explained before, the job characteristics are used to derive the measures of alters' job characteristics. The main source used for measuring job characteristics is a self-report survey, as in most cases of research in job design. I used the scales developed by Morgeson and Humphrey (2006), who designed a scale for measuring jobs which solves some reliability and dimensionality concerns found in the more traditional scales. The survey proposes 3-4 item scales for each job characteristic, evaluated on a 5-point Likert scale. Job characteristics have been measured also using 7-point Likert scales, but the authors argue that a 5-point Likert may be more appropriate for their scales given the level of complexity of the constructs measured.

A first type of analysis which I performed is a Confirmatory Factor Analysis with LISREL 8.8 (Jöreskog & Sörbom, 1993) aimed at testing whether the five job characteristic variables capture distinct constructs. After running the analysis, the goodness-of-fit statistics demonstrate that the hypothesized five factor model exhibit adequate fit with the data, with $\chi^2 = 309.07$ ($p < .001$) and Root Mean Square Error of Approximation (RMSEA) = .077 $_{[.066; .088]}$ ($p < .001$). Each of the items in the five latent

dimensions was demonstrated to have adequate standardized estimates of the loadings. The standardized estimates for the items loading on each job characteristic dimension were the following: task autonomy ($A_1 = .71$; $A_2 = .86$; $A_3 = .92$); task variety ($V_1 = .82$; $V_2 = .95$; $V_3 = .86$; $V_4 = .96$); task significance ($S_1 = .64$; $S_2 = .54$; $S_3 = .94$; $S_4 = .94$); task identity ($I_1 = .59$; $I_2 = .81$; $I_3 = .90$: $I_4 = .87$); and feedback from the job ($F_1 = .75$; $F_2 = .94$; $F_3 = .95$). I also checked whether the five factor model was appropriate for each of the organizational sub-samples. Results were positive for both sub-samples. The goodness-of-fit statistics for the pharmaceutical company were $\chi^2 = 294.28$ ($p < .001$) and Root Mean Square Error of Approximation (RMSEA) $= .12$ $_{[.10; .14]}$ ($p < .001$). The goodness-of-fit statistics for the videogame company were $\chi^2 = 140.79$ ($p < .001$) and Root Mean Square Error of Approximation (RMSEA) $= .069$ $_{[.050; .088]}$ ($p < .05$). The fit is higher for the pharmaceutical company as compared to the videogame company. As a whole the five factor solution adequately fits the data in all cases.

A second set of analyses which I performed is the assessment of reliability for the variables considered. Indicators in the whole sample were shown to have high reliability: autonomy ($\alpha = .86$), variety ($\alpha = .91$), significance ($\alpha = .87$), identity ($\alpha = .90$), and feedback ($\alpha = .90$). In order to assess the stability of the reliability indicators across samples, I also calculated Cronbach's alpha on each organization. Results are stable across organizations. The pharmaceutical organization shows the following reliabilities: autonomy ($\alpha = .88$), variety ($\alpha = .88$), significance ($\alpha = .83$), identity ($\alpha = .87$), and feedback ($\alpha = .89$). The videogame organization shows excellent reliabilities as well: autonomy ($\alpha = .84$), variety ($\alpha = .94$), significance ($\alpha = .87$), identity ($\alpha = .91$), and feedback ($\alpha = .90$).

In Paper 1, I also used other sources to assess jobs and to derive a more complete operationalization of job characteristic variables. These different sources were used in Paper 1 but not in Paper 2. The main reasons for which they are included is to decrease the concern for possible reverse causality between networks and job perceptions and avoid problems related to common method variance between job characteristics and job crafting. This concern is stronger for Paper 1 but less evident in the model of Paper 2, where job characteristics are only used to derive a measure for alters, entailing fewer

concerns for reverse causality or for common method variance. Therefore, in order to avoid excessive complexity in Paper 2, this paper only uses the traditional self-report measures. The self-report measures capture what the individual really does, while other sources of job evaluation may be independent but have less information to assess the tasks that every individual performs. This idea is especially true considering the general argument of this thesis, which is that individuals change what they do, and people with the same job may actually perform rather different tasks. Therefore, unless there is no necessity for measuring alternative sources of job characteristics, the self-report measures are indeed superior.

Paper 1 provides a detailed description of the other sources used, explaining the advantages of disadvantages of each of them. In this chapter of the thesis, I just briefly introduce these other measurement instruments, and invite the reader to combine the information reported here with the information in the methodology section of Paper 1. First, I derived a measure of job characteristics averaging the self-report measures at the job level. In other words, the score for a job characteristic is represented by the average score of all individuals in the organization performing the same job. This measure eliminates individual idiosyncratic behaviors and perceptions, having the disadvantage of disregarding the different behaviors within the same job but having the advantage of reducing the different perceptions of the same job which could result from network influences. Second, I derived another measure of job characteristics from top management assessment. Management rated jobs they were familiar with through a single-item measure. Management has less information than individuals to rate jobs and measurement instruments lack reliability, but supervisory measures avoid problems of common method variance and offer a more "objective" measure of job characteristics. Last, I performed a job coding analysis, personally coding the job characteristics from archival data on job descriptions provided by the partnering companies. The procedure is described in detail in Paper 2. Time constraints did not allow for multiple independent raters to assess jobs, although this option will be contemplated in the future for publication purposes.

2.4.6. Satisfaction with the Group

The overall level of individual satisfaction with the group was used in Paper 3 as an outcome of the group-level network composition variables. Satisfaction with the group was measured through a single-item measure asking respondents to report the level of agreement or disagreement with the following statement: "I am very satisfied to work in my subunit". Subunit was defined in a line below as the group of individuals working under the same immediate supervisor. Companies preferred the term "subunit" because the use of the term group is quite generic and it could have been misleading for some employees. Although measuring dependent variables with a single item is generally unwarranted, the measurement of satisfaction is a specific case of a variable that has been measured very frequently by scholars through single-item indicators (Nagy, 2002; Wanous, Reichers & Hudy, 1997). Paper 3 will describe in detail the advantages and disadvantages of adopting the single-item measure.

Generally speaking, single-item measures of satisfaction are not particularly problematic in terms of reliability. In the videogame organization, which was the last to be sampled, only one item of satisfaction was measured, but in the pharmaceutical organization I also included a second item to check for the possible unreliability of the single item measure. The item asked: "I am very happy to work in my subunit". The item reflects a wording similar to that of the first item. It captures the hedonic emotional response to satisfaction but shows less face validity than the first item as it does not directly mention the word satisfaction. As expected, adding an additional item to the measurement of satisfaction does not change the results. The two items show very high reliability ($\alpha = .94$) and are highly correlated to each other ($r = .88$). The aggregate measure of satisfaction built on two items almost exactly overlaps with the single-item measure ($r = .98$). Results are robust and the two-item measure does not alter the empirical conclusions of Paper 3.

Furthermore, using a single-item measure could better capture overall satisfaction than multidimensional scales based on facet satisfaction. Single item measures have good face validity, are cost-efficient, and, most importantly, could be less related to measurement error. Individuals may not be comfortable with reporting that they do not like working in their organization or in their unit. If they are asked about

their satisfaction multiple times, they may develop adverse attitudes toward the questionnaire or believe that satisfaction is a core issue of the research, with resulting higher likelihood of errors or lies.

2.4.7. Performance

Individual performance was assessed through supervisory ratings and employed as a dependent variable in Paper 2 and in Paper 3. The immediate supervisor rated the performance of his or her employees. Performance was measured as the comparative evaluation of the employee in relation to the average of his or her colleagues in the organization. Responses ranged from 1 (much below the average) to 5 (much above the average) with 3 as the average. In this research, I preferred using a dimensional formative index of performance rather than a reflective multi-item scale of performance. Such scales often either tend to focus on in-role performance, for instance the strongly used Williams and Anderson's (1991) scale, of in specific extra-role behaviors. A dimensional index of performance offers a general assessment of the output of individuals in the organization, which is perhaps more amenable to the studied research questions and to the investigation of the predictive effect of job crafting or networks. I had a set of preliminary meetings with management in order to define the dimensions to be used to assess performance. A limitation of the thesis is that I could not use the very same dimensions to measure performance in both organizations. While the pharmaceutical organization allowed me to measure performance through the research questionnaire, the videogame company asked me to use supervisory ratings collected independently by the human resources department and used in the internal performance appraisal system of the company. I therefore had different measures of performance in the different organizations. More specifically, while performance was measured through three dimensions in the pharmaceutical company (effort, quality of work and quantity of work), performance was measured through six different dimensions in the videogame company (efficiency, determination, market-orientation, creativity, innovation, and collaboration). Furthermore while in the pharmaceutical company I could assess reliability ($\alpha = .89$) because I directly measured the construct, the videogame company only gave me the final score given to each employee and I could not have any indication

of reliability. The limitation of the difference in performance measures is not highly problematic for the following reasons. First, in the analyses I controlled for the organization. Second, the constructs, in each case, asked respondents to rate individuals comparatively to one another and hence in both organizations the scores have a similar meaning (being like the other employees, above, or below). Third, reliability estimates are indeed useful but not necessary given that performance is measured through formative dimensions and not through reflective indicators. Fourth, even though I do not have reliability estimates for the videogame company, the appraisal system used by this company was considered by the company to be sufficiently reliable and accurate to be a basis for employee compensation. More specifically, supervisors had to first rate employees, then meet with the higher-level supervisors and the HR management to discuss ratings and be sure that they accurately reflected the individual performance as well as accurately measured the comparative evaluation with respect to other employees. The advantages and limitation of the performance measures are discussed further in the methodology section of Paper 3.

2.4.8. Controls

I used a common set of demographic controls across all the papers. The papers provide a theoretical justification for the use of the control variables. I controlled for the *organization* with a dummy variable. Controlling for the organization is fundamental because the organizations have different characteristics, because they have different sizes, resulting in differences on the centrality measures calculated at the individual level, and because the measures of performance were diverse across the two organizations. I controlled for the general individual characteristics of *gender* (M = 1; F = 2) and *age*. Furthermore, I controlled for *education* (1 = high school; 2 = bachelor; 3 = master; 4 = Phd). I also included two measures of tenure: *tenure in the organization* and *tenure in the position*. The first variable was measured in years. The second variable was measured in months, since a priori I did not want to risk failing to capture variance if the organization was too dynamic. I did collect a third indicator of tenure, *tenure in the team*. However, this indicator was removed from the analyses because it was too

strongly correlated with tenure in the position and could have distorted the analyses due to multicollinearity problems.

Additionally to the common pool of controls, there are controls which were used for the specific purposes of each paper. Paper 1 had a regression test predicting job crafting and exploring the influence of structural holes with individuals having high or low job crafting. In order to improve the quality of regressions, avoid endogeneity problems and isolate the unique portions of variance explained by the variables hypothesized to have an effect, I controlled for *alters' job crafting* and for structural holes. In Paper 2, when exploring the predictive role of alters' job characteristics on individual's crafting, I controlled for the individual *job characteristics*. Controlling for the individual job characteristics, I included the five Hackman and Oldham (1975) characteristics and I also included specialization from Morgeson and Humphrey (2006), which was initially measured for empirical testing in the group-level paper and which could be valuable to complete the set of job controls necessary for Paper 2.

2.5. Conclusion

The present chapter introduced the methodological instruments adopted in the three papers which compose this thesis. The information presented in this chapter has to be combined with the information provided in the methodological sections of the three papers as well as with the information provided in the next chapter. The network measures were derived from a network name generator survey and the network matrixes were constructed following the assumptions generally adopted by network theorists. In general, the scales used in this thesis have good psychometric properties which allow adequate possibilities for testing the empirical hypotheses proposed. Data have been collected from multiple sources in order to increase the quality of measures and decrease possible biases in the empirical findings. Data will be analyzed through a series of OLS and HLM regressions in the ways specified in each of the three papers. The survey has been administered to two dissimilar organizations, in order to capture different empirical conditions and to decrease possible external validity concerns. The next chapter will

present these organizations and provide some descriptive information on the empirical data collected.

Chapter 3:

THE CONTEXT OF THE STUDY

3.1. Introduction

This chapter of the thesis provides some contextual information aimed at helping readers to interpret the findings presented in the three papers. The papers are written in a format and style similar to those of an academic journal and therefore do not include illustrative examples and figures which give some descriptive depth to the data. This chapter provides some clarifications, definitions, descriptive statistics, concrete examples and figurative illustrations aimed at facilitating the understanding of the reader and assessing the possible generalizability of findings. The thesis has four main classes of variables which need contextual explanation: job design variables, the job crafting variable, network variables and final outcome variables. This chapter of the thesis will therefore provide illustration of all those variables, describing the structure of organizations and jobs, the context of job crafting specific to the two organizations sampled, the nature of networks studied, and the final outcomes considered.

3.2. Description of the Structure of Organizations and Jobs

The two organizations sampled in this thesis present considerable dissimilarities in their organizational structure. The first company is a pharmaceutical organization and operates in a relatively stable and mature industry. The second company is a videogame organization which operates in a relatively dynamic and growing industry. Both companies have job descriptions which reflect the formal task requirements associated with each job. There is a certain degree of standardization of task activities in both companies. However, as expected, the pharmaceutical organization has much higher

standardization of processes and outputs as compared to the videogame organization. The areas of responsibility for each individual are much more defined in the pharmaceutical organization as compared to the videogame organization. It is also reasonable to expect that the interdependence among task activities is much higher for the videogame company. In the pharmaceutical organization interdependence is sequential or reciprocal but it rarely involves complex patterns in which several units have to simultaneously exchange work inputs for the activities to progress. The videogame company, on the contrary, often requires inputs from multiple sources for the tasks to be performed effectively. The pharmaceutical organization manufactures products on a continuous basis, while the videogame company is a project organization which develops one single project at a time. The mechanisms of coordination adopted by the two organizations are also likely to be diverse. The videogame organization is likely to use more rich coordination mechanisms, employing liaison roles, task forces, groups. This company continuously schedules formal meetings which constantly characterize the daily work practices. The pharmaceutical organization is likely to use simpler coordination mechanisms, standardizing activities, planning the execution of tasks and writing up documents and memos which are circulated in the organization to coordinate work.

Although the organizations are characterized by significant dissimilarities, they are also qualified by some similarities. Both organizations have a rather simple hierarchy with few layers. The videogame company, although highly dynamic, still assigns defined areas of responsibility to team leaders and has defined hierarchical reports. The pharmaceutical company operates in a stable and standardized environment but it is still a small organization which does not need excessive bureaucracy for its functioning. The average span of control in both organizations is not particularly dissimilar, with group sizes which do not significantly differ. Both organizations also have great variety in specializations and individuals perform highly dissimilar tasks. Operations are complex in both organizations and require skilled employees. Although the pharmaceutical organization operates in a stable and mature industry, this industry is characterized by high competition and considerable uncertainty, given the difficulty of forecasting *a priori* the success of newly developed products. The pharmaceutical

company is a niche player which markets several new products per year and does not rely on selling the same pharmaceuticals each year. Therefore, even within a stable industry, the company has to continuously reinvent its processes and seek innovation. In the next section, I will provide specific details on each organization.

3.2.1. Pharmaceutical Company

The first organization that participated to the study is a pharmaceutical company, which operates in North America. The company is specialized in the production and selling of diverse pharmaceuticals in the North American market. It does not have operations outside the United States and Canada. It does not have an R&D laboratory and it is not involved in scientific research and development of products. It engages in vast exploratory activity to search for promising patents and buys such patents from independent laboratories. After a patent is purchased, the company may eventually improve or alter the composition of the chemical solution in order to fit the production requirements of its plant. Once the chemical solution is ready for the manufacturing process, the company buys the raw materials, granulates them, assembles them in the new chemical solution, compresses them and coats them in small pills. The pills cannot be sold to clients, but the company develops a network of relationships with physicians and pharmacies in order to promote the products and their functional properties. The company has three core sets of activities: manufacturing activities, selling activities and administrative activities. The manufacturing activities are located in a production plant which is physically separate but not far from the administrative offices. Administrative staff have offices in both the administrative building and the manufacturing plant and visit the other site on a daily basis. The sales agents are located at various sites in North America depending on the areas that they serve but they regularly go to the administrative building for meetings.

The company has a rather simple structure. It employs 151 persons who are grouped into 22 units. The groups have an average of about 5 individuals. Each unit has a supervisor who is responsible for the objectives of the whole group. The company has few hierarchical layers and units may be nested in larger units. For instance, the

manufacturing units are under the responsibility of the director of the manufacturing division. The manufacturing division as well as the quality units are under the supervision of a production director. The production director is then under the supervision of the CEO, who also supervises the sales units and the administrative units.[1] The third paper of the thesis focuses on groups as level of analysis for the independent variables. The groups included in the third paper consider staff units (for instance, human resources and finance) and line units at the lowest level of aggregation. Not all individuals are included in the groups for the third paper and there are some individuals who do not belong to any group. For instance, the three sales units have a common sales training manager and other separate staff employees who directly report to the sales director but are not part of any of the three sales units. Only individuals grouped in units with a common supervisor who is uniquely responsible for all and only the employees in the group are considered in the group-level of analysis.

Although the pharmaceutical company is a rather mechanistic organization, there is a high variety of tasks performed by individuals as well as many occupational titles and diverse educational requirements of employees. Here I provide a short description of the activities performed by each unit. The activities are described without detail in order to comply with the regulations of the disclosure agreement signed by me. Several units have diversified and sometimes very specific professional profiles but great detail on occupational positions cannot be given for reasons of confidentiality.

- **Business Development:** the pharmaceutical company does not have its own R&D department and does not develop its own pharmaceuticals. The company buys patents from external laboratories and manufactures the products developed by those laboratories. The unit is responsible for developing business partnerships with independent R&D companies that develop the products to be marketed. It is composed of individuals with business competence and different levels of education and experience.

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[1] This description is a simplification. The whole organization is more complex but I am prohibited for confidentiality reasons from describing the structure in detail or providing more specific details on the functioning of the organization.

- **Engineering:** the unit is responsible for the design, implementation, negotiation with contractors and functioning of the machinery used in the plant. It is composed of both engineers and technicians with different levels of education.

- **Finished Products:** the unit is responsible for planning, supervising, coordinating resources and executing laboratory analyses on the products developed. The unit Finished Products performs a different set of analyses as compared to the quality units. The quality units focus more on the process while this unit focuses more on the analyses of final products. This mostly involves advanced laboratory analyses and it employs highly qualified chemists and pharmacists.

- **Finance:** the unit is responsible for financial accounting, financial management, and develops the relationships with the financial institutions. It is composed of financial analysts and accountants with different levels of expertise.

- **Human Resources:** the unit deals with traditional human resource practices, such as recruitment, training, job design, evaluation, promotion, and resource planning. It is composed of individuals with advanced business education and different HR specializations.

- **Marketing:** the unit is responsible for both external marketing activities, such as marketing research, promotion or customer relationship management, as well as internal coordination activities, through product managers that follow specific brands and coordinate joint efforts of the units. The individuals have traditional marketing, business and communication skills.

- **Medical Affairs:** Medical Affairs is a unit whose members are responsible for building links with the medical community, go to congresses and engage in exploratory activities to detect new possible trends in the pharmaceutical industry. The employees have different sets of skills and education and are required to have business and communication skills as well as industry-specific knowledge.

- **Packaging:** the unit is responsible for packaging pharmaceuticals. The unit has individuals with different responsibilities, from the packaging operators, to the technicians responsible to set up the equipment, to foremen responsible for scheduling work and controlling its execution.

- **Pharmacy:** the unit is responsible for laboratory analyses and improvement of solutions for the development and adaptation of pharmaceuticals, after the patents are purchased from the laboratory. The pharmacy unit, differently from the Finished Products unit, develops solutions after the patents are bought and before the products are manufactured. It is composed of chemists, biologists and pharmacists.

- **Planning, Purchasing and Distribution:** this is a staff unit responsible for business planning, operational planning, inventory management, distribution, purchase and logistics management. It employs individuals with different skills and education, from buyers who negotiate for the supply of raw materials to analysts responsible for planning inventory and logistics.

- **Production (4):** four production units are responsible for the physical manufacturing of the pharmaceutics. They have sequential interdependence and they are responsible for separate phases of the production process, from the granulation of the chemicals composing the pills to the encapsulation of such chemicals into the pill. The units employ mostly blue collar workers with low levels of education. However, the tasks have diverse levels of complexity and may entail work activities in which mistakes could lead to highly deleterious consequences.

- **Quality (3):** three units are responsible for quality control, quality assurance and quality systems. They are responsible for planning quality practices and defining quality protocols, for the actual and regular inspection and testing of intermediate outputs in the manufacturing phases and for the continuous feedback adjustments, correction of faulty procedures and integration of improvements in current practices. The

units are composed of highly trained specialists as well as individuals with management and communication skills.

- **Raw Materials:** unit responsible for depurating and analyzing the quality of purchased raw materials to be used as input for the manufacturing process.

- **Sales (3):** three units are responsible for "sales" to physicians. In the pharmaceutical industry, companies cannot properly sell products to physicians but can promote the product to increase medical prescriptions. So they indirectly improve sales by influencing the choices of physicians rather than the choices of the final customer. Sales agents build a network of business relationships with doctors to present and promote the pharmaceuticals marketed. The three units are divided by geographical area: West Canada, Central Canada and East Canada. Although general task responsibilities tend to be similar, tasks substantially vary from one unit to another because of diversity in environmental conditions (for instance, the density of population and physicians, the demographics, or the different products to be sold in a specific area).

- **Validation.** The unit is responsible for developing, preparing, revising and executing protocols for the functioning and maintenance of equipment in the plant. It is composed of both engineers and technicians who work in contact with the Engineering unit.

3.2.2. Videogame Company

The second organization that participated in the study is an independent division of a videogame company in North America. The organization is responsible for the development of a brand of videogames. The organization is not responsible for selling videogames or for physically producing the videogames, but it is only responsible for developing the content of the videogames. The organization works by project. Each project is related to the development of a videogame. The videogames are connected to each other and are part of the same brand. When one videogame is completed, the

organization immediately starts working on another videogame which is the sequel of the previous one. All individuals simultaneously work on the development of the same videogame. Each project lasts a couple of years. When the survey was administered, the project was in a middle phase of its development. The project started several months before the administration of the survey and management planned to conclude it several months after the survey.

The organization employs 191 employees clustered into 28 groups. Even in this case, each unit has a supervisor who is responsible for the objectives of the whole group. Similar to the previous organization, in this case the average group size is about 5 members. The company has few hierarchical layers and units may be nested into larger units. For instance, there are 5 units which are responsible for developing the features of the game, and such units are under the same director, who also supervises the other parts of the game. This higher level manager is then under the supervision of the executive producer, who also leads administrative offices and the staff functions.[2] As in the case of the pharmaceutical company, there are individuals who are not assigned to any group. The criteria for the inclusion of groups in Paper 3 are the same used for the pharmaceutical company.

The videogame company is a dynamic organization. However, the company has a clear organizational structure, specific tasks assigned to each individual and clear hierarchical reporting. The organization employs a vast variety of individuals who perform different tasks and have a diverse educational background. I hereby present the general characteristics of the units which compose the organization. It is important to acknowledge, though, that the level of detail for this organization can only be vague. While the pharmaceutical company is structured in a rather traditional way and it is possible to see other pharmaceutical companies structured in a similar fashion, the videogame company constructs its own competitive advantage on the way in which it is structured. Management therefore considers the information about the structure as well as the information about the division of tasks into units to be highly confidential and not to be disclosed. Only generic information which is likely to describe units in most

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[2] Even in this case, the description is a simplification

videogame companies will be presented. Some units are clustered and I will not provide information of the number of units which compose each cluster because the allocation of resources represents a key element that builds the competitive advantage of the company. Furthermore, although those groups of units have rather diversified tasks, for instance the units responsible for game development, I will not discuss their specific responsibilities in order not to disclose important information.

- **Art Teams:** art teams are responsible for guaranteeing the artistic quality of the visual contents of the game. They are not responsible for designing the features of the characters, which are under the responsibility of another unit. They do not specialize in human figures but on all other objects and environments that characterize the game. Individuals generally have an artistic background, but specialize on different tasks, depending on the specific feature they are responsible for.

- **Audio:** the audio team is composed of sound specialists. As for the audio of movies, employees have different specializations and different competences, ranging from artistic/musical competences to technical competences.

- **Brand:** the brand unit provides technical support to the other units, solves problems related to the use of the technical tools for executing the different tasks. It is composed of individuals who have technical competences in the functioning of the platforms used to develop the game.

- **Brand Management:** this unit provides administrative assistance to the other units and facilitates the coordination of units. The tasks of the human resources department are executed in this unit. Employees have business and communications skills.

- **Characters:** this team is responsible for the design of features of the characters in the videogame. Individuals have very different task responsibilities. For instance, one employee can be responsible for the development of a very specific figural element of the characters, and

have a very repetitive job, while another may be responsible for larger body features and movements, having a much more complex job which requires a different set of skills. Employees generally have an artistic background.

- **Design Teams:** the teams design the "backbone" of the videogame. They elaborate the vision of the artistic director and define the core subject of the videogame, offering input for the work of the different units. Since they provide inputs to the other units, employees have diversified skills and competences.

- **Engine Teams:** the engine of a videogame refers to the machinery and software platforms that all other employees use to develop the videogame. The units are responsible for the development, feedback adjustment and continuous improvement of such platforms. The unit is composed of individuals with engineering, programming and industry-specific technical skills.

- **Game Development Teams:** the game development units execute diversified tasks. They take the game designed by the design units and they program the videogame. Programming the videogame requires a set of very distinct task activities, which all require unique sets of skills. Diverse activities have to be programmed, for instance: the movements of the controlled character (such as bending or jumping), the control of the character by the player, the artificial intelligence of the videogame, the movements of uncontrolled characters (such as the villains), the different chains of events triggered by the choices of the player, the interfaces between different players who participate together online in the same adventure. These different programming activities require personnel of diversified artistic, graphical, or programming skills. Within programmers there are several different specializations and degrees of responsibility. The units can also include individuals with managerial competences, necessary to coordinate the different parts.

- **Level Design Teams:** a level in a videogame is a scene in which action unfolds. Videogames are composed of many levels. Each player must complete one level before he or she has access to the following level. A level can be imagined as a mission to be accomplished by the character and the whole game can involve the completion of a dozen missions. The level designers are the architects of the scenes. They design the spaces in which action takes place. Level designers have graphical and technical competences. The level designers are not responsible for the artistic quality of the level, but for creating levels that can exploit the game features specified by game development and design units.

- **Marketing:** the organization is not directly responsible for selling or defining the global marketing strategy of the videogames. Marketing strategies are centralized in the headquarters. However, the unit can develop promotional and advertising material and is responsible for transferring the centralized marketing strategy at the organization's level. Employees have the general marketing skills of a marketing unit in any organization.

- **Story and Events Teams:** the units are responsible for writing the story of the videogame, transforming the story into visual images and "storyboards" and describing in details the events of the story. The units are composed of both artistic and technical employees.

- **Outsourcing:** the outsourcing unit is responsible for linking the organization with the other divisions of the whole company as well as with partner companies which provide services for the realization of parts of the videogame. It is composed of individuals with diversified technical or artistic skills as well as business and communication competences.

- **Presentation:** the presentation in a videogame is the content which is not related to the action in which the player in involved. For instance, the introduction of the videogame, the menu and the transitions between one level and another level. Employees have video, sound and other artistic competences.

- **Quality Control:** the unit is responsible for testing and inspecting the activities performed in all the other units. Employees ensure that the programming activities do not have any bugs or that any graphical and artistic output is perfect.

- **Service:** the unit provides a specific type of service to the other units. The unit also offers administrative staff roles to the other units. Employees have general business and administrative skills.

- **Special Effects:** the unit employs highly qualified specialists for a specific type of visual effects in the videogames.

3.2.3. Job Characteristics

The differences in jobs between the two organizations as well as within each organization are captured by the job characteristics variables, which represent the core task dimensions of jobs. The survey, the interviews and the secondary data provided the information to assess the five job characteristic variables: task autonomy, task variety, task significance, task identity, and feedback from the job. Looking at the self-report measures of job characteristics some interesting characteristics can be identified. The average task autonomy of individuals in the videogame organization (3.81) is similar to the average task autonomy of individuals in the pharmaceutical organization (3.90) [$p = .44$]. Although it is natural to assume that the dynamic videogame organization would leave more autonomy to each single individual it is also true that individuals often work in teams and therefore individual discretion may not always be high. On the other side although in the pharmaceutical company there are blue-collar workers who cannot use any discretion in performing task activities, there are also sales agents who, on the contrary, work in a completely autonomous fashion and can exercise considerable discretion. Likewise, the two companies report a marginally significant difference in their degree of task identity [$p = .055$], for which the pharmaceutical company has an average of 3.69 and the videogame company has an average of 3.45.

Beside the similarities, some interesting differences emerge. Surprisingly, individuals in the pharmaceutical organization (4.29) report more task variety than

individuals in the videogame organization (3.83) [$p > .001$]. In the pharmaceutical organization, blue-collar workers show the lowest variety but they still operate different machines and report some degree of variety. Differently, although tasks may be highly creative in the videogame organizations, several times individuals may perform the very same creative task over and over again. There is surprisingly a higher significance reported by individuals in the pharmaceutical organization (3.93 vs 3.17, $p > .001$), which witnesses how employees may see themselves as performing a job with high social impact. The videogame company also reports lower feedback from the job (3.43 vs 3.93, $p > .001$), which could be dependent on the fact that tasks may entail more uncertainty, ambiguity and complexity.

In both organizations task variety is the variable which has the highest average scores. Both organizations may therefore show above-the-average levels of dissimilarity among activities performed. In the pharmaceutical organization task identity is the variable with lowest scores, while in the videogame organization task significance is the variable with lowest scores. The low task significance reported by the videogame organization is striking, given the nature of activities performed. A possible explanation for these scores could be identified in the comparative nature of assessments about task significance. The videogame organization is a division of a large videogame company. This division is not the one with the largest resources and market. It is possible that employees may feel that they occupy a comparatively less significant job in relation to the job that employees in other divisions do.

Figure 3 provides evidence of the distribution of job characteristic variables studied in this thesis. More specifically, the figure reports the observations of the job characteristics derived from the survey administration. The figure shows that the jobs measured in the two organizations capture substantially distinct characteristics. The job characteristics are reported for the aggregate sample in order to give a general appreciation of the range of scores observed, but even within each single organization, there is substantial variance captured for each single job characteristic. Task significance is the variable which reflects the best normal distribution, with scores well distributed in the normal curve and with an adequate range of scores captured. Task autonomy as well

FIGURE 3 - Distribution of Job Characteristics – *Self-Report*

Pharmaceutical Company

Task Autonomy	Task Variety	Task Significance	Task Identity	Feedback

Videogame Company

Task Autonomy	Task Variety	Task Significance	Task Identity	Feedback
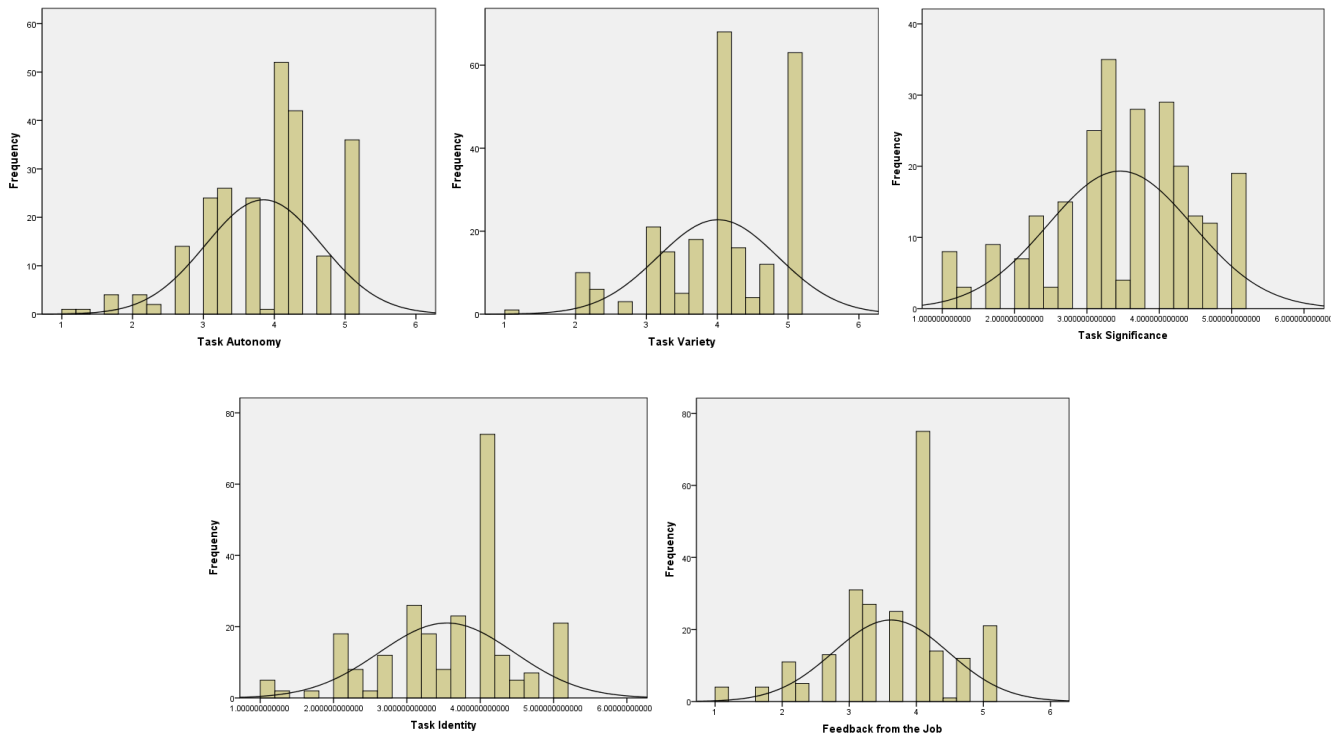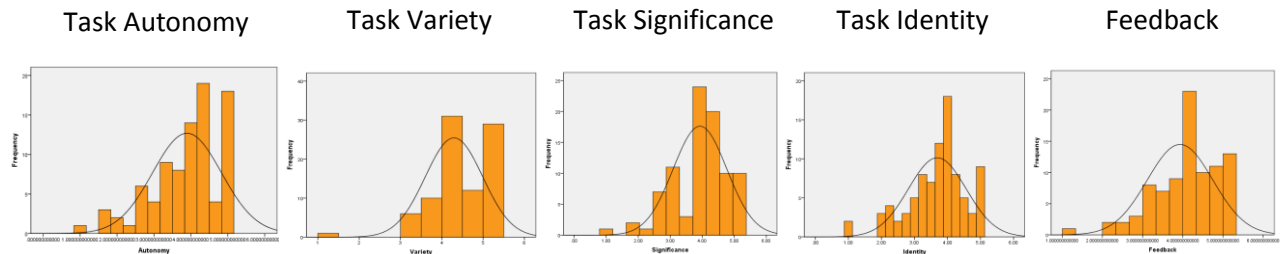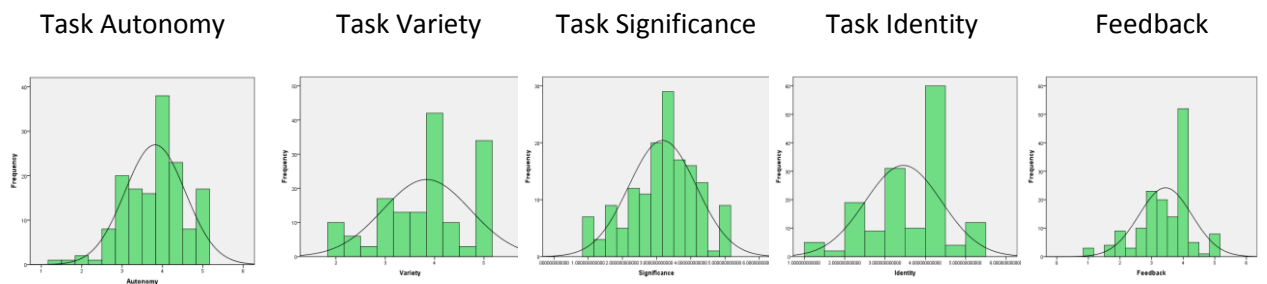
shows a good normal distribution, although the distribution slightly exhibits negative skewness. The other three job characteristic variables have a concentration of observations around the score 4 and therefore exhibit lower variance than significance and autonomy. The lower variance captured still does not create substantial problems when it comes to assessing the predictive value of the job characteristics. A good portion of respondents also reports the highest degrees of task variety. The figure also shows the differences between the distributions in the two sub-samples. There are not particularly high differences between the two organizations, although some dissimilarity can be noticed for task autonomy and task identity.

FIGURE 4 – Distribution of Job Characteristics – *Supervisor*
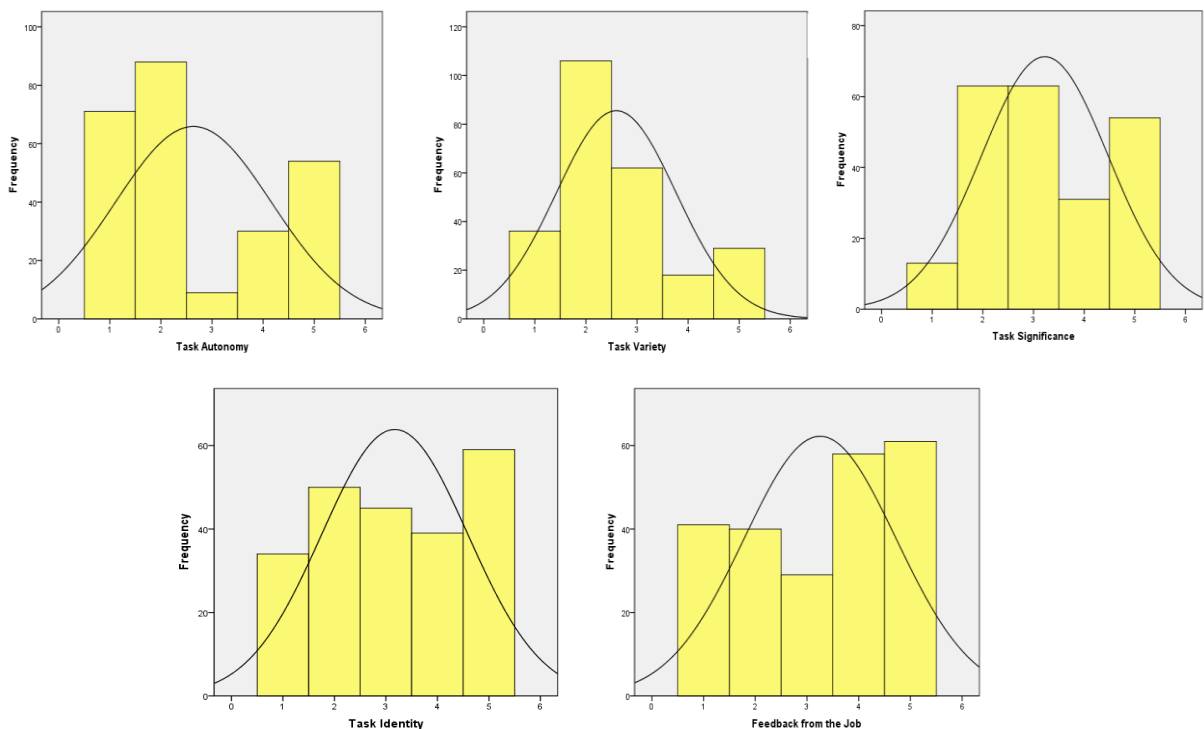
Figure 4 illustrates the distribution of job characteristic variables rated by supervisors. Supervisors are the second source of ratings for job characteristics. Paper 1 includes supervisory ratings along with self-report measures of job characteristics. In general, it is possible to see that the scores tend be more evenly distributed as compared to the case of self-report job characteristics. The variance captured also tends to be

higher, with a lower concentration of scores around the mean. Task variety and task significance show a normal distribution, while the distribution is slightly more rectangular in the cases of task identity and feedback from the job. Task autonomy shows a particular distribution, with observations concentrated around the two extremes and relatively fewer observations near the mean. Task autonomy shows major differences between self-report and supervisory ratings. It is interesting to see that the mean in the distribution of self-report ratings is considerably higher than the mean in the distribution of supervisory ratings. Perhaps this difference is explained by the different points of reference that employees and supervisors consider when evaluating scores. For instance, supervisors tend to have high autonomy and when they rate subordinates, they may tend to see them as having low autonomy as they could implicitly compare them with themselves. Differently, employees may not have the same reference point when self-assessing their own job and may generally report higher autonomy.

FIGURE 5 – Distribution of Job Characteristics – *Coding*
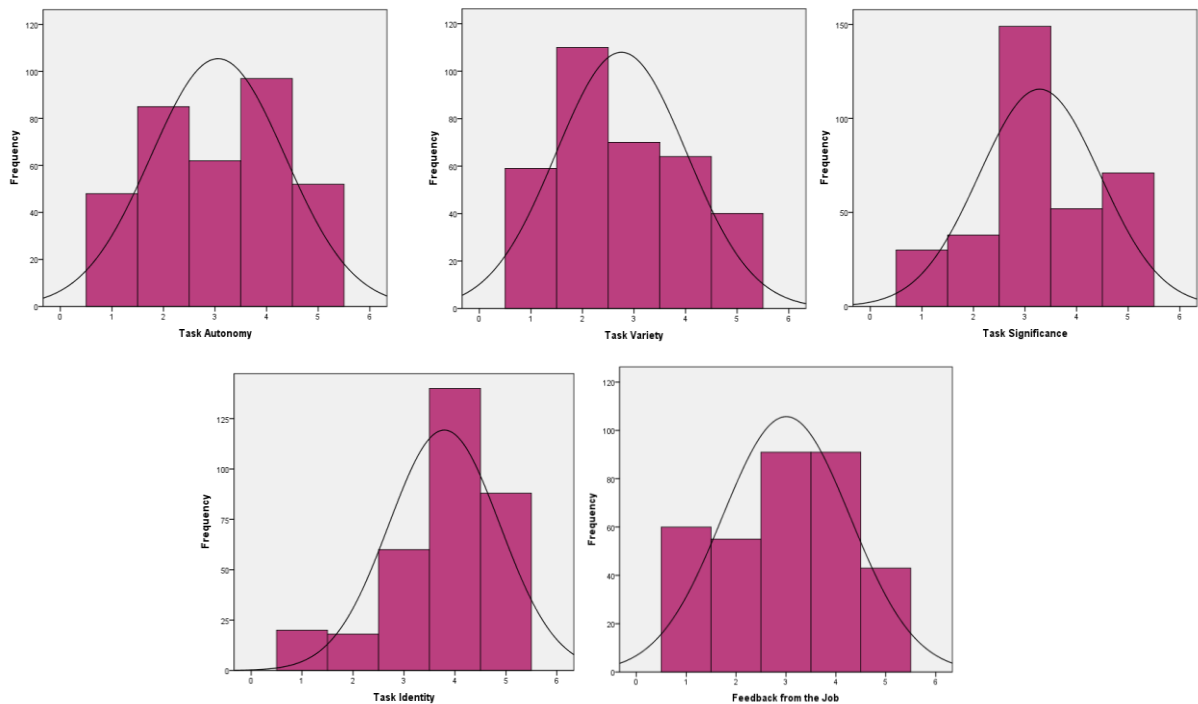
Figure 5 reports the distribution of job characteristic variables measured through job coding. Coding is the third source of ratings for job characteristics. Even in this case, this alternative operationalization of job characteristic variables has been proposed as complement to the others in Paper 1. The distributions in this case tend to follow a normal curve, more than the previous cases. Such distributions also capture substantial variance and are less concentrated around the mean. Task significance is the only job characteristic which shows a substantial concentration of observations around the mean. It is worth noting that coded job characteristics show similarities to the supervisory ratings while being relatively different from the self-report measures.

3.3. Description of Job Crafting in the Two Companies

The job characteristics capture the *structure* of jobs. In this thesis, the interest does not only focus on the structure of jobs but also on the *structuring* of jobs. The structuring of jobs is captured by the job crafting variables, which reflect the proactive behaviors of individuals to alter their tasks. Given that job crafting is the only variable which is present in all three papers and given that it is the new construct that this thesis contributes developing and measuring, some detail is offered to illustrate the possible crafting behaviors observed in the study. The data show that job crafting behaviors were equally captured in both organizations. The videogame company, as expected, is shown to have on average a higher degree of job crafting behaviors as compared to the pharmaceutical company, but the difference is not very high (3.47 *vs* 3.18) [$p =.003$]. Furthermore, there are good variance conditions in both companies, suggesting that in both companies there is a considerable within-company variation in job crafting behaviors performed by employees. I could not obtain qualitative data that provides detailed information on the job crafting practices of individuals in the company and it would not be possible to describe such practices because of the need to comply with the requirements of the contracts signed with the companies. However, it is possible to identify the general categories of job occupations which show higher degrees of job crafting behaviors and speculate about some possible crafting practices which could be

performed by individuals. It is important to acknowledge that job crafting, differently from other proactive behaviors, does not entail large changes with direct consequences for the whole organization, but refers to alterations in the structure of tasks. In the argument of Wrzesniewski and Dutton (2001), even if there are variations in the extent to which individuals engage in job crafting behaviors, such behaviors could ideally be performed for any occupation. In fact, the authors take the example of hospital cleaners or hairdressers to show how crafting behaviors can be performed even in jobs which are certainly not considered to be innovative. Hence, we can see why, although the pharmaceutical company is a mechanistic organization, individuals still exhibit good levels of job crafting behaviors and measuring these types of behaviors is not only relevant to dynamic knowledge-based organizations.

Although some job categories show on average more crafting behaviors than others, there are strong differences within the same job category. Individuals with the same job can report very different crafting behaviors. For instance sales agents in the pharmaceutical company can at the same time have lowest and highest crafting behaviors. This empirical observation is consistent with the hypotheses of the thesis. In fact, although I examine how jobs predict networks and how networks predict crafting I will show that networks do not transfer the effects of networks on crafting. The thesis will show that the networks which are predicted by jobs are not the same networks which directly affect job crafting. Crafting depends on the social context which can be influenced by the job but does not entirely depend on the job. Hence, even in the same job there can be differences in crafting, because there are differences in the social context in which jobs are embedded. However, there is still some evidence directly linking the characteristics of jobs to crafting behaviors and there are some substantial variations across job categories, which allow us to speculate about the possible job crafting behaviors which could be performed in the two organizations.

In the pharmaceutical company, one of the three *sales units* reports the highest degrees of job crafting. It is a unit in which individuals have generally high degrees of autonomy and are tied to others who also have degrees of autonomy. I had a personal interview with the sales director of the company. He told me that sales agents, being

generally unconstrained, tend to alter their tasks, not only to fit the requirements of the physicians they meet, or the necessities of the products to be sold, but to incorporate their personal selling style in the job. They cannot change the final output of their work, which requires addressing physicians, visiting pharmacies and promoting the pharmaceuticals. Yet, they create their own strategy to contact physicians, they can expand their tasks including new ways to build relationships with the pharmacies or they can develop independent promotion plans working with the marketing department. They could also simplify their tasks by removing unnecessary activities if they believe, for instance, that working on some promotional material is useless in some areas. The production unit responsible for the *coating* process of pharmaceuticals is the unit whose individuals report the lowest degree of job crafting. Those individuals have to follow strict protocols, have very reduced and standardized job tasks, do not have the chance to develop sparse or large network relationships with other individuals in the company and are embedded in networks where individuals are also very constrained. It is reasonable to expect that in this environment, altering tasks is more difficult, although, as Wrzesniewski and Dutton (2001) point out, even such constraining environment could hide opportunities for altering tasks.

In the videogame company, the unit whose individuals report the highest degree of job crafting is *brand management*. Individuals in the unit occupy a good central position in the whole company and are linked to many other units. I also personally interviewed a manager in the brand management unit. He says that the unit continuously adapt as a function of the changing needs associated with the videogame in stage of development. However, the unit does not simply respond to the needs of the other units, but it proactively anticipates the activities which could create value for the realization of the game. The brand management employees are responsible for developing new practices which facilitate the smooth coordination among different groups. Single units are often incapable of understanding what this staff unit could do to help them, so employees get information from their rich social environment to derive new approaches and offer solutions to guide the units. The unit whose employees report the lowest degrees of job crafting is *special effects*. This unit is responsible for developing a class of high technical visual effects to include in the videogame. The work of this unit is very

important to clarify the meaning of job crafting and its fundamental difference with creative behaviors. The special effects unit performs very creative behaviors in which highly skilled artists with technical competences develop visual effects for the videogames. However, although their job is highly creative, they do not change it. They use the same types of software to execute their tasks and, although across videogames the outputs that they produce are highly diversified, the tasks that they perform are similar. This is an important characteristic which distinguishes job crafting from creative behaviors. A novelist performs highly creative behaviors which can be traced in innovative novels as outputs of his work. However, the work tasks that a novelist performs each time he writes a novel are exactly the same.

Figure 6 shows the distribution of variables for job crafting. Given that this variable is relatively more important than others and it is the only variable whose scale has been developed specifically by this thesis, I report the distribution of the overall sample, as well as the distribution in each of the organizational subsamples. The differences across distributions are important to show in order to evaluate the extent to which job crafting behaviors are present in completely different organizations and are therefore worthy to study in diverse organizational environments. It is relevant to observe that job crafting is the variable which shows the most normally distributed observations across all variables of the study, confirming the adequacy of the measurement instrument developed in the thesis. Normal distributions are also observed in each of the two organizational subsamples. The pharmaceutical organization shows a relatively more irregular pattern of distribution in the observations, with a high peak of responses on the score 2. The videogame organization shows a normal distribution with a modest negative swekness. Overall, the distribution of observations in job crafting behaviors seems ideal for empirical testing in the present study.

FIGURE 6 – Distribution of *Job Crafting*

Videogame Organization
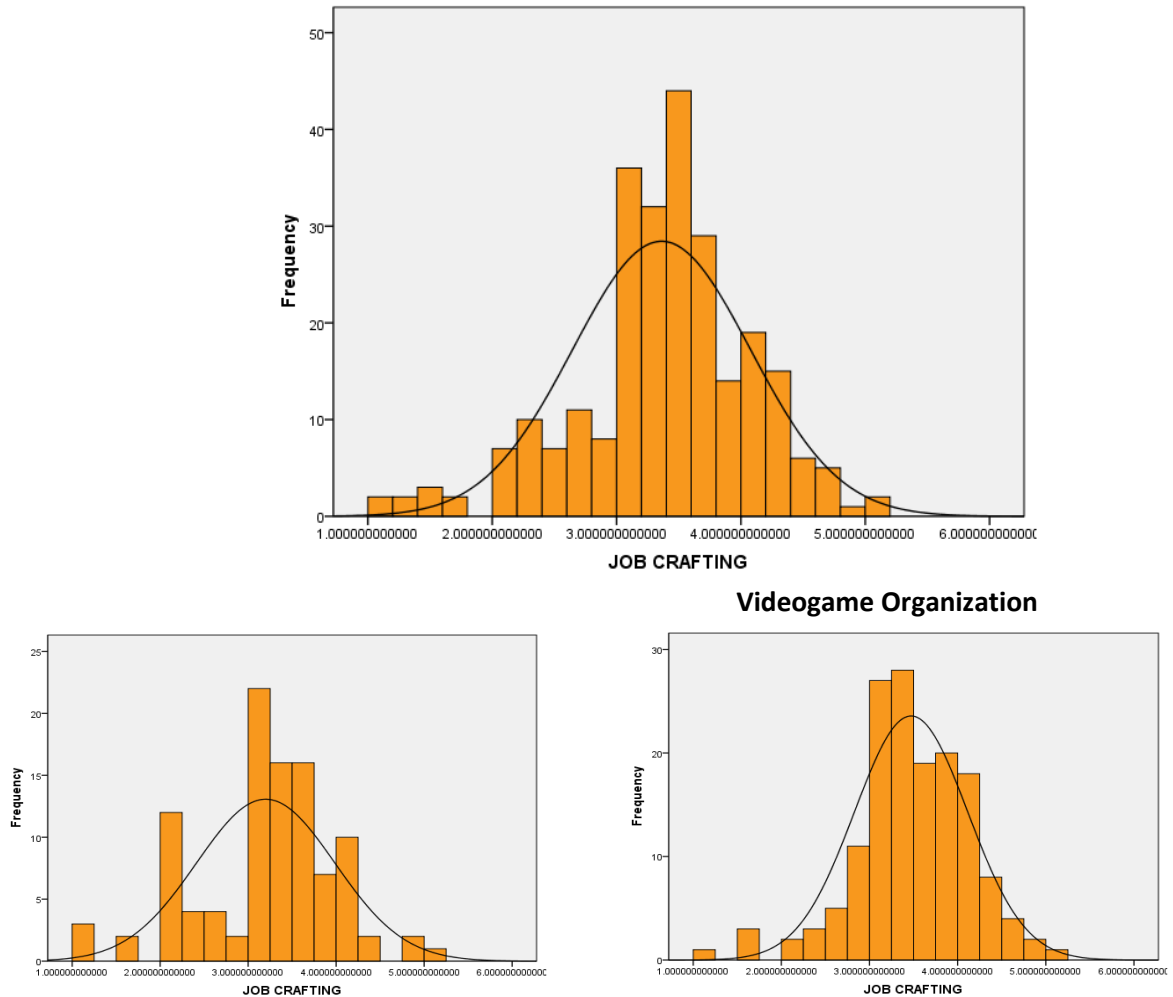
3.4. Description of the Structure of Networks

3.4.1. Network Size

After having illustrated the structure and structuring of jobs, it is relevant to discuss the structure of networks. Networks play an important role in the thesis because they are assumed to interplay with jobs both predicting and being predicted by them. The network variables were collected through the name generator survey. An important first indicator to have a general understanding of the networks in the two organizations

is the *network size*, or degree centrality, simply conceptualized as the number of ties individuals reported to have in the organizations. This indicator may not give an appreciation of the position an individual occupies in the network of relationships but it gives a general understanding of the extent of connections every respondent has in the organization. Figure 7 provides an indicator of respondents' number of ties. The number of ties is weighted by the tie intensity according to different intensity thresholds considered. The numbers in the horizontal axis have to be interpreted as the intensity threshold considered (so, for instance, the 3 indicates the number of ties having intensity 3, 4 and 5). The first important element to notice is that for all thresholds except for threshold 4, the difference between the two organizations is not significant. In other words, individuals in the two organizations seem to have the same average number of relationships. This factor is beneficial for the analyses because the samples do not seem to be substantially heterogeneous and social dynamics could somehow be comparable across organizations. Another element that appears is that individuals in the pharmaceutical company have slightly more relationships than individuals in the videogame company. This indicator may seem particularly surprising since a mechanistic organization has more relationships than a dynamic, organic organization. However, there is a reason behind this result. The network survey measures *stable* network relationships, developed at least 6 months before the completion of the survey. The mechanistic organization is likely to have substantially more stable relationships, while the organic organization is likely to have more dynamic and continuously changing relationships. In fact, if we look at Figure 7 we can see the average number of new ties, built within the most recent six months. Here we can see that the videogame company has considerably higher number of new ties as compared to the pharmaceutical company. In the case of the lowest intensity threshold the videogame company has 7 times more new ties than the pharmaceutical company. It is also interesting to notice that in the videogame company the difference between the new ties and the stable ties is rather small, while this difference is very large for the videogame company.

FIGURE 7 – Number of Ties per Respondent
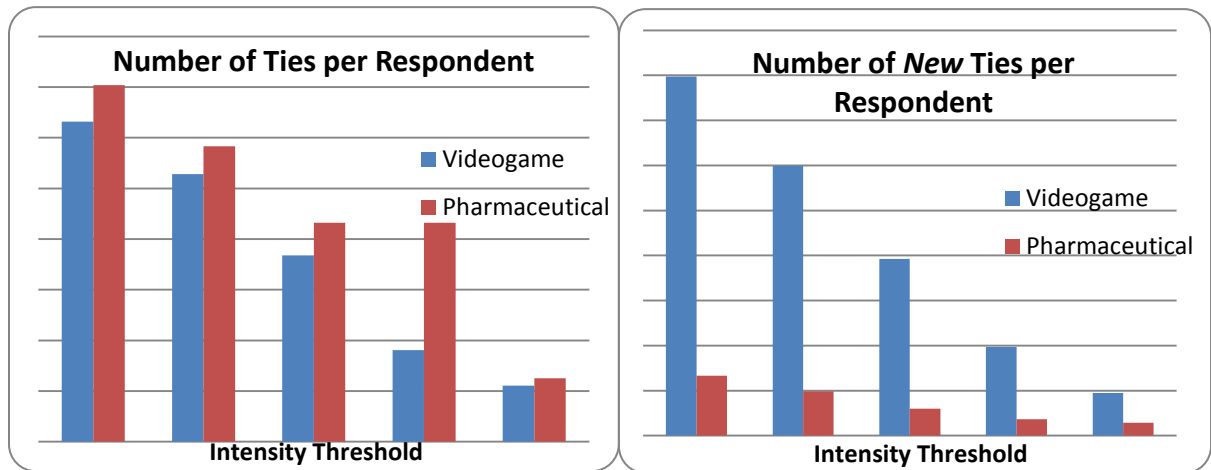
3.4.2. Network Centrality – Betweenness vs Eigenvector

In Paper 2 of the thesis I develop hypotheses showing the divergent predictive validity of two different centrality measures: betweenness and eigenvector centrality. Betweenness centrality refers to the extent to which an individual serves as "go-between" for others, lying on the shortest path that connects any two other individuals in the organization (Freeman, 1979). Differently, Eigenvector centrality captures the extent to which an individual is tied to alters who are themselves tied to many others (Bonacich, 1987). It is therefore a centrality indicator built on the centrality of alters.

Although the variables are conceptually different and are intended to capture distinct phenomena, they tend to be significantly and positively correlated. It is in fact often possible that an individual who is tied to others who are themselves well tied has many more occasions to fall into the shortest paths linking nodes of a network than an individual who is tied to relatively unconnected others. The correlations tend to be smaller for highly clustered networks, where it is more possible that someone falls in shortest paths even if he or she is not tied to well-connected other and where having high eigenvector position could not be sufficient to reach the clusters in the network. Table II shows the correlation matrix of betweenness and eigenvector measures in the whole dataset as well as in the sub-samples of the pharmaceutical and the videogame company. It can be seen that one of the reasons why the pharmaceutical company was chosen for the empirical testing of Paper 2 is that the correlation between betweenness

TABLE II – Correlations between Betweenness and Eigenvector Centralities

Correlations

Full Sample

	Bet1	Bet2	Bet3	Bet4	Bet5	Eig1	Eig2	Eig3	Eig4	Eig5
Bet1										
Bet2	.897**									
Bet3	.796**	.905**								
Bet4	.699**	.774**	.824**							
Bet5	.476**	.541**	.628**	.700**						
Eigen1	**.598****	.577**	.519**	.537**	.466**					
Eigen2	.564**	**.575****	.529**	.556**	.492**	.974**				
Eigen3	.493**	.514**	**.527****	.541**	.524**	.888**	.940**			
Eigen4	.454**	.462**	.470**	**.545****	.527**	.795**	.839**	.915**		
Eigen5	.246**	.259**	.286**	.305**	**.511****	.585**	.606**	.664**	.602**	

Pharmaceutical Organization

	Bet1	Bet2	Bet3	Bet4	Bet5	Eig1	Eig2	Eig3	Eig4	Eig5
Bet1										
Bet2	.841**									
Bet3	.782**	.911**								
Bet4	.540**	.667**	.717**							
Bet5	.438**	.571**	.667**	.847**						
Eigen1	**.418****	.416**	.375**	.443**	.359**					
Eigen2	.361**	**.393****	.357**	.449**	.379**	.978**				
Eigen3	.269**	.308**	**.305****	.436**	.388**	.898**	.953**			
Eigen4	.118	.161	.163	**.363****	.347**	.684**	.760**	.878**		
Eigen5	.142	.188*	.210*	.448**	**.461****	.592**	.666**	.769**	.796**	

Videogame Organization

	Bet1	Bet2	Bet3	Bet4	Bet5	Eig1	Eig2	Eig3	Eig4	Eig5
Bet1										
Bet2	.963**									
Bet3	.816**	.893**								
Bet4	.655**	.692**	.712**							
Bet5	.513**	.533**	.619**	.720**						
Eigen1	**.755****	.745**	.679**	.664**	.555**					
Eigen2	.749**	**.772****	.728**	.713**	.588**	.970**				
Eigen3	.706**	.747**	**.796****	.732**	.642**	.878**	.926**			
Eigen4	.607**	.616**	.651**	**.724****	.638**	.696**	.731**	.835**		
Eigen5	.332**	.327**	.369**	.379**	**.556****	.575**	.545**	.557**	.444**	

**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).

and eigenvector is significant but not so high as to create serious multi-collinearity concerns. On the other hand, the correlation between the two centrality measures in the videogame company is very high and it makes it prohibitive to detect the unique variance explained by each of the dimensions. The relatively lower correlation between eigenvector and betweenness centralities in the pharmaceutical company may raise some generalizability concerns. The unique portions of variance explained by betweenness and eigenvector centrality may not be testable in all organizations. However, it is worth noting that the difference between the correlations in the videogame sample and the correlations in the pharmaceutical sample tend to be lower for the high-intensity threshold – the threshold used to test the empirical model in Paper 2.

Figure 8 enables us to illustrate graphically the difference between betweenness and eigenvector centrality. The Figure shows the whole network of the pharmaceutical company with a medium-high intensity threshold. Note that individuals are excluded from the network if they do not report ties with the intensity threshold considered for the graph. For instance, some sales agents do not report regular daily exchanges with other employees in the company and therefore are excluded from a network which shows regular daily exchanges. Individuals with the highest betweenness centrality are those in green, while individuals with highest eigenvector centrality are those in red. First of all, it is important to notice that among all individuals in green and in red, only two occupy managerial roles. This feature shows how individuals at the core of the social networks of an organization are not necessarily those with higher hierarchical positions. The figure also shows that individuals with high betweenness and individuals with high eigenvector centrality are not the same. As the figure shows, individuals may be at the center of the flow of information that bridges two distant parts of the organization, but not necessarily be directly tied to central individuals. As is shown in the figure, individuals may belong to a dense cluster in which everyone is embedded in a very rich network, gaining eigenvector centrality, but they may not be in the midst of the information flow reaching peripheral and distant parts of the organizational network.

There are certain individuals who have high betweenness centrality but have relatively low eigenvector centrality. For instance, individuals in Medical Affairs and

FIGURE 8 – Whole Network in the Pharmaceutical Company

High Betweenness Centrality   High Eigenvector Centrality
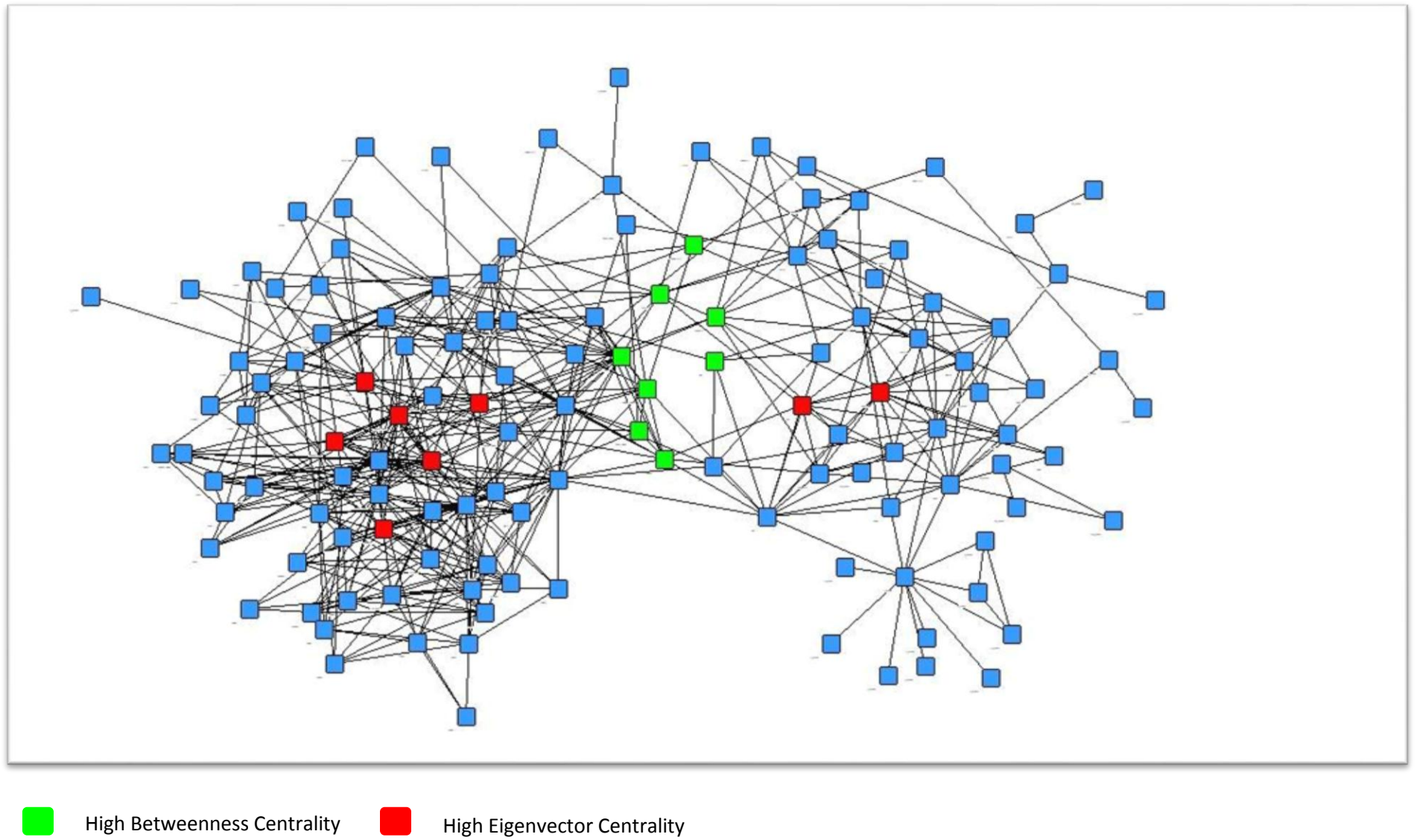
individuals in Planning, Purchasing and Distribution have fundamental liaison roles in the organization, linking the different parts of the organization together. Specifically, the Medical Affairs individuals have a core role in linking the sales, marketing and business development groups with the quality and production groups. Such individuals do not have ties with particularly central individuals but they strategically position themselves in the midst of the information flow becoming important for the circulation of information in the company. They also do not have any hierarchical power over the individuals they are tied to, showing that betweenness may not be the simple result of hierarchical position. Because of their betweenness centrality individuals can give access to much diversified information while being capable of controlling the flow of information that circulates in the organization.

There are individuals who have high eigenvector centrality but have relatively low betweenness centrality. Individuals in Marketing or Quality Assurance tend to have very high eigenvector centrality, although they do not have high betweenness. A few individuals in dense units, such as production units (encapsulation) or even packaging may occupy positions with high eigenvector centrality. Last, individuals in the very same unit, such as Planning, Purchasing and Distribution, may have either high betweenness or high eigenvector centrality. Individuals with high eigenvector centrality, such as those in Quality Assurance, may gain a position of prominence in the organization. Note that even in this case, such individuals do not occupy managerial positions but gain their advantages or disadvantages directly from their network position and not from their hierarchical structure. Furthermore, it is not necessarily the nature of tasks performed that allows individuals in the unit to occupy eigenvector positions because within the same unit individuals having the same job exhibit very high variation in eigenvector position.

Figure 9 illustrates the whole network of the videogame company. As before, only the medium-high intensity threshold is represented. In this case, we can see that there is some overlap in the individuals having highest betweenness and individuals having highest eigenvector centralities. While the whole network of the pharmaceutical company is divided into two macro clusters, the whole network of the videogame

FIGURE 9 - Whole Network in the Videogame Company

High Betweenness Centrality   High Eigenvector Centrality   Both High Betweenness and High Eigenvector Centrality
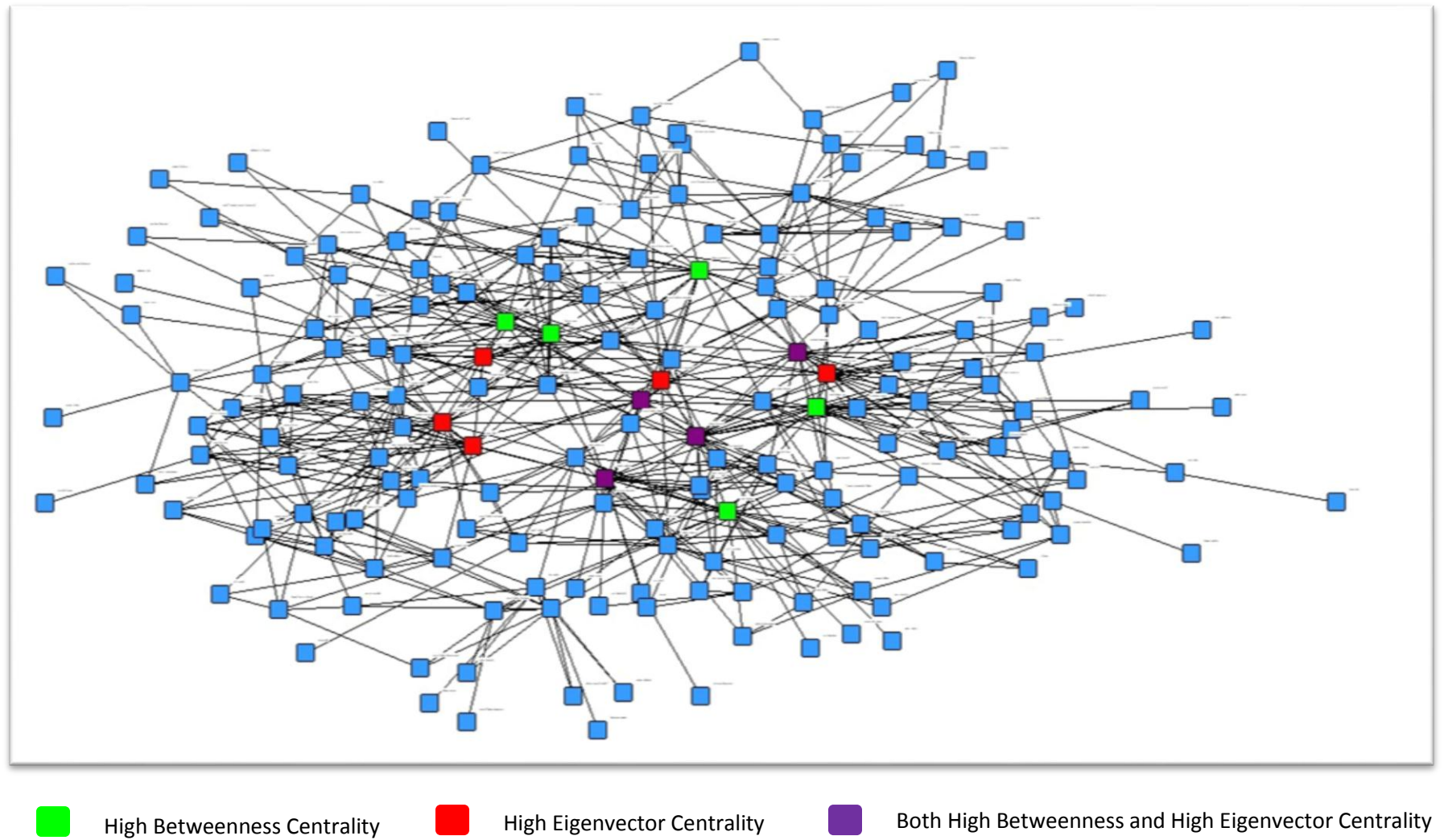
company is denser, although there are 4-5 core clusters. From the figure it is more difficult to discern why some individuals occupy high betweenness or high eigenvector centrality. It is interesting to note that central individuals are spread around the network and not close to each other. The individuals with high betweenness centrality are not close to each other as in the case of the previous organization. Many individuals with high betweenness do not have more ties than others but they are positioned in an area of the network crucial for accessing one or more separate clusters. Although there is some overlap between eigenvector and betweenness centrality there are still some observable differences between the variables. Some individuals may be very central in their cluster and gain eigenvector centrality but they do not have any unique access to other parts of the organization, showing lower betweenness centrality.

Figure 10 shows the distribution of the betweenness and eigenvector variables. The distributions of variables for all thresholds of intensity are represented because the difference in the patterns of data is likely to explain the empirical evidence collected in Paper 2. As it is possible to see, the centrality variables are not normally distributed and they exhibit a significant degree of positive skewness. Many individuals generally have similar and low centrality measures, while few individuals have high or even very high centrality measures. This distribution is indeed a limitation of the research. Such positive skewness tends to be a condition quite common in network studies (Newman, Watts & Strogatz, 2002). We can clearly see that the variance conditions tend to be better for lower intensity thresholds as compared to higher intensity thresholds, which capture substantially less variance. In the case of betweenness centrality, the range of scores increases with larger intensity thresholds because in sparser networks there are fewer routes for the information and therefore few central individuals find themselves between many shortest paths because there are few alternative ways for the information to flow. Differently, in denser networks there are many alternative routes for information and a single individual has more difficulty in becoming the best option for many others in the network. The different variance conditions for the intensity thresholds affect the findings on Paper 2. The discussion section at the end of the thesis will address the limitation stemming from the distribution of centrality measures and will provide an explanation of the methodological choices adopted in the thesis.

FIGURE 10 – Distribution of Network Centrality Variables – *Paper 2*

Betweenness Centrality   **Eigenvector Centrality**
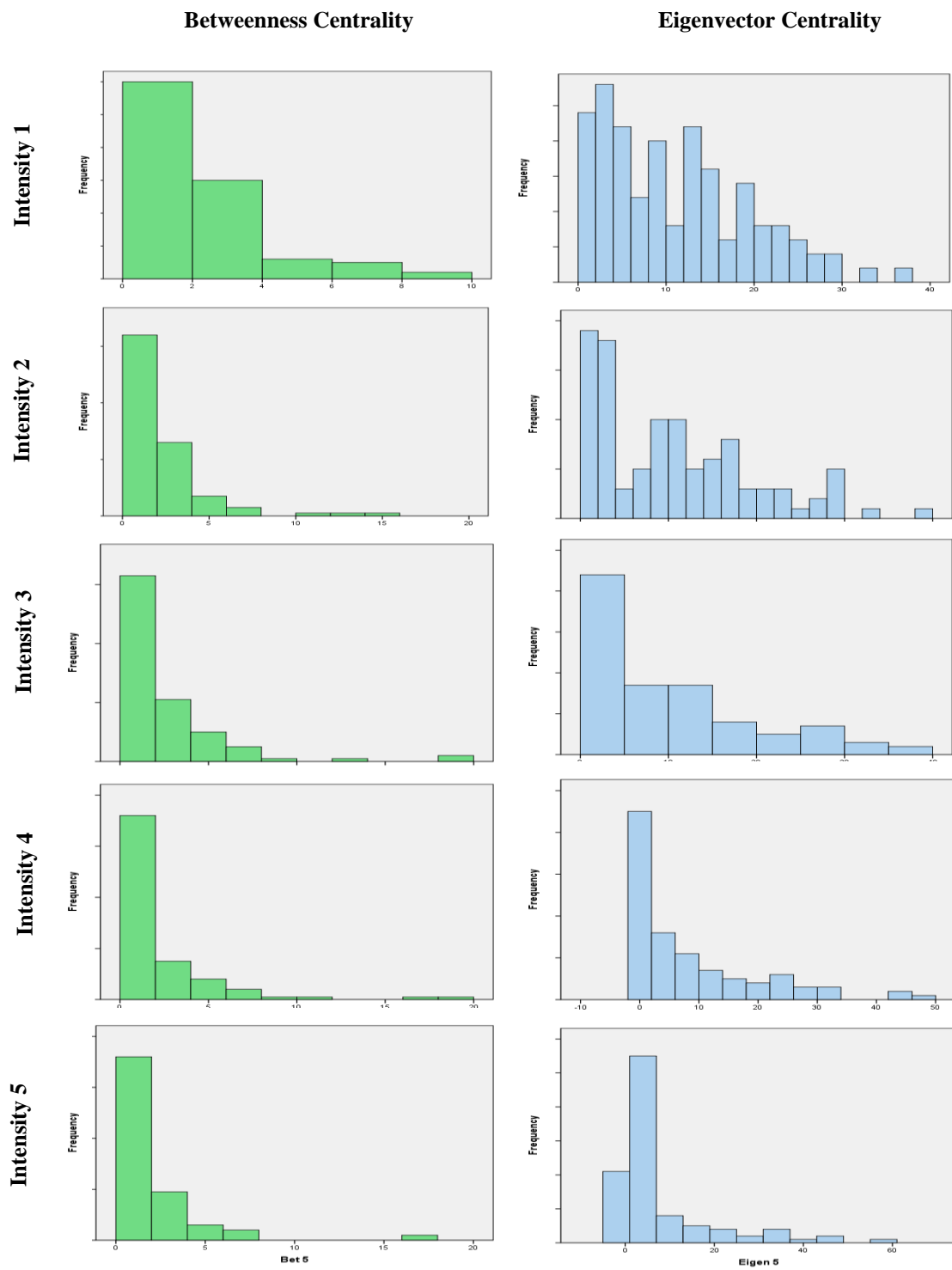
3.4.3. Structural Holes

Paper 1 focuses on the variable of structural hole positions. An individual occupies a structural hole position when he or she bridges otherwise unconnected individuals (Burt, 1992). The lack of connection between a pair of actors is defined as a structural hole and an individual can exploit bridging opportunities stemming from this lack of direct connection among those two actors. It is important to specify that a structural hole position is a position built on the local structure of an individual, called its network neighborhood or its ego-network. The ego-network considers the ties of the individual with his or her alters and the ties among those alters. It does not consider all the ties that alters have but only the ties among ego's alters. The limitation of the structural hole concept is that, since it builds only on the ego-network, it does not account for the fact that individuals could be bridged by others who are outside the ego-network, because they are not tied to ego. However, Burt (1992; 2007) developed a compelling argument on the importance of focusing on the local structure and provided supporting evidence for the explanatory value of local structures.

FIGURE 11 – An Individual Occupying a Low Structural Holes Position
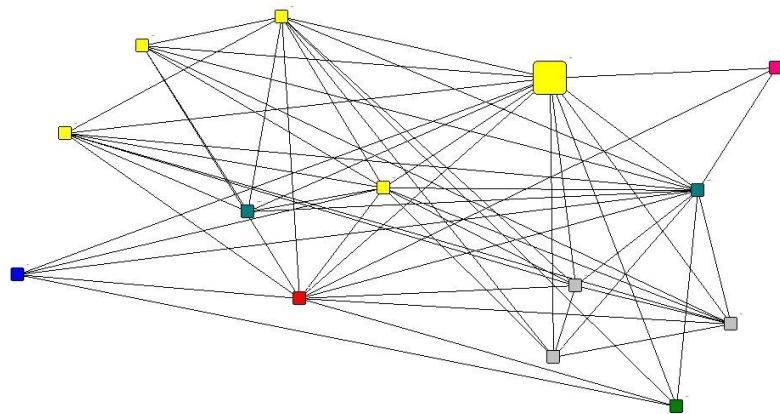
See Figures 10 and 11 for a graphical illustration of the concept of structural holes. These figures report the ego-networks of two individuals with rather similar number of connections but a different structure of the ego-network. The color of the nodes is indicative of the group each node belongs to. The name of the group is not illustrated to avoid disclosing information, given the detail of information provided in

the figure. The ego is the node with larger size. The central or peripheral position the ego occupies in the ego-network is a general indicator of the centrality in the flow of information. Figure 11 shows the ego-network of a videogame programmer in the videogame company, who has tasks with rather low variety and high feedback from the job. We will see in Paper 2 that those characteristics have divergent effects on the formation of structural hole positions. We can see that the ego-network is substantially dense and that individuals in the ego-network tend to have many direct connections with each other. The programmer does not occupy a central position in the ego-network and there are many alters who have several ties and occupy relevant roles in the local structure.

Differently, Figure 12 shows the case of an individual in the human resources department of the pharmaceutical company. The individual is not the same considered when discussing the betweenness centrality. This individual reports high levels of task autonomy and task variety which, as we will see, are supposed to lead to the formation of structural hole positions. We can see that the individual is particularly central in the ego-network and is tied to separate clusters of alters. There are therefore considerably more chances of spanning structural holes in the ego-network.

FIGURE 12 – An Individual Occupying a High Structural Holes Position
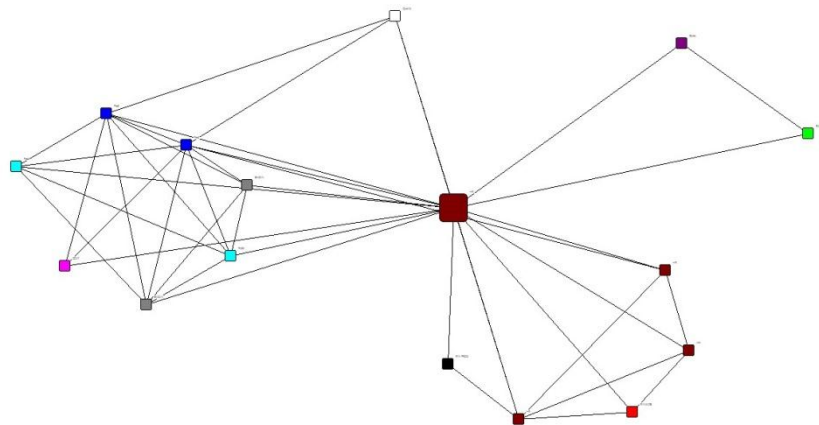
Figure 13 shows the distribution of the constraint variable at the individual level of analysis, used as control variable in Paper 3, while Figure 14 shows the distribution of the effective size variable used as independent variable in Paper 1. The figure also

shows the distribution of the two effective size variables constructed from the ego-networks of individuals on the basis of alters' degree of job crafting. These variables have been used in Paper 1 to illustrate the combination of structural holes and alters' characteristics in the prediction of individual job crafting. Note that the constraint variable used in Paper 3 and here reported refers to the intensity threshold 3, while the effective size variables used in Paper 1 and here reported refers to the intensity threshold 2, accordingly to the thresholds used in the papers. The constraint variable shows a normal distribution, which is particularly rare to find in network variables. Differently, the effective size variables show a logarithmic distribution. It is quite common to find variables which are not normally distributed when studying structural holes (Burt, 1992). The two operationalizations of the structural hole construct show their main difference in the distribution of observations. Although the variables tend to be highly correlated (from -.73 to -.83 depending on the threshold of intensity considered) they show considerable differences when it comes to the distribution of observations. Such differences may be explained by the *relative nature* of the measures captured by the effective size construct. As explained in the methodology chapter and in Paper 1, effective size measures the extent to which individuals have *comparatively* more ties in their ego-network than their contacts. Several individuals do not have any comparative advantage with respect to their ties. The larger the advantage becomes, the fewer individuals have it. The constraint measure does not have the same properties as the effective size variable and leads to a different operationalization and consequent distribution.

FIGURE 13 - Distribution of Structural Hole Variable (Constraint) – *Paper 3*
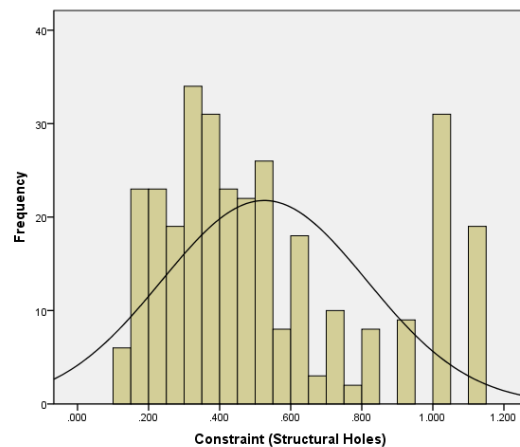
FIGURE 14 – Distribution of Structural Holes Variables (Effective Size) – *Paper 1*
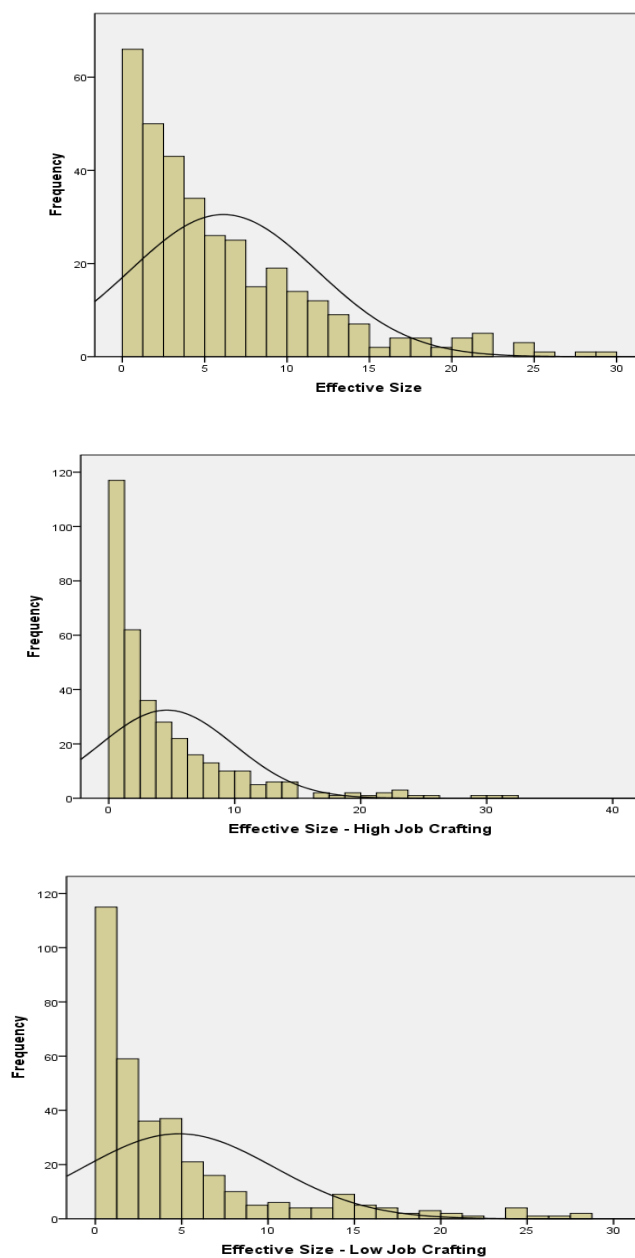
3.4.4. Network Composition

Network composition variables represent the third category of variables studied in this thesis. Network composition is intended as the aggregate attributes or characteristics of the contacts an individual is connected to. In the thesis network composition variables appear in Paper 1 and in Paper 2. Paper 2 is the article which gives more importance to network composition variables, studying how the job characteristics of network contacts are capable of exercising a predictive role on job crafting above and beyond the role exercised by the job characteristics of the individual himself or herself. In order to facilitate a better understanding of the concept of network composition, we can observe differences in the networks of individuals reported in Figure 15. The figure focuses on task autonomy as network characteristic. The colors in the figure are representative of the degrees of task autonomy of nodes: brighter colors in the figure represent individuals with lower task autonomy while darker colors represent individuals with higher task autonomy. The figure shows the case of two individuals who perform the exact same job in the exact same unit. The main difference between the two individuals is represented by the composition of their networks. The individual on top has 50% contacts with low autonomy and 50% contacts with medium autonomy. The individual at the bottom has one third contacts with low autonomy, one third contacts with medium autonomy and one third contacts with high autonomy. The latter individual has therefore a higher average degree of alters' task autonomy as compared to the former. This second individual shows substantially higher degrees of job crafting than the first individual, according to the prediction in Paper 2. The logic, here simplified, is that the autonomy of an ego's contacts enables the crafting behavior of such ego beyond the autonomy of ego's job. A further confirmation to this logic can be seen by the fact that in the figure represented, the first individual has higher job autonomy than the second individual. Nevertheless, thanks to the enabling effect of the network composition, this second individual is capable of performing higher job crafting behaviors.

FIGURE 15 – Network Composition

Lower Network Autonomy

Higher Network Autonomy
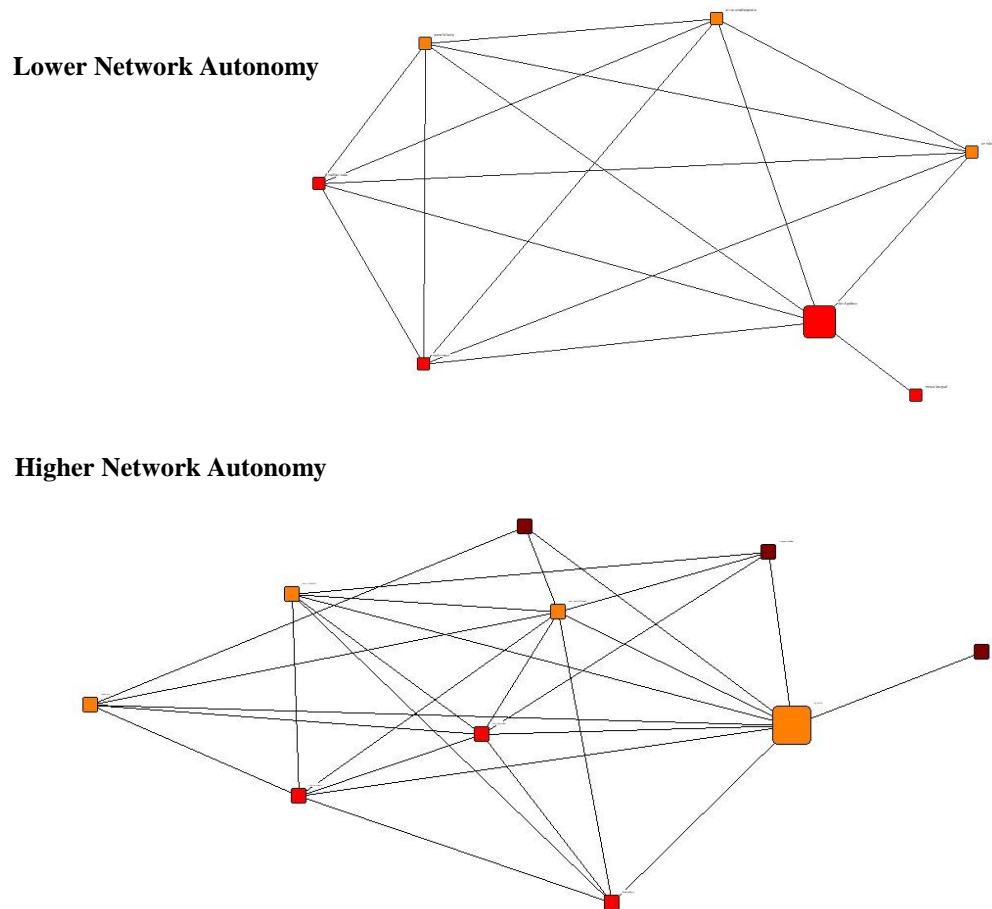
Figure 16 reports the distribution of network job characteristic variables in Paper 2. The intensity threshold considered to measure the five variables is the highest, in accordance with the operationalization of the constructs in Paper 2. As we can see from the figure, all five variables tend to show good normal distributions. It is relevant to acknowledge that the distribution of network job characteristics is actually better than the distribution of individual job characteristics. In other words, the condition of normality in the distribution of observations is better respected in the network job characteristics as compared to the individual job characteristics. Network task variety is the only variable which represents a certain degree of swekness and which shows a good portion of observations with the highest scores. However, also the individual job characteristic variable of task variety shows a similar pattern, with several respondents reporting highest degrees of variety.

FIGURE 16 - Distribution of Network Job Characteristic Variables – Paper 2
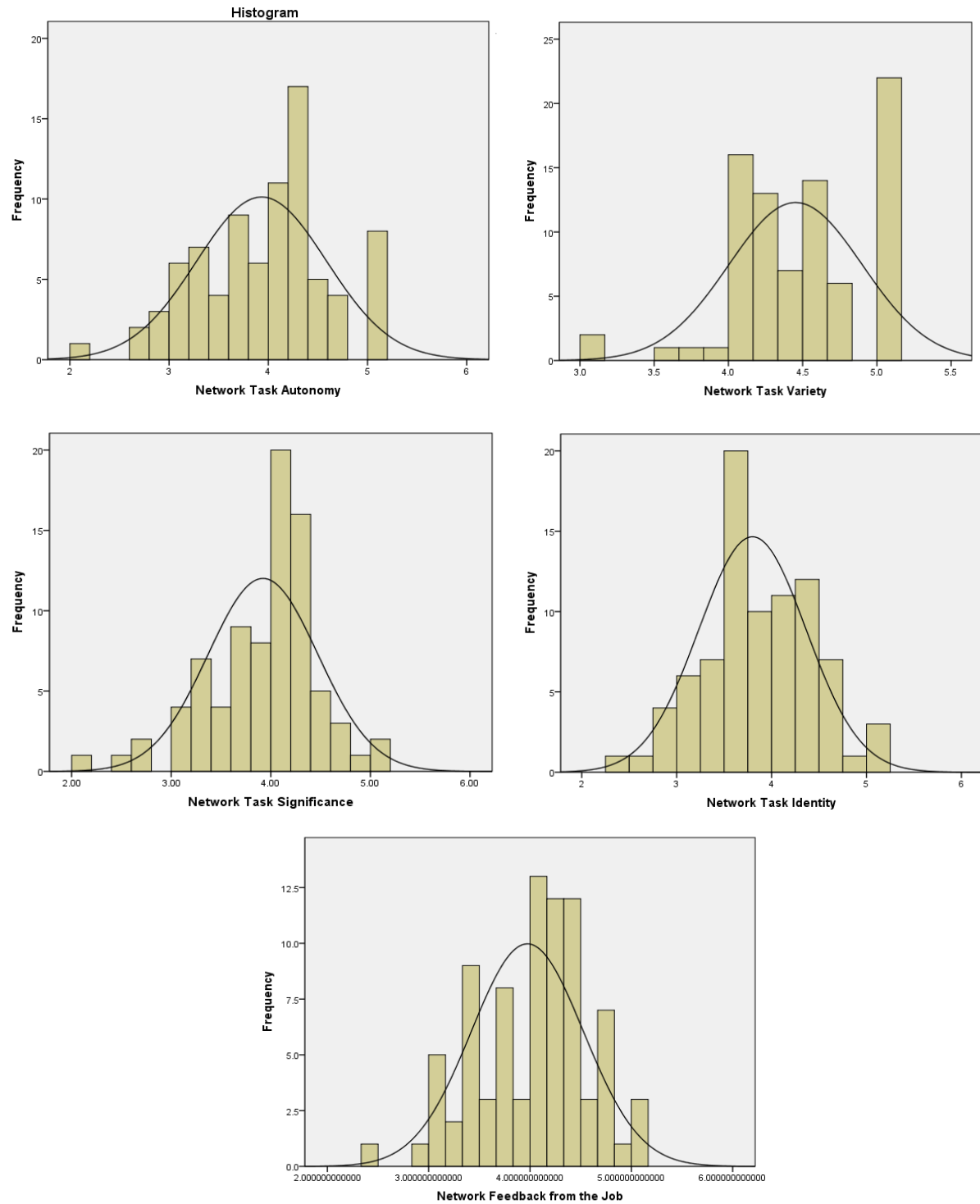
3.4.5. *Group Network Characteristics*

Paper 3 focuses on network characteristics aggregated at the group level. More specifically, the paper considers the group-level mean and the group-level variance in individual structural hole positions. I illustrate in Figure 17, Figure 18 and Figure 19 three cases of units with different group-level network characteristics. The three cases represented refer to the three specific situations discussed in Paper 3. The units were chosen because of their dissimilarity in structure but also because of their relative similarity in group size and in group-level average number of ties, so that the differences in structure could be easier to observe. Larger units or units with too many average contacts were avoided because the picture becomes too dense in relationships, the ties cannot be easily distinguished and it is relatively more difficult to observe the differences among individuals. All figures refer to units in the videogame company.

FIGURE 17 – Group Network Structures: High Group-Level Mean

Ego-Network
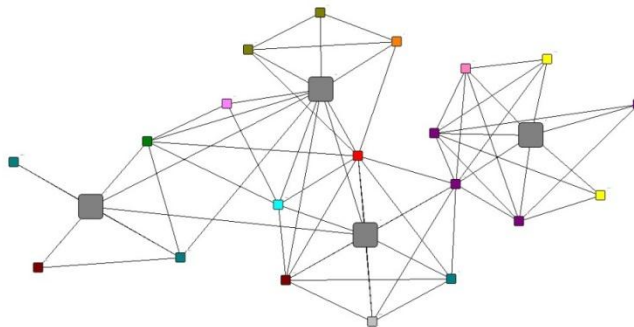
Direct Network Ties
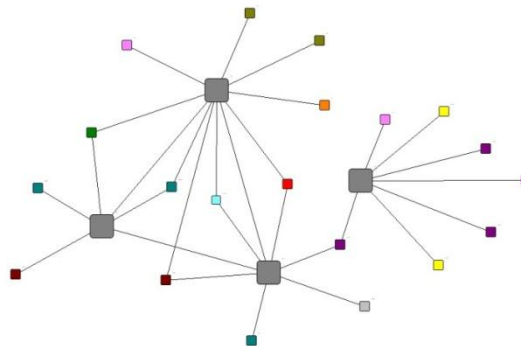
Figure 17 shows the case in which there is high group-mean in structural hole positions. In other words, all individuals occupy high structural hole positions in the group. The unit represented is the unit responsible for outsourcing to external divisions of the company. In the unit, individuals deal with separate sections of the working environment and all exercise strong brokerage roles within the unit and within the whole organization. The figure shows two networks. On top, there is a network showing the aggregate ego-networks of the group members, while at the bottom there is a network showing exclusively the direct ties of the group members and is useful to see how members broker information from outside the group to inside the group. We can see that there are separate clusters of external individuals and although each single individual does have overlapping ties he or she also spans good brokerage opportunities linking otherwise unconnected individuals. All individuals have many ties and those ties tend to be relatively unconstrained. In the figure at the bottom it is possible to see how the group members have very few overlapping ties and each individual brokers the external individuals with the other group members.

FIGURE 18 – Group Network Structures: Low Group-Level Mean

Ego-Network

Direct Network Ties
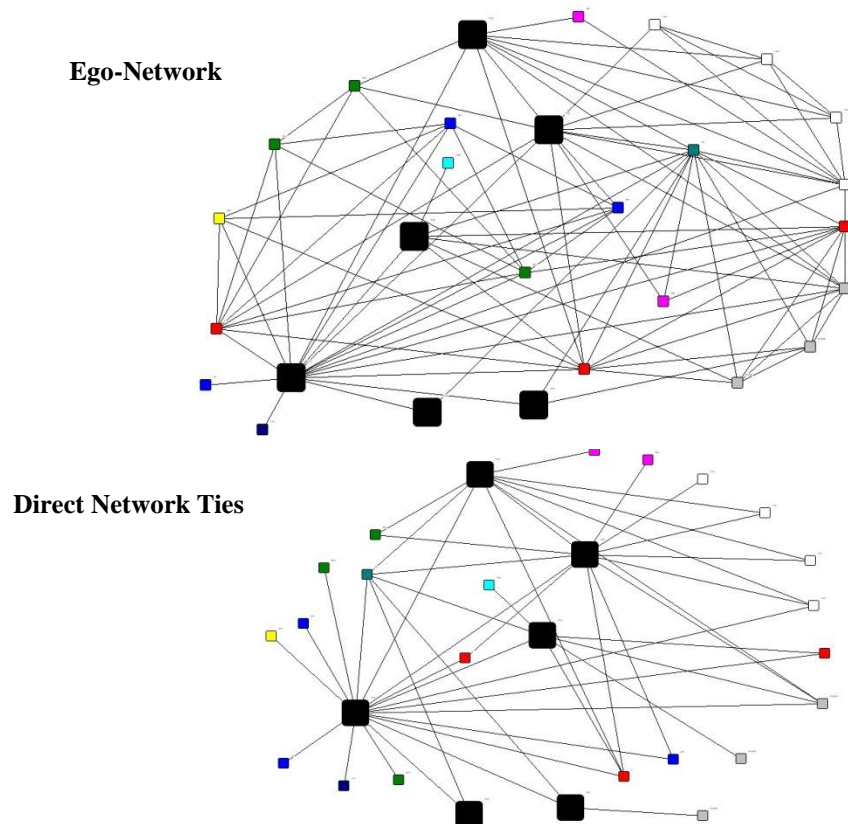
Figure 18 shows the case of a unit with low group-level mean in structural hole positions. The unit represented is one of the Engine units. As we can see from the graph on top, the relationships of the individuals in the unit tend to be substantially overlapped. The average number of relationships in this unit is not much different from the average number of relationships in the previous unit, but we can see how connections tend to be much more overlapped and ties significantly intersect with one another. It is also possible to see that there are some individuals in the ego-network external to the unit who occupy a strong role in the unit ego-network and who therefore do not allow group members to occupy strong bridging roles. Although the unit does not show high variance in structural hole positions, there are still two individuals who report a noticeably lower number of ties. As it is reasonable to expect, although the unit has a dense ego-network there are still brokerage opportunities as no unit in the studied sample is a separate island with complete internal connectivity. The graph at the bottom shows the direct ties of the individuals in the unit and contributes to providing additional evidence of the density in the relationships and the relatively lower degrees of brokerage. It is easy to observe the difference with the previous unit, in which individuals were brokering information from outside to inside the unit, while in this case there are fewer exclusive contacts for each team member and alters have ties with multiple team members.

FIGURE 19 – Group Network Structures: High Group-Level Variance

Ego-Network

Direct Network Ties
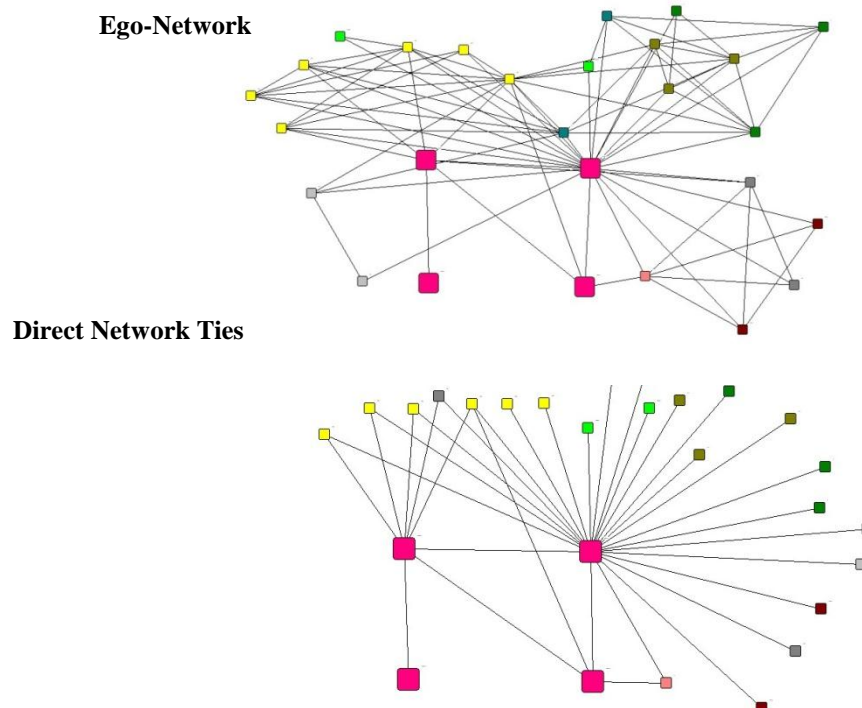
Both previous cases show relatively low variance in structural hole positions within the group. Figure 19 shows the case in which there is variance or heterogeneity within the group in terms of structural hole positions. The group shown is one of the groups responsible for the design of the videogames. In the figure showing the ego-networks, we can see that there are three main separate clusters which are tied to the group. One individual it tied to all three separate clusters and significantly brokers them. Another individual is heavily embedded in one cluster. Two remaining individuals are not strongly tied to any of the external clusters. From the figure showing exclusively the ties of the group members, we can see that one individual controls the access to most external sources of information. This individual is one of the most powerful, in terms of networks, in the whole organization and has one of the highest brokerage positions. Another individual has good access to actors working in a single unit and brokers a good number of alters in his or her ego-network. Two individuals occupy a rather peripheral role in the group. The first of them has few strong ties and such ties are heavily overlapped, so that only one missing link between two actors can offer bridging opportunities. This individual shares information with all his or her contacts. The second of those peripheral individuals has only a single strong tie and does not bridge any structural hole. Note that the graph only shows ties of intensity threshold 3, accordingly to the threshold used in Paper 3. The individual does have ties with lower tie intensity which are not represented. The group has high heterogeneity in structural hole composition. As we will see in Paper 3, this condition of heterogeneity is likely to create possible conditions of imbalance in the group. The four team members that design the games need access to other units to get information for the design process but two individuals, and specifically one, centralize the access to many external units controlling the flow of information and potentially limiting the possibility of others in the group.

Figure 20 shows the distribution of observations of the group-level network variables. The variables refer to the threshold level 3, as used in Paper 3. We can see that the observations of group-level mean in structural holes are normally distributed. It is interesting to note that the observations for structural holes are more normally distributed at the group-level as compared to the individual-level. We can compare Figure 20 with the figure reported in the section discussing structural holes at the

individual level. The figure also shows the distribution of observations for group-level variance in structural holes. In this case, we can see that there is no normal distribution and relatively more groups tend to show little variance in structural hole positions. It has to be specified that no group has complete lack of variance in structural holes, however the difference in structural hole positions for some groups tend to be significantly low. Several cases in which the difference in structural hole positions is low are related to the situation in which group-level constraint is high and individuals in the group are embedded in the same cluster of strongly overlapped relationships.

FIGURE 20 - Distribution of Group-Level Network Variables – *Paper 3*
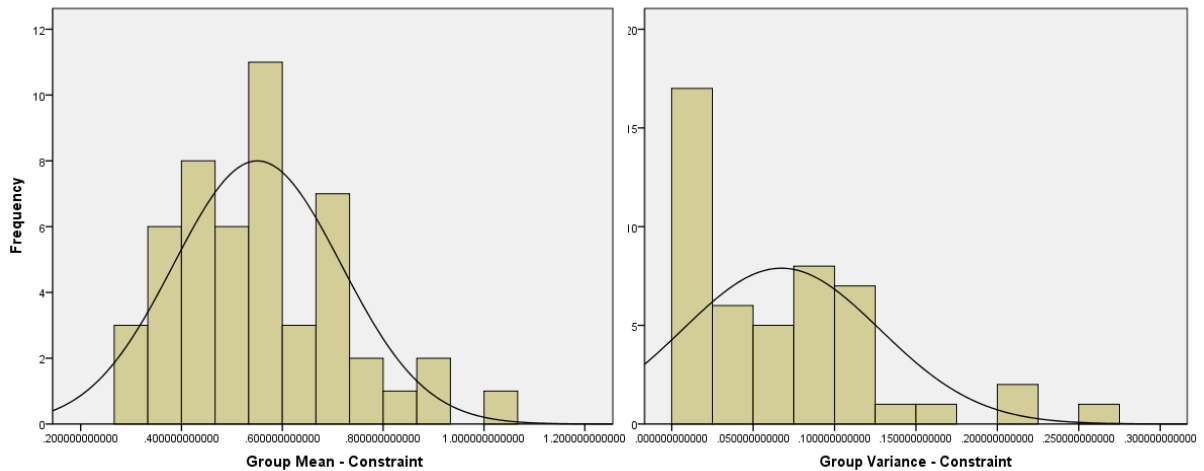
3.5. Outcome Variables

Although job crafting is the core dependent variables of the three papers, there are two final outcome variables which have been considered in the study. These outcome variables are performance and satisfaction. There is perhaps no need to describe the characteristics of performance and satisfaction, whose operationalization and nature are described in the methodology chapter as well as in each of the papers in which they are used. Nevertheless, it may be worth discussing the distribution of such variables, in order to assess the capacity for detecting empirical results as well as possible concerns for the external validity of findings.

FIGURE 21 – Distribution of *Performance*

Full Sample

Pharmaceutical Sample

Videogame Sample
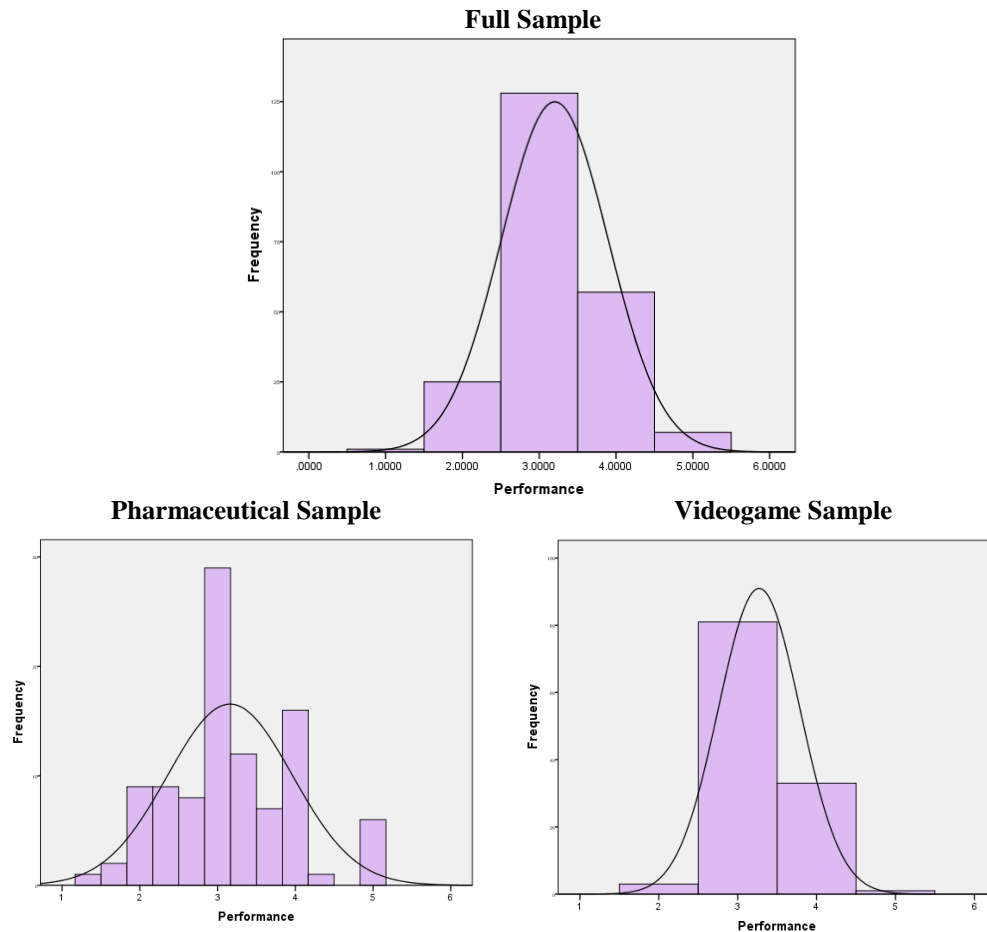
Figure 21 reports the distribution of performance variables. Given that the variable was measured through different instruments, I report the aggregate distribution as well as the distribution of the two organizational samples. The chart with the aggregate performance dimensions displays data with integer intervals to facilitate interpretation and because the videogame organization provided only integer scores. It is possible to see that the variable shows a normal distribution with high concentration of observations in the middle score. The variable measures comparatively performance of individuals, asking them to report how individuals are more or less performing in comparison to their colleagues in the organization. Please note that the reference point for the comparative evaluation is not the work group, but the whole organization. This characteristic is empirically confirmed by the ANOVA tests in Paper 3, which show that a large portion of variance in the distribution of performance scores is between-groups

and not within-groups. If individuals were compared relatively to the others in the group, therefore capturing only within-group variations, there would be no between-group variance and no conditions for detecting the predictive role of group-level variables studied in Paper 3. The choice of the comparative evaluation was suggested by management of one company. Management said that supervisory evaluations of performance in this company were generally affected by leniency bias because supervisors implicitly tend to rate employees with respect to workers in other organizations and assume that "in this organization everyone is a great performer". Management itself reported that previous attempts to measure variance in the organization faced empirical problems because supervisors tended to rate their employees with highest performance. Therefore, management suggested using a *within-organization* comparative anchor in order to capture a better distribution of scores and have adequate variance conditions.

The figure shows that the distribution of observations is fundamentally different between the pharmaceutical organization and the videogame organization. More specifically, the videogame organization shows considerably lower variance conditions than the pharmaceutical organization. The pharmaceutical organization has a good normal distribution of observations in the sample, while the videogame organization lacks the same condition of normality. This difference, as it will be better explained in the discussion chapter of the thesis, may be one of the main reasons why the results of Paper 2 were not replicated on the videogame organization and the model of Paper 2 had to be tested exclusively on the pharmaceutical organization. A main reason for which variance conditions in the videogame company are poorer can be found in the distinct methodological instrument used to operationalize performance. More specifically, in the videogame company performance was derived from formal company records collected by the human resource department. The performance appraisal process in the videogame company is very accurate. However, the performance ratings are the main determinant of compensation decisions and salary bonuses. If an employee obtains a rating comparatively higher than others, he or she must be paid more and, symmetrically, when one individual is rated as less effective than others, he or she must be paid less. The importance of the performance appraisal may have influenced supervisors, making them

give evaluations which are highly concentrated around the mean. Scores in the videogame company are also discrete (3-4-5). While in the pharmaceutical company I collected performance ratings in three items, averaging them to derive an overall score, in the videogame company I was only given the final score of the performance appraisal. The evaluation process in this company takes into account six different dimensions, but after the first evaluation of the immediate supervisor, the score is discussed in a team with higher management and the human resource manager, weighting all the dimensions and reaching a final discrete score. The discrete overall score is fundamental to justify compensation decisions, because a continuous distribution of scores would generate disputes over compensation choices.

FIGURE 22 – Distribution of Satisfaction with the Group
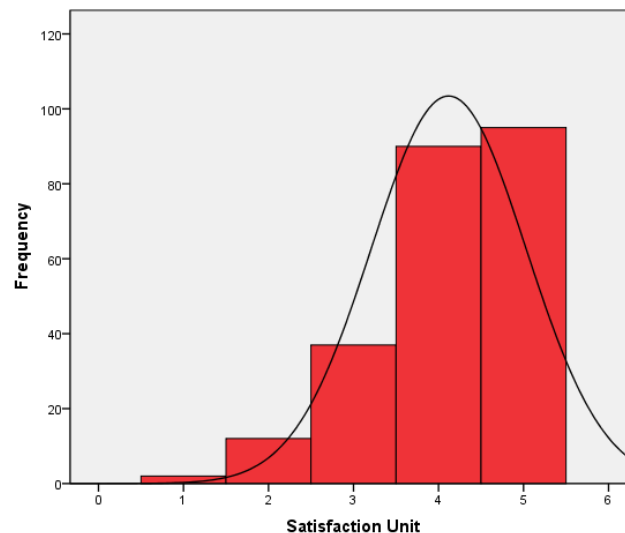
Figure 22 reports the distribution of observations for satisfaction with the group. It is possible to see that the observations tend to show a skewed distribution in which most individuals report very high degrees of satisfaction. Degrees of satisfaction are high for both the videogame company and the pharmaceutical company. It is often possible to observe relatively high levels of satisfaction because the satisfaction question is not a neutral question and individuals may be afraid of reporting low levels of satisfaction, which could be compromising in case management becomes aware of the responses. In the surveys of this study, employees were informed that ratings of satisfaction were held in strict confidentiality and management could not have access to

individual reports of satisfaction. Nevertheless, the survey was not anonymous, given the necessity of matching employee and supervisory data and given the necessity of matching network responses to build the network maps. Employees were also aware that results would have been shared with management for consulting purposes, although individual responses would have been kept confidential. Therefore, it cannot be excluded that, despite the researcher's encouragement and assurance of the confidentiality conditions in the survey, employees may have over-reported their degrees of satisfaction. There is also a possible generalizability restriction to explain the skewed distribution of satisfaction scores. The videogame company is one of the most admired organizations in the area, operating in a highly creative industry where individuals may have strong intrinsic satisfaction. The company receives a very high number of job applications every year, selecting highly motivated employees. It is plausible to assume that employees in this organization are generally highly satisfied with the job they have the chance to perform. The pharmaceutical company also is an organization with high satisfaction. The HR manager told me the company is characterized by very low voluntary turnover. The degree of satisfaction, regularly and independently measured throughout the years by the human resource department, tends to be high.

3.6. Conclusion

The present chapter offered illustrations and descriptions to help understand the context of the study. After having provided the theoretical introduction of the thesis and the explanation of the constructs studied and after having briefly introduced the methodology and measures of the study, this chapter gives a concrete understanding of the dynamics studied as well as of the empirical boundaries which could limit the validity of the conclusions. Contextual information on the organizations and their structure was provided. I also gave some detail on the units in each organization as well as the main job categories. Then, the networks were introduced, giving some concrete illustrations which can be useful to grasp concepts often criticized for being excessively

abstract. The distributions of all core variables are described in order to assess the possible empirical limitations of the study. The details about networks and jobs could not be exhaustive because the two participating companies required me to sign contracts which impede the public disclosure of company information. Nevertheless, the details reported are sufficient to contextualize the research and help interpret the evidence which will be reported in the next chapters. The following chapters present the three articles of the thesis.

Chapter 4:

JOB STRUCTURE AND STRUCTURAL HOLES: MUTUAL AND AMBIVALENT RELATIONSHIPS BETWEEN JOBS AND NETWORKS

Abstract

This paper examines the interplay between the task context and the social context. Building on social network and social job design literatures, I theorize that the task context and the social context are associated by a mutual and ambivalent relationship. More specifically, I show that job characteristics predict the development of structural hole positions and structural hole positions predict the job crafting behaviors of individuals, in which employees proactively alter their tasks. Furthermore, I found that the association between jobs and networks is characterized by ambivalence. Although previous research supported that job characteristics exercise convergent and positive effects on individual outcomes, I found that job characteristics exercise divergent, either positive or negative, effects on structural hole positions. Although previous research supported that structural holes exercise positive effects on individual outcomes, I show that structural hole positions exercise either positive or negative effects on job crafting, as a function of the job crafting of alters bridged.

Keywords: social networks, structural holes, job characteristics, job crafting, job design

4.1. Introduction

Previous research has provided cumulative empirical evidence for the beneficial effects of occupying structural hole positions in a social network. An individual, called ego, occupies a structural hole position when he or she is connected to others, called alters, who are not directly tied to each other. Although authors have acknowledged a certain controversy in empirical evidence (Gargiulo & Benassi, 2000; Gargiulo, Ertug & Galunic, 2009), the majority of scholars have embraced the theoretical tenet claiming that individuals derive gains from structural hole positions (Buskens & van de Rijt, 2008; Burt, 2000). According to previous research, occupying a structural hole position makes individuals perform better (Burt, 2007; Rodan & Galunic, 2004), facilitates the pursuit of entrepreneurial behavior and the generation of innovation (Ahuja, 2000), allows better negotiations and enables the person to make better deals with clients (Mizruchi & Stearns, 2001), contributes to higher pay and bonuses (Mizruchi, Stearns, & Fleischer, 2011), and facilitates faster promotion (Burt, 2004; Seibert, Kramer and Liden, 2001).

The cumulative evidence on the beneficial effects of structural hole positions invites a question: if such network positions are so manifestly beneficial for the individual, why does everybody not strive to bridge unconnected alters (Buskens & van de Rijt, 2008)? The evidence on the beneficial consequences of structural holes raises the issue of understanding what enables some individuals to reach advantageous structural positions while others fail. Nevertheless, although research on the effects of structural holes is very prolific, empirical investigations on the determinants of structural holes are scanty and scholars lack an understanding of the origins of structural holes (Burt, 2005; Zaheer & Soda, 2009). In order to fill this research gap, the present work examines the interplay between jobs and networks. Recent research in job design drew attention to the role that jobs play in influencing the development of social relationships (Grant, 2007, 2008; Grant & Parker, 2009). Our understanding of the origin of structural holes can be extended by exploring the association between jobs and networks.

Yet, if we want to examine the interplay between jobs and networks, studying the predictive role of the former may only address half the story. In fact, although jobs may influence structural hole positions, the relationship is not likely to be simply unidirectional and the interplay between task and social context may entail more complex and mutual associations. Emerging perspectives on social job design have not only acknowledged that the structure of jobs can affect social relations, but also that social relations can affect the alteration of jobs (Grant & Parker, 2009). Individuals tend to engage in job crafting behaviors in which they alter the structure of their jobs, proactively modifying the nature of tasks they perform (Wrzesniewski & Dutton, 2001). Job crafting behaviors can be a function of the specific characteristics of jobs as well as depend on the relations individuals develop within the organization (Grant & Parker, 2009; Leana, Appelbaum & Schevchuk, 2009; Wrzesniewski & Dutton, 2001).

Building on these premises, the present empirical investigation studies how jobs interplay with network relationships. Social relations play an active role between the structure of individuals' jobs and the structuring behaviors of individuals who proactively alter their jobs. In this paper, I initially elaborate a theory that explains how structural holes are predicted by the structure of jobs. Then, I illustrate and explain how structural holes are likely to influence individuals' job crafting behaviors. I test the theory on two organizations, observing how findings replicate across different organizational contexts and measuring job characteristics through multiple sources, in order to establish clearer patterns of causal precedence between the job and the social context.

4.2. Structure of Jobs and Structural Holes: An Ambivalent and Mutual Association

Building on the theory of advantages in sparse network structures developed by Granovetter (1973), Burt (1992) defined the notion of "structural hole" as the lack of connection between two individuals and argued that people spanning structural holes, or brokering unconnected others, derive a substantial advantage because they gain control

and informational benefits. Structural hole theory represents one of the strongest empirical positions in network research and many authors provided compelling evidence of the predictive role of brokerage on several individual outcomes (Brass, Galaskiewicz, Greve, & Tsai, 2004; Burt, 1997; 2004; 2007; Gargiulo & Benassi, 2000; Gargiulo, et al., 2009; Mizruchi & Stearns, 2001; Mizruchi et al., 2011; Shi, Markoczy & Dess, 2009). However, previous research on the determinants of structural holes is still narrow (Burt, 2005). Previous studies focused on two main streams of investigation, examining how structural holes are explained by personality (Burt, Jannotta & Mahoney, 1998; Kalish & Robins, 2006; Oh & Kilduff, 2008; Sasovova, Mehra, Borgatti & Schippers, 2010) or by previous network structures (Fleming & Waguespack, 2007; Zaheer & Soda, 2009). However, although these studies offer interesting insights into the reasons why people are capable of reaching structural hole positions, they offer little guidance to managers wishing to understand how organizations can influence and empower networks. The question of how organizations could try to influence networks remains largely unanswered.

Such questions can be addressed by studying the interplay between the social structure and the job structure. The social perspective on job design (Devaro, 2010; Grandey & Diamond, 2010; Grant, 2007, 2008; Grant & Sonnentag, 2010; Humphrey, Nahrang, & Morgeson, 2007) offers a theoretical justification for the need to study the causality between the task context and the social context. When Hackman and Oldman (1975) pioneered the study of the structure of jobs, they initially contemplated the possibility of considering job characteristics that explain or describe relationships with others. Their ideas were based on the early study by Turner and Lawrence (1965) who acknowledged that jobs vary in the extent to which their characteristics allow the opportunity to interact with others or demand interaction with others for effective performance. Nevertheless, Hackman and Oldham (1976) later preferred focusing on the characteristics believed to generate motivational thrust and eliminated the focus on social relations. Although the interest on how jobs enable or constrain social relations disappeared from job design research, it resurged recently, based on the premise that nowadays jobs and social relations are strongly intertwined and job design needs to be

revitalized by exploring the association with social relations (Grant, Fried, Parker, & Frese, 2010; Grant & Parker, 2009; Oldham & Hackman, 2010).

Building on the premises of social job design research, I posit that the structure of jobs influences the development of structural hole positions. There are two core processes underlying the relationship between job structure and structural holes. First, an individual can occupy a structural hole position if he or she is capable or motivated to form ties between unconnected others. Research on the origin of structural holes is concerned with understanding the reasons and mechanisms through which an individual decides or is capable of placing himself or herself in the interstices between unconnected individuals (Zaheer & Soda, 2009). Job characteristics may influence both the motivation and the capacity to form new relationships. Generally speaking, the characteristics of the work individuals perform regulates the need to gain information from others, the possibility of getting or receiving information from others, and the motivation to engage in information search behaviors (Campion, 1988; Galbraith, 1977; Humphrey et al. 2007; Tushman, 1978). These mechanisms triggered by the characteristics of the work are the very same mechanisms that explain the formation of network ties (Borgatti & Cross, 2003; Kilduff & Brass, 2010; Kilduff & Tsai, 2003; Nebus, 2006). As the mechanisms consequential to job characteristics overlap with the mechanisms preceding tie formation, there is ground for theorizing a causal association between the structure of jobs and the formation of structural hole positions.

Second, an individual can occupy a structural hole position if he or she is capable or motivated to maintain ties between unconnected others. Structural hole positions may be easier to form than to maintain because they could be unstable and individuals may not be willing to be continuously brokered by others (Buskens & van de Rijt, 2008). For a structure to be developed it is not sufficient that a person is addressed once, but that the flow of communication, once established must not dissolve. Rather, it must stabilize and become more or less regular so that the mechanisms associated with structural relationships are activated and a communication exchange between two parties can be properly considered a tie (Marsden & Campbell, 1984). Individuals must have the capacity or motivation to maintain the ties between unconnected others and to

keep others unconnected to each other. Previous research showed that holding a boundary spanning position that bridges unconnected parts of an organization is a complex activity and individuals need to be highly motivated and have a varied pool of knowledge (Cross, Yan & Louis, 2000; Druskat & Wheeler, 2003). As the structure of jobs can affect motivational sources and the possibility of acquiring and exploiting knowledge (Campion, 1988; Morgeson & Humphrey, 2006), there is ground to theorize that maintaining a bridging position can be affected, enhanced or eventually hindered, by job characteristics.

I posit therefore that the structure of jobs influences structural hole positions through the intermediating processes of forming and maintaining ties between unconnected others. The effects of job characteristics on the formation and maintenance of ties between unconnected others can be particularly interesting to study because they have an ambivalent nature: they can enable networking or constrain networking. The structure of individual tasks, regulating information processing capacity and requirements, can motivate or limit individuals' search for information (Galbraith, 1977; Tushman, 1978). Previous research in job design reached the conclusion that in general job characteristics tend to exercise convergent and positive effects on individual outcomes because they have a motivating effect on individuals (Morgeson & Humphrey, 2006). However, the nature of tasks can enable individuals to exchange with others but also can impede social exchange (Bergeron, 2007). What individuals do gives them the possibility to cumulate information: the more information individuals own the more they can network, but also the less information individuals own the more they need to network (Nebus, 2006; Stevenson & Gilly, 1991). Furthermore, job conditions which can be ambiguous and uncertain could actually be beneficial for some network structures in which individuals need to leverage uncertainty surrounding them (Burt, 1992). These considerations suggest that the task context can affect networks in ambivalent ways.

However, the association between the structure of jobs and the structure of networks is not interesting exclusively because it has ambivalent nature, but also because it can be mutual. In fact, the social perspective on job design has not only hinted

at the possibility that the structure of jobs influences the social relationships, but it also highlights that social relationships can influence individual's behaviors to change the structure of his or her job (Leana et al., 2009; Wrzesniewski & Dutton, 2001). New approaches to job design suggest that there is both a prescribed structure of jobs, defined a priori by management and capturing the differences across jobs as a function of distinct requirements, and an emergent structure of jobs, stemming from individuals' proactive initiative to alter the content of tasks (Grant & Ashford, 2008; Grant & Parker, 2009). According to Wrzesniewski & Dutton, (2001), individuals engage in job crafting behaviors in which they alter the structure of their jobs, change the nature of their tasks, and extend or simplify their tasks. The authors argue that social relations can play a role in job crafting and invite scholars to investigate that role.

The association between structural holes and job crafting is relevant to study because it may be characterized by ambiguity as well. On one side, structural holes exercise an enabling effect on job changes, as they provide opportunities, information and flexibility for individual behaviors (Burt, 1992). Through structural holes, individuals can recombine knowledge to develop new ways to address job activities (Fleming, Mingo & Chen, 2007). On the other hand, in the specific case of crafting behaviors, structural hole positions could also reveal an unexplored dark side. Brokerage can be deleterious because it hinders the possibility to garner support for change behaviors (Obstfeld, 2005). Brokerage and bridging boundaries can exercise a constraining force on job changes, as they can create conflict and confusion, which restrain individual's initiative or inhibit change (Miles, 1976; Rizzo, House & Lirtzman, 1970). Brokerage can be associated with lack of trust and obstruct action in situations where there are reciprocal expectations (Coleman, 1990). There can be both positive and negative mechanisms which link structural holes to crafting and this paper elaborates a contingent perspective on structural holes which helps disentangle and understand the ambivalent effects on crafting.

Building on these insights, this paper elaborates a theory in which I claim that the structure of jobs and the structure of relations are characterized by a mutual and ambivalent association. The structure of jobs exercises both positive and negative

influences on the development of the network structure and the network structure exercises both positive and negative influences on the individual's proactive development of his or her job. The following two sections elaborate the theoretical arguments presented and illustrate how structural hole positions link the structure of jobs to the individual's structuring of jobs. In the first section, I will develop a set of specific hypotheses showing how different job characteristics exercise divergent effects on the development of structural hole positions, activating in distinct ways the underlying processes of tie formation and tie dissolution with unconnected partners. I focus on the five classic job characteristics introduced by Hackman and Oldman (1975) and generally acknowledged to be the variables which best describe the structure of individual jobs (Humphrey et al., 2007). While these five characteristics are often considered to be "empowering", triggering a motivational thrust and hence exercise convergent positive effects on individual outcomes (Morgeson & Humphrey, 2006), I will show that they exercise divergent effects on structural holes. In the second section, I will illustrate the ambivalent effect of structural holes on the emergent structure of jobs, illustrating how structural holes can exercise both positive and negative effects on job crafting. Although previous research shows that structural hole positions are mostly beneficial I show that their effect is contingent on the type of structural holes considered.

4.3. The Ambivalent Influence of Jobs on Networks

The first job dimension of the job characteristics model that I study in relation to structural holes is task autonomy. Task autonomy relates to the amount of independence and discretion an employee has in carrying out his or her own work assignments (Hackman & Oldham, 1975). The autonomy of tasks an individual has may justify why an individual is motivated to form relationships with unconnected others rather than with connected others. Autonomy in a job is a desirable condition for individuals, as it gives a sense of responsibility, and individuals are generally motivated to keep their autonomy once they have it (Langfred & Moye, 2004). Having ties with connected

others risks limiting the discretionary behaviors of individuals because connected others exercise a social monitoring behavior on the common tie and raise expectations for behavioral conformity (Coleman, 1990). On the contrary, forming ties with unconnected others allows people to retain the possibility of exercising discretionary behaviors because the contacts cannot monitor and control individuals (Burt, 1992). For this reason, it is assumed that the individuals' awareness of social monitoring affects the selection of networking behaviors: it is likely to imagine that an individual with an autonomous job will be less comfortable inhabiting closed and dense networks, which exercise a constraining force, while he or she may prefer developing relationships within sparser networks rich in structural holes, so that the potential to exploit autonomy can be utilized.

Task autonomy not only influences structural hole positions because it affects the likelihood of forming ties with unconnected others but it is also relevant because it influences the likelihood of *maintaining* ties with unconnected others. Task autonomy entails flexibility in the execution of tasks, giving discretionary choice on how to execute tasks, when to execute tasks and which procedures to use for executing tasks (Morgeson & Humprehy, 2006). Unconnected individuals, differently from connected individuals, tend to perform tasks of adistinct nature, belong to social groups who have different values, opinions and task priorities (Oh & Kilduff, 2008). If an individual wants to maintain his or her boundary spanning activity in the organization, linking unconnected social groups and individuals, he or she needs a job that grants autonomy and an opportunity to exercise discretion (Marrone, 2010; Marrone, Tesluk, & Carson, 2007; Tushman & Scanlan, 1981a, 1981b). Individuals regularly spanning boundaries need autonomy because they mediate between groups with diverse interests, are caught in the cross-fire of conflicting behavioral expectations and continuously pulled in opposite directions (Caldwell & O'Reilly, 1982; Mehra & Schenkel, 2008). With a rigid job, individuals cannot continuously comply with diverse situational demands, while an autonomous job makes individuals comply with incompatible requests from different social groups making it possible to maintain relations with distinct social contexts (Mischell, 1977; Gellatly & Irving, 2001). Maintaining ties with individuals belonging to different groups requires autonomy because those individuals have conflicting

schedules that necessitate discretion in determining work arrangements (O'Leary, Mortensen & Woolley, 2011). For the above-mentioned reasons, I anticipate that task autonomy is positively associated with structural hole positions.

Hypothesis 1: task autonomy is positively associated with structural hole positions

The second dimension of the job characteristics model is task variety. Task variety is the degree to which a job requires employees to perform a wide and diversified range of tasks (Morgeson & Humphrey, 2006). Task variety may affect the formation of ties among unconnected individuals because unconnected individuals are more likely to ask for information from an individual with high task variety than from an individual with low task variety. The reason that justifies this claim is that individuals tend to be unconnected because they usually perform tasks of a diverse nature and have distinct informational needs (Mehra, Kilduff & Brass, 2001; Oh & Kilduff, 2008). An individual that performs varied tasks can satisfy the informational needs of colleagues with diverse informational requirements (Nebus, 2006). An individual exercises boundary spanning activities if he or she is familiar with a distinct set of tasks which can be useful to a range of people performing dissimilar jobs (Ancona & Caldwell, 1992; Druksat & Wheeler, 2003). Consequently, the more an individual performs tasks of a varied nature, the more he or she would be capable of providing information which satisfies the needs of separate social groups and individuals. Symmetrically, a person with high task variety may be more likely to search for information from unconnected individuals. When the activities the employee performs are diverse in nature it is likely that he or she searches for information among individuals that have diverse specializations or experience on different areas, and that might be less likely to be connected than individuals doing similar jobs (McPherson & Smith-Lovin, 1987).

An example of formation dynamics in case of task variety related to the empirical setting could be useful: if individuals perform a single type of activity, for instance programmers, they will be capable of satisfying narrow informational requirements of others and they will be contacted by individuals who perform relatively similar tasks, such as other programmers. As contacts perform relatively similar tasks, it

is likely that, sooner or later, they may also ask information from each other instead of relying exclusively on the broker. Differently, if individuals perform tasks of a varied nature, for instance project managers, they can be contacted by individuals performing diverse tasks, like sales agents and R&D specialists, and they would bridge them because contacts are less capable of satisfying their own informational requirements by talking to each other. For such reasons, I anticipate that the higher the task variety, the more possible it is that individuals occupy structural hole positions.

Hypothesis 2: task variety is positively associated with structural hole positions

The third dimension of the job characteristics model is task significance. Task significance is the degree to which a job has a substantial impact on the lives or work of others, whether inside or outside the organization (Hackman & Oldham, 1975). Individuals having jobs with task significance are likely to be involved in the formation of relationships between unconnected individuals. The first reason that justifies this claim is related to the networking behaviors of alters. According to Kilduff and Tsai (2003) individuals can either network with serendipity and get introduced to new contacts by their current contacts, or they can network with agency, choosing to address who they need regardless of the existence of common ties. Individuals are likely to exercise choice in their networking behaviors when they derive high informational value from someone (Buskens & van de Rijt, 2008; Flap, 2003; Watts, 1999). The significance of tasks is associated with high informational value that can be provided to others (Grant, 2007, 2008). Hence, there is likelihood that individuals with high task significance are contacted by alters because of choice. Logically, when individuals are introduced to each other by a common contact, the structure is inevitably closed, while when someone is contacted by choice of alters, those alters are more likely to be unconnected. Individuals with jobs having high task significance are therefore more likely to be contacted by unconnected alters than individuals having jobs with low task significance.

The second reason that justifies the association between task significance and formation of structural holes is related to the networking behavior of the individual himself or herself. Theories of network contagion have claimed that the perceptions of

significance, importance, and status are transferred through network relations so that the significance of someone in the organization is judged as a function of the significance of their contacts (Kilduff & Krackhardt, 1994). Zaheer and Soda (2009) build on the idea of network contagion to state that actors who occupy a significant role choose to inhabit sparse networks in which alters are disconnected because they are reluctant to be embedded in a dense network, where their significance will be transferred to everyone, resulting in loss of exclusivity and popularity.

Furthermore, individuals having jobs with high task significance are capable of maintaining positions of brokerage between unconnected alters. Buskens and van de Rijt, (2008) argue that structural hole positions may be unstable in the long run because brokered individuals may be unwilling to be continuously bridged. If an individual is perceived to have a role with significant influence on others in the organization, alters focalize their attention around him or her, let the individual become the central reference point and become less concerned with networking with each other (Balkundi, Kilduff & Anison, 2011; Bono & Anderson, 2005). Actors with jobs having high task significance can therefore become the constant point of reference of alters and stabilize their structural hole position. For the above-mentioned reasons I hypothesize a positive association between task significance and structural hole positions.

Hypothesis 3: task significance is positively associated with structural hole positions

The fourth dimension of the job characteristics model is task identity. Task identity is the extent to which a job requires the completion of a whole, identifiable and non-fragmented piece of work followed from the beginning to the end (Hackman & Oldham, 1976; Morgeson & Humphrey, 2006). Task identity reflects the extent to which the tasks an individual performs are well integrated with one another forming a whole and identifiable piece of work. The condition in which an individual perceives identity for the work is motivational and creates satisfaction (Hackman & Oldham, 1976). It is important to specify that the construct of task identity, at least in the way in which it is defined and operationalized by Morgeson and Humphrey (2006), does not refer to the size or the complexity of the piece of work. Task identity refers to the degree of

fragmentation in a task, to the existence of a clear beginning and end of the task performed, and to the fact that individuals uninterruptedly follow the task, small or large, from its beginning to its end.

The seminal work of Mintzberg (1975) highlighted the fact that a lot of jobs with an important coordinative role in an organization are not characterized by integrity, as traditionally assumed, but they are strongly fragmented and discontinuous. According to the author, fragmentation is the essential job dimension to cope with multiple and mutating requests. On the contrary, stable jobs with clear boundaries of responsibility and accountability assigned for a specific set of tasks can be characterized by integrity and be highly identified (Alder & Borys, 1996). The job of an assembly line worker does not necessarily entail low task identity because, although the worker performs a small piece of work, he or she has clear responsibility over a task which has a clear beginning, a clear end, and it is uninterruptedly followed from the beginning to the end.

Individuals with jobs having high task identity would feel gratified while fragmentation in jobs could trigger negative psychological states and lead to a sense of frustration and anxiety (Spector & Jex, 1991). Jobs with low task identity are fundamentally unstable jobs, while jobs with high task identity may be stable jobs. Unstable jobs may indeed lead to frustration and anxiety but they can trigger coping reactions to try to improve the situation and engage in change behaviors, including exploratory relational behaviors (Ashford, Blatt, & VandeWalle, 2003; Grant & Parker, 2009). The perception of instability, inconsistency, lack of clear beginning and end in work activities can affect the perception of informational needs of individuals promoting search behaviors to acquire information from others (Ashford et al., 2003; Galbraith, 1977; Tushman, 1979).

There are other reasons which justify the relationship between task identity and structural holes. Keeping a fragmented nature of job activities is a necessary condition for quickly coping with multiple informational requests coming from separate parts of the organization (Mintzberg, 2009). Brokers often do not finish what they start, following a unique piece of work from the beginning to the end, but they have a job which allows them to comfortably navigate among unconnected pieces of work (Burt,

1992; Shi et al., 2009). Furthermore, stable and well-identified task activities favor stability in the surrounding network while fragmented and discontinuous task activities destabilize the surrounding network (Tichy & Fombrun, 1979). While in stable networks individuals sooner or later realize how and when to directly connect to each other bypassing the broker (Buskens & van de Rijt, 2008), structural holes can be spanned in unstable networks where it is unclear where to get some information (Burt, 1992). Last, when individuals have identified tasks, their work is associated with an identifiable outcome (Morgeson & Humphrey, 2006). When there is an identifiable job outcome, individuals develop a clear purpose for their behaviors, which results in more focused action and lower exploratory interpersonal behaviors, such as social network building behaviors (Grant & Ashford, 2008). All these reasons suggest that task identity is negatively associated with structural holes.

Hypothesis 4: task identity is negatively associated with structural hole positions

The fifth dimension of the job characteristics model is feedback from the job. Feedback from the job is the extent to which the job provides direct and clear information about the effectiveness of performance (Hackman & Oldham, 1976). Individuals with high feedback from the job have clear understanding of what they should do and how they should do it to perform well (Hackman & Oldham, 1976). Feedback from the job may be negatively associated with the formation of ties with unconnected individuals. The search for information and the networking behaviors of individuals are a function of the need to get information from the outside which stems from the lack of information about what they have to do (Nebus, 2006). According to Burt et al. (1998) it is when individuals perceive uncertainty about what they should do that they derive the fundamental motivation to engage in sparse information search which generates structural hole positions. Developing relationships and executing tasks require time and when individuals have a clear understanding of their work, they prefer focusing on the execution of tasks rather than on the exploration of relational possibilities, which are often perceived as a distraction from task execution (Bergeron, 2007; Ibarra & Hunter, 2007; Cross & Parker, 2004). Uncertainty about what to do to

perform well is the fundamental trigger that motivates individuals to explore sparse and uncharted relational opportunities (Burt, 2005).

Individuals with high feedback from the job may also have difficulty in maintaining structural hole positions. It is important to acknowledge that feedback from the job improves the efficiency in information exchanges because individuals, knowing what to do, are capable of gaining and transferring clear information to others (Earley, Northcraft, Lee, & Lituchy, 1990; Kluger & DeNisi, 1996). Paradoxically, the clarity of information transferred plays against the maintenance of a structural hole position. When brokers provide clear information to their unconnected contacts transferring information from one source to the other, the structural hole position is unstable because sooner or later the contacts will learn how to get information from each other and reduce their dependence on the brokerage activity (Buskens & van de Rijt, 2008). Burt (1992) developed the argument that individuals maintain structural hole positions because they leverage the uncertainty surrounding what they do to manipulate the information flow between unconnected partners and to keep those partners unconnected as they are dependent on the brokerage activity. In the theory of Burt (1992) uncertainty is what allows an individual to maintain a condition of high dependence on him or her and keep on brokering. As long as there is clarity in the role and tasks of individuals, they cannot leverage uncertainty to create a condition of dependence of others on the information provided by them (Crozier, 1963). Unconnected contacts are dependent on the brokers and incapable of bypassing them because they exploit information filtering, control and manipulation tactics which stem from the uncertainty surrounding their role (Fandt & Ferris, 1990). Building on these ideas I anticipate the following hypothesis:

Hypothesis 5: feedback from the job is negatively associated with structural hole positions

4.4. The Ambivalent Influence of Networks on Jobs

After having justified how the structure of jobs affects the development of structural hole positions, I now complete the theory turning to the analysis of how structural hole positions affect proactive job change behaviors of individuals, captured by the concept of job crafting. There are some core reasons to assume that structural hole positions may be beneficial to job crafting behaviors. Structural holes may expose individuals to unexplored opportunities for exercising behavioral discretion which enable individuals to identify and pursue change initiatives (Burt, 1997). Beside the identification of opportunities, structural holes may also provide access to information which facilitates the implementation of new ideas: structural holes may enable an individual's initiative to change his or her job tasks because they make individuals gather substantial non-redundant information which can help implement one's own initiatives for change behaviors (Burt, 2004; Perry-Smith & Shalley, 2003). Furthermore, while connected alters can exercise a form of monitoring on ego, unconnected alters leave ego more independent and free to engage in change behaviors on the job (Burt, 2000, 2005).

However, although most previous research supported the enabling effects of structural holes, the specific association with job crafting may highlight a possible dark side of bridging unconnected others. Although structural holes may be beneficial to performance and to other outcomes, they can be associated with an action problem when it comes to innovative changes on the job because such changes require mobilizing unconnected people around innovative ideas and structural holes hinder social support (Obstfeld, 2005). Structural holes could block individuals' initiative because unconnected others often send conflicting behavioral expectations and can generate a perception of ambiguity in one's role, with ensuing stress that can paralyze the initiative to change role (Katz & Kahn, 1966; Mehra & Schenkel, 2008). Last, when individuals are connected to each other they develop trust which facilitates mutual adaptations of behaviors, while unconnected individuals may develop suspicion of opportunistic behaviors towards the broker and obstruct his or her behavioral adaptations (Coleman, 1990).

Given that structural hole positions are likely to activate both positive and negative explanatory mechanisms which exercise opposite effects on job crafting, it is plausible to assume that the relationship between structural holes and job crafting is null and non-monotonic, becoming positive or negative as a function of the contingent situations considered. The effects of structural holes on change outcomes may be contingent on the characteristics of alters bridged (Soda & Bizzi, 2012). The positive and negative mechanisms illustrated above are activated or not as a function of the characteristics of contacts. Building on the core premise that individuals' crafting initiatives are interdependent (Wrzesniewski & Dutton, 2001) I consider that the effects of structural holes on job crafting are contingent on the job crafting of alters. In other words, bridging contacts can be positive or negative for one's crafting depending on the crafting of contacts themselves.

In order to elaborate this argument, we can consider three distinct situational contingencies, mirroring the three distinct types of brokerage activities an individual can have. First, we can consider the effect of brokerage with alters exhibiting high job crafting. More specifically in the network of contacts surrounding an individual we can focus only on the contacts with high job crafting and we can consider how they are connected or unconnected to each other. With alters having high job crafting behaviors the positive mechanisms linking structural holes to individuals' job crafting are activated. First, when alters proactively change their jobs and are dynamic, structural holes could lead to the identification of more opportunities for changing tasks. According to the theory proposed by Burt (1992), exploiting behavioral opportunities through structural holes is a function of the uncertainty and dynamism of contacts. When individuals constantly perform the same tasks, their activities become predictable and everyone in the organization understands what they do and the opportunities surrounding them (Alder & Borys, 1996). The broker may not discover opportunities that others in the organization cannot already see. Differently, when individuals dynamically change their jobs, what they are doing may be less visible to people. Therefore, brokers can exploit the area of uncertainty surrounding what their contacts do to identify behavioral opportunities that others cannot see (Burt, 1992). Second, if individuals proactively change their job, the intensity of informational exchanges is

high, as dynamic jobs require dynamic and rich flows of information (Berg, Grant & Johnson, 2010). Therefore, brokerage when individuals have high crafting may allow access to a richer pool of information and resources, which may enhance the possibility for crafting. The core positive mechanisms linking structural holes to crafting are therefore activated in the case of high crafting alters. Following these lines of thought, I propose the following hypothesis:

Hypothesis 6: Bridging alters with high job crafting is positively associated with job crafting.

The second situation that we can consider is the case in which individuals in structural hole positions broker alters who exhibit low job crafting behaviors. More specifically, in the network of contacts surrounding an individual we can focus only on the contacts with low job crafting and we can consider how they are connected or unconnected to each other. Structural hole positions do not hold substantial advantages when bridging individuals that engage in low crafting behaviors. As a direct consequence of the arguments developed before, the core beneficial mechanisms of structural holes are not activated. As I mentioned, brokering individuals that constantly perform the same job over time does now allow the chance of identifying rich behavioral opportunities as compared with brokering individuals with dynamic jobs. Furthermore, brokering individuals with low crafting also does not allow the broker to be in the midst of a more intense flow of information, with less enabling effect on crafting activities. The core advantages of brokering alters with low job crafting are therefore weakened.

However, although the relationship between structural holes and job crafting is weaker when bridging individuals with low crafting, it can still be beneficial. Unconnected alters still allow the flexibility and lack of monitoring that makes brokers independent and capable of pursuing their own change initiatives (Burt, 2000, 2005). When individuals exhibit low crafting and do not want to change their jobs, they could constrain the change initiatives of others (Wrzesniewski & Dutton, 2001). However, the possible constraining effect of alters on ego's behavior is stronger if alters are connected because they can monitor the behavior of ego and exercise pressure for behavioral

conformity that restrains changes (Coleman, 1990). The dynamics of triads modify when individuals are all tied to one another and if the two alters share a common view, they can constrain rather than enable the initiative of ego (Kilduff & Tsai, 2003). Hence, brokerage is still beneficial for personal initiative comparatively to a closed network in which the two low-crafting alters would be capable of exercising a stronger constraining force on ego. Nevertheless, I anticipate that the benefits of structural holes are weakened because the information and opportunity advantages are not triggered and they represent the strongest mechanisms which are supposed to justify how structural holes lead to the pursuit of change initiatives (Burt, 2004; Perry-Smith & Shalley, 2003).

Hypothesis 7a: Bridging alters with low job crafting is positively associated with job crafting.

Hypothesis 7b: the effect of structural holes on job crafting is higher for alters with high job crafting and lower for alters with low job crafting.

Individuals do not broker only pairs of individuals with high crafting and pairs of individuals with low crafting. There is also a third possible situation in which an individual can broker an alter with high crafting and an alter with low crafting. More specifically in the network of contacts surrounding an individual we can consider only how individuals with low job crafting are connected or unconnected to individuals with high job crafting. As I will explain in the methodological section, operationalizing brokerage of heterogeneous pairs in which a low-crafting alter is tied to a high-crafting alter is methodologically complex. However, individuals can broker only three types of ties between pairs of individuals: a tie between a pair of high crafting alters; a tie between a pair of low crafting alters; and a tie between a low crafting alter and a high crafting alter. The effect of this third type of brokerage could be indirectly assessed partialling out the effect of the first two types of brokerage from the global structural hole position and hence isolating the residual effect of brokerage between pairs of heterogeneous alters.

Brokerage of alters having high job crafting with alters having low job crafting activates the deleterious mechanisms of structural holes. Burt (2004) found that

structural holes are beneficial to the generation of creative ideas but he explicitly mentioned that he only focused on the generative processes of independent ideas and he did not consider the fact that alters may be influenced by the idea and eventually influence its implementation. Job crafting behaviors are different from independent creative ideas. Contacts influence each other's jobs (Kilduff & Brass, 2010) and the crafting initiative of an individual may be contested by others because they will have to adjust their own job as a result of the alteration implemented by the crafting actor (Berg, Wrzesniewski, & Dutton, 2010; Wrzesniewski, & Dutton, 2001). Because of interdependence in the adaptation of jobs, individuals send behavioral requests and expectations for dynamic adaptation to others as a function of the dynamism in their own jobs (Fondas & Steward, 1994; Graen & Scandura, 1987; Katz & Kahn, 1966). It is plausible to assume that an alter with high crafting will expect and request that ego modifies his or her tasks as well, while an alter with low crafting will expect and request that ego does not modify his or her tasks. In other words, an alter with high crafting and an alter with low crafting will send competing behavioral requests and expectations for the crafting of ego.

The relationship between structural holes and job crafting may be contingent on the conflicting behavioral expectations and requests raised by alters. Obstfeld (2005) argues that structural holes are beneficial to generate ideas but they hinder the implementation of ideas when such implementation needs to mobilize social support. The author posits that when alters raise divergent expectations, it is better that they are connected to each other so that they can directly exchange their competing viewpoints clarifying to ego how he or she can implement changes with their support. When brokers receive competing behavioral requests and expectations, they may not know what to do and experience stress which inhibits the implementation of initiatives (Singh, 1993; Singh & Rhoads, 1991; Stamper & Johlke, 2003). Diversity in contacts may lead to recombining knowledge in new ways, but contacts with diverse and competing expectations should be connected to each other when it comes to implementing new combinations of knowledge in concrete change behaviors (Fleming et al. 2007; Hansen, 1999; Reagans & McEvily, 2003). Mors (2010) found a contingent relationship between structural holes and innovative behaviors. He argues that when the context in which an

individual is embedded is homogeneous and individuals have relatively convergent interests and viewpoints,exploiting non-redundant knowledge is the challenge and structural holes are beneficial to performance. However, when individual have ties with heterogeneous contacts having conflicting interests and expectation, gaining support for change initiatives is the challenge, and closed structures lacking structural holes are beneficial. Lingo and O'Mahony (2010) found a different role of structural holes as a function of ambiguity in the implementation of novel initiatives. They argue that brokers generally gain advantage for integrating diverse knowledge of others, but when ambiguity becomes excessive due to competing expectations, collaboration between contacts fosters the initiative. When alters raise competing expectations, brokerage may generate distrust because alters may perceive that the broker has "a foot in each boat" and does not follow the expectations of anyone (Xiao & Tsui, 2007). Differently, when there are conflicting demands, the trust that can be developed through closed networks lacking structural holes may be fundamental to enable innovative change action (Fleming et al. 2007). For such reasons, I theorize a divergent predictive role of structural holes and job crafting, in the case of ties between alters having heterogeneous crafting behaviors. After controlling for the effect of bridging others with low crafting and bridging others with high crafting the residual and negative effect of bridging alters with heterogeneous crafting emerges, revealing a negative relationship between structural holes and job crafting.

Hypothesis 8: After controlling for bridging others with low crafting and bridging others with high crafting, structural holes are negatively associated with job crafting.

4.5. Methodology

4.5.1. Sample

I collected empirical data from two distinct organizations. The two organizations exhibit considerable differences in terms of operations and markets encouraging us to examine whether the hypotheses are robust and replicated across opposite organizational

contexts. The first organization is a pharmaceutical company involved in producing and selling pharmaceuticals in North America. The company is composed of 151 total employees and usable answers were obtained for 138 of them (a response rate of 91%). The sample captures substantial variance in task characteristics as individuals perform highly varied tasks in the organization. The most representative jobs include blue-collar workers, chemists, biologists, scientists, human resource specialists, finance and accounting specialists, sales representatives, logistics specialists, engineers, technicians, marketing and brand specialists, administrative assistants, and managers at different levels. The second organization is a division of a videogame company with operations in North America that is involved in the development of videogames marketed all over the world. This organization has 191 total employees and viable answers for 152 of them (response rate 80%) were collected. Also in this organization there is a substantial variance among tasks performed by individuals in the units. The individuals generally occupy creative and artistic roles, programming roles and managerial roles. Within each category of role there is high variance of tasks performed: for example, artists span from having large responsibility over a whole game level to a focus on designing a specific character's feature (such as face wrinkles); programmers span from having responsibility over the design of the whole engine of the game to the design of a specific artificial intelligence feature (such as bending down); managers cover the diverse functional roles, from marketing to human resources or from IT support to quality control.

4.5.2. Measurement

Job Characteristics. Considering that job characteristics could influence social networks but also that social networks could influence job characteristics, I collected data on job characteristics from three different sources, deriving four different measures. It is not uncommon in job characteristics research to derive measures from multiple sources. Each measure has advantages and limitations and, although they are often uncorrelated, they can capture different aspects of jobs, deriving a more complete operationalization of jobs and minimizing the impact of individual idiosyncrasies and perceptions (Hackman & Lawler, 1971; Roberts & Glick, 1981; Spector & Jex, 1991).

The first measure is derived from the employee self-report data from a questionnaire survey. The subjective perceptions of the employee are limited because they could be more subject to the reverse causality of networks or crafting and because employees may not be capable to assess their job in relation to the jobs performed by others. Yet, self-report measures have advantages because employees own more information about the job for accurately describing what they are doing. I collected data on job characteristics using the Work Design Questionnaire (Morgeson & Humphrey, 2006). This questionnaire employs three to four items for each job characteristic variable, rated on an agreement five-point Likert scale. Measures in the whole sample were shown to have high reliability: autonomy ($\alpha = .86$), variety ($\alpha = .91$), significance ($\alpha = .87$), identity ($\alpha = .90$), and feedback ($\alpha = .90$). In order to check the stability of the reliability indicators across samples, I also calculated Cronbach's alpha for each organization. Results were shown to be stable across organizations. Organization 1 shows the following reliabilities: autonomy ($\alpha = .88$), variety ($\alpha = .88$), significance ($\alpha = .83$), identity ($\alpha = .87$), and feedback ($\alpha = .89$). Organization 2 shows excellent reliabilities as well: autonomy ($\alpha = .84$), variety ($\alpha = .94$), significance ($\alpha = .87$), identity ($\alpha = .91$), and feedback ($\alpha = .90$).

The second measure that I used for the job characteristics is self-report employee ratings averaged by job. In other words, I averaged the perceptions of employees having the same job for each job characteristic and, instead of measuring the job characteristics by the individual's perception, I measured it by the average perception of individuals performing the same job. Algera (1983) suggests the usefulness of measuring job characteristics both through individual self-reports and through self-reports averaged by job. He argues that measures on the average perception of the job provide a more "objective" assessment of the job characteristics because they partially eliminate individual differences in the perceptions of the same job and idiosyncratic individual responses. Furthermore, it is likely that newcomers are less capable of assessing their jobs compared to old-timers and averaging responses allows a stronger indication.

I calculated the relationship between within and between group variability, to assess whether there are adequate conditions for aggregating data at the job level,

following approaches used in Multilevel Modeling. It is important to specify that the aggregation does not follow a reference shift model (Chan, 1998) in which individuals rate the very same phenomenon, for instance "group autonomy". In our case any individual is rating his or her own job. I aggregated individuals by job and I considered each job to be an independent group, even in case in which individuals were belonging to different units. Results report that there is high between-group variability, suggesting that groups are significantly different from each other with respect to the observed characteristics. There is still, though, a considerable portion of variability attributed to within group differences. *Eta square* analyses show very large portions of between-group variability compared to within-group variability, according to the rules of thumb suggested by Cohen (1988). It is important to consider that between-group variance, aggregating data at the group level, has much fewer degrees of freedom that within-group variance, for which data are at the individual level. Between-group variability is 49% for feedback from the job, 46% for autonomy, 42% for significance, 39% for identity and 28% for variety. The results of the ANOVA tests show that job characteristics aggregate very well in groups for feedback ($F = 2.15$, $p < .001$) and for autonomy ($F = 1.87$; $p = .003$), well for identity ($F = 1.67$; $p = .013$), sufficiently for identity ($F = 1.48$; $p = .046$), and insufficiently only for variety ($F = .90$; $p = .64$). As a result of the analyses, it is possible to suggest that aggregating jobs may be an important additional indicator to consider. This indicator is not perfect and has indeed limitations, but it can still provide complementary information which needs to be combined with the evidence from the other indicators for a full understanding of job characteristics.

The third measure for job characteristics is derived from top management's ratings. For each of the two sampled organizations I had personal interviews with 4 top managers from which I collected data on job characteristics. In all cases, all managers were directly involved in the formal job design procedures implemented by the human resources department of the company and had therefore substantial information on the prescribed nature of jobs in their company. Differently from the individual, who has most information about his or her job, top managers offer the possibility of assessing jobs in relation to each other and therefore better capture variance among jobs in the company. The personal interviews were structured as follows: initially the researcher

explained in detail the job characteristics to be assessed; then the researcher selected a job and asked the respondent to provide a description of the tasks involved in the execution of this job; last, the researcher asked the respondent to provide an assessment of each job characteristic. The procedure was repeated for other jobs. In order to give priority to accuracy in judgment, the respondent was not asked to judge with all jobs in general terms but to judge with substantial detail only the jobs he or she was familiar with. Managers were sampled in order to be able to collect judgments on all job categories. Judgments were on a 5-point basis and comparative to other jobs, ranging from "considerably below" to "considerably above" the average. Judgments of supervisors were independent, as respondents were unaware of employees' ratings. The limitation of this measure is that, as in Brass (1981), I could not measure multiple items in the supervisory assessment because the procedure would have been excessively lengthy. However, the personal interview and the assistance of the researcher in the judgment process suggest adequate accuracy in job ratings.

The fourth measure used is derived from the researcher's independent coding of job characteristics. If external judges have access to adequate and reliable information on work requirements and tasks of different jobs, they may be capable of performing an analysis of jobs similar to that performed by HR departments which leads to useful, though imperfect, identification of job characteristics (Dierdorff & Morgeson, 2009). Job coding of external judges has often complemented self-report ratings in job design literature (Dierdorff & Wilson, 2003). I gained access to the documents of the formal job analyses performed by the human resources department of each organization. The job analysis process in each organization was accurate, involving a team of highly qualified specialists who meticulously defined task requirements for each specific job. The organizations allowed me to have access to the confidential job descriptions and task competence requirements. Each organization specified the core competences, task requirements and task specifications associated with each position. I could verify the stability across time of the formal prescriptions of jobs in the organizations: for some jobs, I had access to different job descriptions written in different years and I could confirm the stability of job requirements across years. Data from the documents were combined with information from interviews, which were relevant to clarify their

meaning, and to obtain explanations and more detail about archival data. Data from the documents were also combined with job title descriptions from the occupational information network (O*NET) of the U.S.A. Department of Labor, which can be validly used to derive objective comparisons across job titles for empirical job design research (Peterson et al., 2001). Last, data from documents was combined with observational analysis of the researcher, who made a dozen visits to the locations of the study (for instance, observing the production process of pharmaceuticals in the production plant and the programming, designing tasks in the videogame production studio). I aggregated the pieces of information from different sources to derive a detailed understanding of jobs, which were rated on the basis of each characteristic and assigned a 1 to 5 Likert indicator. The use of the researcher's independent coding of job characteristics from archival, interview, or observational sources is common practice followed by job design scholars (Fried & Ferris, 1987). The job coding of the researcher, if he or she is allowed access to sources of high quality information, can be more detailed and specific than the employee or the supervisor's ratings. The researcher also has more understanding of each job characteristic. However, the limitation of this approach is that there is often heterogeneity in the pieces of information available for each job, making it difficult to establish a standardized coding protocol to uniformly assess each job, allowing bias in the judges' interpretations, and creating inaccuracy in ratings from independent job coding of external judges (Dierdorff & Morgeson, 2009).[3] The measure is therefore incomplete and imperfect but it can still be useful to combine with the other measures, also imperfect, and derive a more complete operationalization of jobs.

Social Networks. Employees of both organizations were administered a network name generator survey in which individuals were asked to name the persons with whom they regularly exchange information. In this research, I focused on instrumental network relationships. The network variables were built from a network questionnaire asking respondents to report first and last names of persons with whom the respondent has been

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[3] For future purposes, such as publication in an academic outlet, I will probably attempt to aggregate all collected evidence to write standardized and complete job descriptions. Such descriptions will then be coded by independent raters and inter-rater reliability will be assessed. Given that the coding procedure was long and rather complex and given the current time limitations, this procedure is avoided in the thesis.

"regularly exchanging information about work-related issues at least once a week". Individuals were free to name as many respondents as they wanted following a flexible-choice research design which is generally preferable over a fixed-choice research design which asks the name, for instance, of only the top five contacts (Mehra et al., 2001). In order to decrease the concern for possible recursive relationships between network structure and job crafting, I considered only stable ties formed at least six months before the survey: I asked individuals to indicate with whom the respondent has been regularly exchanging information for at least six months. Several authors reported that individuals are substantially accurate in assessing the duration of their ties and can determine when a stable tie was formed (Granovetter, 1973; Marsden & Campbell, 1984; Perry-Smith, 2006). The job crafting behaviors were then assessed over the time span of the most recent six months. Discussions with management were held to ensure that the lagged structure of six months was appropriate to capture an adequate range of time for job crafting behaviors. The lagged data structure between network and job crafting allows stronger confidence in the interpretation of causality. Once I had collected relational data, I used the software UCINET VI (Borgatti, Everett, & Freeman, 2002) to construct an adjacency matrix "individual by individual" and to calculate network variables in the way specified below.

Structural Holes. The structural hole position of an individual in the network of relationships was measured through the *Effective Size* brokerage indicator introduced by Burt (1992). Effective size is calculated on the ego-network of an individual, which considers both the ties of the focal individual, the ego, with his or her contacts, the alters, and all the ties among alters. Effective size calculates for each ego the number of alters minus the average number of ties of alters within the ego-network, not counting ties to ego. In others words, it does not consider how many ties ego has but it considers the extent to which ego has *relatively* more ties with his or her alters than alters themselves, hence providing an indicator of the extent to which alters are unconnected. In a closed network in which everyone is connected to everyone else, ego has the same number of ties as his or her alters, while in a network rich in structural holes, ego has substantially more ties than his or her alters and the greater the effective size, the more alters depend on ego for brokerage. Burt (1992) identified effective size and constraint

as the two core measures to operationalize structural holes. However, effective size is a more appropriate indicator than the constraint index in the present research context. In fact, the constraint index calculates the arithmetic sum of contacts weighted by the degree of overlap in ties and provides an overall indicator of brokerage power which accounts for both redundancy and the central position of the individual in the network. Given that network centrality may influence the perception of job characteristics (Brass, 1981) it may create concerns for possible reverse causality. As effective size gives a relative assessment of redundancy considering the ties of ego with respect to the ties of his or her alters, the concerns for reverse causality may be mitigated, although not completely ruled out. In fact, while it is conceivable to assume that the number of social sources of an individual may affect the perception of job characteristics, it is less apparent to see how the simple lack of connectedness among ties in the ego-network may directly affect job perceptions.

Job Crafting. Leana et al. (2009) so far developed the only scale for measuring job crafting. Their scale develops items specific to their empirical context (childcare classrooms) while also adapting items from the taking charge scale (Morrison & Phelps, 1999: 410). I developed a 9-item scale of job crafting, borrowing items from Leana et al. (2009) and from Morrison and Phelps (1999), while adding items that directly mirror the definition of job crafting proposed by Wrzesniewski and Dutton (2001). Wrzesniewski and Dutton (2001) identify three sets of crafting behaviors: task expansion, task change, and task simplification, which are believed to co-occur as individuals proactively attempt to alter the nature of their job. The overall reliability of the scale was adequate for the whole sample ($\alpha = .88$), as well as for Organization 1 ($\alpha = .89$) and Organization 2 ($\alpha = .86$). Following Leana et al. (2009) the job crafting scale is a self-rated scale. The use of a self-rated scale to measure job crafting builds on the idea that supervisors are often incapable of understanding how individuals alter their job tasks, while individuals themselves are better able of assessing the degree of changes in their jobs (Grant, Parker & Collins, 2009).

Structural Holes Position with High/Low Job Crafting Alters. The measurement of the combination between structural hole positions and the characteristics of contacts

required some computational effort. I followed a procedure similar to that employed by Soda and Bizzi (2012). The simple interaction term between structural hole positions and the crafting of contacts does not allow the testing of the hypotheses developed. In fact, an interaction term allows exploration of how structural hole positions exercise different effects depending on the average degree of crafting of all contacts, but it does not give any information on who the broker is actually bridging. Two individuals could show the same interaction term if they have similar structural holes and similar aggregate crafting of contacts but, within their network, one individual could bridge only contacts with high crafting while the other individual could bridge only contacts with low crafting. In order to test the hypotheses, for each individual I extracted from the whole network structure the contacts with low crafting and the contacts with high crafting, on the basis of the median split. For each organization I constructed an asymmetric matrix "individuals by contacts" and I calculated the structural hole position of each individual with contacts having low crafting and with contacts having high crafting. In other words, I extracted the network cluster of contacts having low crafting and the network cluster of contacts having high crafting and I calculated the structural hole positions of individuals within each network cluster extracted, using the effect size indicator.

It is important to clarify that extracting sub-networks does not create distorted measures of structural holes because structural holes are constructed exclusively considering ties among alters in the ego-network. Burt (2007) showed that the operationalization of brokerage through structural holes considers only the local network structure of the individual and focuses on the absence or presence of direct ties between alters. Structural hole positions in the theory developed by Burt (1992) do not consider the fact that alters are brokered exclusively by ego or by other actors in the network. The theory of the local structure proposed by Burt contrasts with views of bridging power built on the whole network derived, for instance, from the construct of betweenness centrality (Mehra et al., 2001). The extraction of sub-networks allows me to identify how contacts with high crafting and contacts with low crafting are connected to each other or not. Hypothesis 6 and hypothesis 7 can therefore be tested.

However, this procedure does not help in assessing how contacts with high crafting are connected or not to contacts with low crafting. For this case, it is not possible to extract any cluster of network contacts but it would be necessary to consider the whole ego-network of contacts surrounding the focal individual and, case by case, identify the ties by which a high crafting contact is tied or not to a low crafting contact. Given that this approach is rather costly, I indirectly assessed the effect of brokering heterogeneous alters through statistical analysis. The structural hole indicator of an individual calculated through the effect size accounts for the three types of ties: ties between pairs of alters having high crafting, ties between pairs of alters having low crafting, and ties between one alter having low crafting and one alter having high crafting. The first two types of ties are directly measured through extraction of network clusters in the ego-network and I need to isolate the effect of the third type of ties on individual job crafting. For this reason, if I include in the regression equation the overall measure of structural holes, after controlling for the effect of structural holes of high crafting contacts and structural holes of low crafting contacts, I partial out the effect of the first two types of ties and I isolate the effect of the third type of ties between heterogeneous contacts. Removing the effect of structural holes of high crafting contacts and structural holes of low crafting contacts, the overall structural hole measure captures the residual effect of ties between pairs having heterogeneous job crafting.

Controls. I controlled for *gender* (M = 1; F = 2), because individual networks may vary substantially in men and in women (Ibarra, 1992, 1993). I also controlled for *age*, assuming that young individuals may be more dynamic in networking and in crafting tasks but also considering the possibility that individuals with high age may have experience which can influence both networking and crafting. I controlled for *education* (1 = high school; 2 = bachelor; 3 = master; 4 = Phd) to account for the possible effect education can play on the capacity to network, craft and even perceive job characteristics. I also included two controls for tenure: *tenure in the organization* (in years) and *tenure in the job position* (in months). Controlling for those variables could be relevant because job crafting may be related to tenure in the organization (Fried, Grant, Levi, Hadani, & Slowik, 2007). It is reasonable to assume that the more someone has experience in the organization, the more he or she could be capable of altering tasks.

On the other side, it could also be argued that the more someone has experience in the organization, the less he or she may need to alter tasks, because he or she could have already adapted the job in the past and reached a good fit. Networking could also be a function of cumulated experience in the organization (Nebus, 2006). In addition, I controlled for the *organization*, including a dummy. The sample includes one mechanistic and one organic organization, and the patterns of relationships can vary across these two types of organizations (Shrader, Lincoln, & Hoffman, 1989; Tichy & Fombrun, 1979), as well as the degree of changes in task activities performed by individuals (Miles, Snow, Meyer & Coleman, 1978). In the regression tests predicting job crafting, I also considered the job characteristics as controls, in order to explore how structural holes exercise a unique predictive effect on job crafting. Last, in the regression tests predicting job crafting, I included another control which has particular importance to avoid confounded effects due to possible endogeneity factors. I argued that individuals are likely to influence each other's crafting behaviors, resulting in a possible association between individual's crafting and alters' crafting. Since the dependent variable is the crafting of the individual and the independent variables are based on the crafting of alters, I controlled for *alters' job crafting*, so that I could be capable of isolating the unique effects of bridging alters with diverse characteristics. Alters' job crafting was calculated as the average of alters' job crafting score. The additive logic of aggregation to measure the effects of the characteristics of network contacts on individuals' behaviors is the commonly accepted aggregation logic used in network studies (Reagans & McEvily, 2003; Zaheer & Soda, 2009), generally assuming that the characteristics of contacts have equal importance in the determination of the aggregate network characteristic. Research in network homophily that examines how individuals' characteristics are influenced by alters' characteristics generally considers the average of alters' characteristics to assess the influence on individuals (McPherson, Smith-Lovin, & Cook, 2001).

TABLE III – Descriptives and Zero-Order Correlations

	Mean	St.Dv.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Organization	0.10	0.49														
2. Gender	1.29	0.45	-.29**													
3. Age	38.06	9.96	-.69**	.18**												
4. Education	2.00	0.56	.01	-.04	-.13*											
5. Tenure Org (Y)	7.70	10.71	-.33**	.12	.44**	-.20**										
6. Tenure Position (M)	48.05	70.99	-.45**	.11	.56**	-.15*	.57**									
7. Autonomy	3.85	0.82	-.05	-.03	.04	.07	.12*	.02								
8. Variety	4.01	0.85	-.26**	.00	.26**	.00	.16*	.12	.41**							
9. Significance	3.46	1.00	-.36**	-.05	.29**	.04	.19**	.20**	.29**	.41**						
10. Identity	3.54	0.92	-.12	-.06	.16*	.02	.13	.11	.28**	.23**	.21**					
11. Feedback	3.62	0.86	-.27**	.12	.20**	.01	.16*	.17**	.33**	.32**	.38**	.41**				
12. AUT-supervisor	2.63	1.53	.33**	-.09	-.23**	.07	-.11	-.21**	.06	-.03	-.16*	-.34**	-.27**			
13. VAR- supervisor	2.59	1.17	-.12	.05	.05	.17*	-.05	-.09	.16*	.15	.04	-.14	-.04	.55**		
14. SIG- supervisor	3.22	1.25	.53**	-.26**	-.43**	.15	-.26**	-.34**	-.13	-.15*	-.31**	-.35**	-.34**	.71**	.44**	
15. IDE- supervisor	3.17	1.42	.50**	-.11	-.33**	.11	-.17*	-.28**	.07	-.13	-.24**	-.32**	-.29**	.50**	.23**	.46**
16. FEED- supervisor	3.25	1.47	-.54**	.10	.34**	-.06	.17*	.30**	.08	.13	.39**	.33**	.35**	-.61**	-.28**	-.81**
17. AUT-coded	3.06	1.30	.22**	-.03	-.15*	.07	-.12*	-.25**	.16*	.06	-.04	-.10	-.06	.78**	.33**	.61**
18. VAR- coded	2.76	1.27	-.29**	.12*	.23**	.07	.08	-.01	.22**	.29**	.22**	-.08	.08	.47**	.73**	.24**
19. SIG- coded	3.28	1.17	.17**	-.13	-.15*	.09	-.17**	-.23**	.10	.15*	.06	-.16**	-.13*	.69**	.56**	.72**
20. IDE- coded	3.79	1.09	.36**	-.10	-.24**	.12	-.14*	-.25**	.23**	.00	-.11	.01	.02	.41**	.02	.30**
21. FEED- coded	3.01	1.28	-.50**	.14*	.29**	.02	.13*	.26**	.06	-.03	.18**	.24**	.27**	-.57**	-.25**	-.61**
22. AUT-job	3.86	.063	-.12*	-.02	.02	.08	.06	-.04	.79**	.36**	.23**	.22**	.30**	.02	.16*	-.24**
23. VAR-job	3.98	0.62	-.39**	.09	.29**	-.01	.18**	.13*	.38**	.74**	.34**	.10	.27**	.01	.23**	-.17*
24. SIG-job	3.44	0.74	-.49**	.03	.34**	.03	.22**	.23**	.23**	.34**	.77**	.17**	.37**	-.15*	.10	-.40**
25. IDE-job	3.56	0.69	-.14*	.02	.14*	.03	.10	.09	.22**	.10	.17**	.77**	.34**	-.39**	-.17**	-.42**
26. FEED-job	3.63	0.65	-.33**	.15*	.21**	.01	.17**	.17**	.29**	.27**	.36**	.33**	.80**	-.27**	.00	-.34**
27. Structural Holes	6.13	5.67	-.03	.03	.06	-.05	.04	.00	.12*	.16*	.05	-.08	-.07	.44**	.35**	.37**
28. Str. Holes – High JC	4.61	5.34	.08	.00	-.03	.03	.02	-.12	.19**	.14*	.08	-.06	-.07	.44**	.35**	.35**
29. Str. Holes – Low JC	4.83	5.52	.02	.03	.02	-.06	.01	-.04	0.0	-.01	-.12	-.23**	-.20**	.46**	.31**	.39**
30. Job Crafting	3.36	0.71	.18**	-.04	-.11	.12	.06	-.16**	.37**	.24**	.13*	.05	.02	.22**	.25**	.12

* p <. .05; ** p < .01

Note: given the size of the correlation table, only two significance levels are considered in order to simplify the representation . *Sample*: 290 employees

TABLE III (continued) - Descriptives and Zero-Order Correlation

	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
1. Organization															
2. Gender															
3. Age															
4. Education															
5. Tenure Org (Y)															
6. Tenure Position (M)															
7. Autonomy															
8. Variety															
9. Significance															
10. Identity															
11. Feedback															
12. AUT-supervisor															
13. VAR- supervisor															
14. SIG- supervisor															
15. IDE- supervisor															
16. FEED- supervisor	-.54**														
17. AUT-coded	.21**	-.53**													
18. VAR- coded	.26**	-.18**	.35**												
19. SIG- coded	.22**	-.56**	.59**	.52**											
20. IDE- coded	.64**	-.36**	.33**	.19**	.21**										
21. FEED- coded	-.50**	.72**	-.36*	-.14*	-.41**	-.19**									
22. AUT-job	.07	.20**	.13*	.27**	.06	.24**	.13*								
23. VAR-job	-.06	.21**	.06	.39**	.16**	-.01	-.03	.47**							
24. SIG-job	-.27**	.51**	-.04	.32*	.06	-.14*	.26**	.31**	.46**						
25. IDE-job	-.35**	.43**	-.12*	-.09	-.23**	-.01	.32**	.27**	.11*	.22**					
26. FEED-job	-.32**	.39**	-.03	.13*	-.10	.03	.30**	.36**	.33**	.43**	.41**				
27. Structural Holes	.07	-.36**	.39**	.43**	.43**	.01	-.32**	.10	.20**	.03	-.12*	-.11			
28. Str. Holes – High JC	.13*	-.37**	.34**	.36**	.36**	.07	-.34**	.16**	.17**	.06	-.07	-.08	.77**		
29. Str. Holes – Low JC	.16**	-.39**	.37**	.38**	.37**	.08	-.28**	.01	.08	-.12*	-.24**	-.18**	.81**	.54**	
30. Job Crafting	.31**	-.16*	.23**	.28**	.22**	.34**	-.11	.30**	.15*	.02	.02	.02	.12	.30**	.13*

* p <. .05; ** p < .01

Note: given the size of the correlation table, only two significance levels are considered in order to simplify the representation . *Sample*: 290 employees

4.6. Analysis and Results

Table III reports means, standard deviations and zero-order correlations among variables. The typical employee sampled is male (29% F; 71% M), has 39 years of age, with bachelor university degree, an average tenure in the organization of 7.7 years and an average tenure in the position of 48 months. This suggests that respondents generally have sufficient experience to assess their jobs. There are evidently good correlations between the self-report and the job-averaged reports of job characteristics and there are significant and strong correlations between supervisory and coded measures of job characteristics although the first two measures show little correlation with the last two measures. These results do not come as a surprise since it is quite common that subjective and so called "objective" sources of job characteristics show little or no covariance as they capture different phenomena, and for this reason they need to be simultaneously considered for providing a stronger assessment of job design features (Algera, 1983; Hackman & Lawler, 1971; Roberts & Glick, 1981; Spector & Jex, 1991). Managers and employees have different points of reference when assessing jobs and may take into account different job aspects as they are exposed to diverse pieces of information from the environment (Salancik & Pfeffer, 1978). However, it is worth noting that although for autonomy, variety and feedback the first two measures correlate positively and significantly with the last two measures, showing consistent positive correlations across methods, for task significance and for task identity there is a strongly significant and negative correlation between the self-report ratings and the supervisory ratings of job characteristics. In other words, employees and supervisors seem to have opposite cognitions about task significance and task identity. In fact, we suggest that the strongly significant and negative zero-order correlations between the supervisory and the self-report ratings of identity and significance are the artificial result of the spurious influence of other variables. For instance, the organizational dummy is negatively related to both self-report measures and positively related to both supervisory measures. Calculating the partial correlations when the demographic variables are controlled for, self-report and supervisory measures of task significance become orthogonal. In the case of task identity, the partial correlation shows a modest negative value. In both cases, the

TABLE IV – Regression Analyses for the Prediction of Structural Hole Positions (*unstandardized β*)

	Model 1	Model 2 Self-Report	Model 3 Job	Model 4 Supervisor	Model 5 Coded
Organization	.94(1.28)	1.19(1.30)	1.09(1.32)	-.81(1.60)	-1.59(1.29)
Gender	.11(.99)	.46(.99)	.72(.97)	.14(1.24)	.04(.80)
Age	.05(.06)	.05(.06)	.04(.06)	-.00(.08)	-.05(.05)
Education	-.60(.80)	-.62(.79)	-.53(.77)	-.81(.90)	-.57(.64)
Tenure Org (Y)	.26(.10)**	.19(.10)*	.20(.09)	.10(.11)	.11(.08)
Tenure Position (M)	-.02(.01)**	-.01(.01)*	-.01(.01)	-.00(.01)	-.00(.00)
Autonomy		1.17(.58)**	1.42(.79)*	1.98(.51)****	.89(.37)**
Variety		1.32(.57)**	2.12(.83)**	.96(.50)*	1.12(.40)***
Significance		.03(.48)	.15(.67)	-.58(.78)	1.06(.46)**
Identity		-.95(.50)*	-1.13(.64)*	-1.36(.50)***	-.68(.38)*
Feedback		-.92(.60)	-1.88(.79)**	-1.31(.60)**	-1.33(.38)***
F Model	1.78	2.58***	3.30****	4.87****	12.57****
Δ F Model		3.44***	4.90****	8.14****	24.54****
Adj. R²	.02	.08	.11	.26	.38
Adj. Δ R²		.06	.09	.24	.36

* $p < .1$; ** $p < .05$; *** $p < .01$; **** $p < .001$ Standard errors in parentheses. *Sample*: 290 employees

TABLE IV (*continued*) – Regression Analyses for the Prediction of Structural Hole Positions (*standardized β*)

	Model 1	Model 2 *Self-Report*	Model 3 *Job*	Model 4 *Supervisor*	Model 5 *Coded*
Organization	.073	.092	.084	-.068	-.127
Gender	.008	.034	.053	.011	.003
Age	.090	.088	.069	-.005	-.080
Education	-.053	-.055	-.047	-.076	-.052
Tenure Org (Y)	.284**	.217*	.224	.141	.131
Tenure Position (M)	-.264**	-.181*	-.169	-.088	-.047
Autonomy		.158**	.153*	.512****	.186**
Variety		.187**	.224**	.193*	.240***
Significance		.006	.019	-.115	.190**
Identity		-.142*	-.133*	-.325***	-.124*
Feedback		-.127	-.206**	-.311**	-.280***
F Model	1.78	2.58***	3.30****	4.87****	12.57****
Δ F Model		3.44***	4.90****	8.14****	24.54****
Adj. R²	.02	.08	.11	.26	.38
Adj. Δ R²		.06	.09	.24	.36

* p <. .1; ** p <. .05; *** p <. .01; **** p <. .001 *Sample*: 290 employees

significance of relationships shown in Table III disappears after controlling for the spurious influence of the other demographic variables.

Table IV reports the results of the OLS regression tests for the prediction of structural hole positions. Generally, we could observe how the hypotheses on the divergent predictive role of job characteristics on structural hole positions tend to be supported and the results are generally replicated considering the different measures of job characteristics. Model 1 introduces the control variables and interestingly illustrates that tenure in the organization is positively related to structural hole positions while tenure in the position is negatively related to them. Model 2 inputs in the equation job characteristics through employee self-report. These analyses support the significant and positive predictive role of autonomy [*Hp1*] (β = 1.17; p = .04) and variety [*Hp2*] (β = 1.32; p = .02). There is marginal support for the negative role of identity [*Hp4*] (β = -.95; p = .06). In Model 3, I considered the effects of job characteristics averaged by job and I find again support, although only marginal, for autonomy [*Hp1*] (β = 1.42; p = .07), variety [*Hp2*] (β = 2.12; p = .02), and identity [*Hp4*] (β = -1.13; p = .08), while also finding support for the negative effect of feedback [*Hp5*] (β = -1.88; p = .01). In Model 4, I accounted for the effects of job characteristics rated by supervisors and I find stronger support as compared to the previous cases. I find positive and significant relationships for autonomy [*Hp1*] (β = 1.98; p < .001) and variety [*Hp2*] (β = .96; p = .05), and negative significant relationships for identity [*Hp4*] (β = -1.36; p = .007), and feedback [*Hp5*] (β = -1.31; p = .03). Last, in Model 5 I introduced the job characteristics measured through coding and I found full support for all hypotheses, including autonomy [*Hp1*] (β = .89; p = .01), variety [*Hp2*] (β = 1.12; p = .006), significance [*Hp3*] (β = 1.06; p = .02) and feedback [*Hp5*] (β = 1.13; p = .001). Identity though is only marginally supported [*Hp4*] (β = -.68; p = .07).

It is worth noting that as measures become more "objective", from the left to the right, the variance explained by job characteristics increases. This finding is relevant because it partially decreases the concerns for reverse causal order between job characteristics and structural hole positions suggesting clearer causality. The more the characteristics are "objective" the less likely it is that they result from perceptual

influences stemming from network position or crafting. If there were a consistent recursive causality between job characteristics and structural hole positions, we would expect that employees' self-rating would exhibit higher covariance than the other measures. It is also interesting to notice that in all significant cases the signs of β are replicated across the four measures of job characteristics and even in all non-significant cases, with the exception of task significance for supervisors, the signs of β are replicated, providing solid support for the divergent effects of job characteristics on the formation of structural hole positions.

I also performed an additional set of regressions aggregating the five job characteristics into a single variable and examining whether the composite index of job characteristics exercise a stronger or weaker predictive influence on structural holes. Given that job characteristics are correlated amongst each other and given that in job design research authors have often explored the overall predictive validity of "enlarged job", derived from the aggregation of the five job dimensions, it may be interesting to see whether the dimension-specific models offer a better prediction than the composite model. I therefore ran the same set of regressions illustrated in Table IV with the composite job characteristic variable instead of the five separate job dimensions. Interestingly, for both self-report measures and job-averaged measures, the aggregate job characteristics measure does not exercise any predictive effect on the development of structural hole position. The relationship is non-significant and there is null improvement in the R^2 of the model. The job dimensions which positively predict structural hole positions and the job dimensions which negatively predict them neutralize each other's effect making the overall variable of job characteristics incapable of predicting networks. In the case of supervisory rating, the aggregate job characteristics variable exercises a positive and significant role ($\beta = 3.04$; $p < .001$) although the model with the five separate dimensions explains 14% more variance than the model with the single aggregate variable. In the case of coded ratings, the aggregate job characteristic variable exercises a positive and significant role ($\beta = 4.00$; $p < .001$), although this model explains 20% less variance than the model with the five separate job dimensions. Since in the model, the job characteristics exercising positive effects are more than the job characteristics exercising negative effect and their significant role is

stronger, it is possible to assume that in the aggregate variable of job characteristics the positive dimensions prevail over the negative, determining an overall significant effect. However, it is plausible to assume that the negative dimensions weaken the effect of the positive dimensions and the presence of divergent predictive roles makes the overall job characteristic variable less capable of explaining variance than the dimension-specific model. The model with the five job characteristics offers a better explanation of structural holes than the model with the composite index, confirming the value of studying job characteristics separately.

In Table V, I report the results of the regression tests performed to assess the predictive role of structural holes on job crafting. In order to provide evidence of the robustness of predictions, I performed different sets of tests including the different measures of job characteristics as controls. I did not consider a model controlling simultaneously for all measures of job characteristics because some job characteristics show inter-method high correlation, leading to multicollinearity problems. Given that the predictors are highly correlated, I assessed the effect of each predictor one by one introducing them in the equation through the stepwise procedure. For each job characteristic measure I developed five models: the first one accounting only for the effects of controls; the second, third and fourth ones including each single structural hole variable, and the fifth one simultaneously considering all three predictors. It is interesting to note that, even in this case, results tend to robustly replicate using different sets of controls and therefore show the predictive value of structural holes for job crafting. Structural holes with alters having high crafting is the only variable which exercises a significant predictive value when considered alone. *Hypothesis 6* is therefore supported. In the full model, we can see that structural holes with alters having high crafting is positively and significantly related to job crafting in the models having self-report ($\beta = .05$; $p < .001$), job-averaged ($\beta = .05$; $p < .001$), supervisory ($\beta = .03$; $p = .07$), and coded ($\beta = .05$; $p < .001$) job characteristics. We can observe that structural holes with alters having low crafting exhibits a substantially lower explanatory power. In the case of self-report measures of job characteristics I provide evidence for a positive and less significant effect ($\beta = .02$; $p = .02$), while in the other cases I found a positive but non-significant relationships. We can therefore confirm *Hypothesis 7a* in the case of

TABLE V - Regression Analyses for the Prediction of Job Crafting – *self-report* (*unstandardized β*)

	Model 6a	Model 7a	Model 8a	Model 9a	Model 10a
Organization	.34(.14)**	.34(.14)**	.29(.14)**	.33(.14)**	.27(.14)*
Gender	.13(.10)	.13(.10)	.13(.10)	.13(.10)	.13(.10)
Age	.00(.00)	.03(.00)	.00(.00)	.00(.00)	-.00(.00)
Education	.04(.08)	.04(.08)	.03(.08)	.04(.08)	.02(.08)
Tenure Org (Y)	.02(.01)*	.02(.01)*	.01(.01)	.01(.01)*	.01(.01)*
Tenure Position (M)	-.00(.00)***	-.00(.00)***	-.00(.00)**	-.00(.00)***	-.00(.00)**
Autonomy	.26(.06)****	.25(.06)****	.23(.06)****	.25(.06)****	.23(.06)****
Variety	.12(.06)**	.12(.06)*	.10(.06)*	.12(.06)*	.13(.06)**
Significance	.05(.05)	.05(.05)	.04(.05)	.06(.05)	.05(.05)
Identity	.01(.05)	.01(.05)	.02(.05)	.02(.05)	.04(.05)
Feedback	-.12(.06)*	-.11(.06)*	-.09(.06)	-.11(.06)*	-.09(.06)
Alters' Job Crafting	.00(.12)	.01(.12)	.02(.12)	.01(.12)	-.05(.12)
Structural Holes		.00(.00)			-.06(.01)***
Structural Holes with High Crafting Alters			.019(.00)**		.05(.01)****
Structural Holes with Low Crafting Alters				.00(.00)	.02(.01)**
F Model	5.64****	5.19****	5.88****	5.28****	6.19****
Δ F Model		.13	6.68**	.90	6.39****
Adj. R²	.22	.21	.25	.22	.29
Adj. Δ R²		-.01	.03	.00	.07

* p <. .1; ** p <. .05; *** p <. .01; **** p <. .001 Standard errors in parentheses. *Sample*: 290 employees

TABLE V (*continued*) - Regression Analyses for the Prediction of Job Crafting – *job-average (unstandardized β)*

	Model 6b	Model 7b	Model 8b	Model 9b	Model 10b
Organization	.34(.15)**	.34(.15)**	.28(.15)*	.33(.15)**	.27(.15)*
Gender	.11(.10)	.11(.11)	.10(.10)	.11(.11)	.10(.10)
Age	.00(.00)	.00(.00)	.00(.00)	.00(.00)	.00(.00)
Education	.05(.08)	.05(.08)	.04(.08)	.05(.08)	.02(.08)
Tenure Org (Y)	.02(.01)**	.02(.01)*	.01(.01)	.02(.01)*	.01(.01)*
Tenure Position (M)	-.03(.00)***	-.00(.00)***	-.00(.00)**	-.00(.00)***	-.00(.00)**
Autonomy	.35(.08)****	.34(.08)****	.31(.08)***	.34(.08)****	.31(.08)****
Variety	.06(.09)	.05(.09)	.03(.09)	.06(.09)	.07(.09)
Significance	.00(.07)	.00(.07)	-.01(.07)	.01(.07)	-.01(.07)
Identity	-.00(.07)	.00(.07)	.00(.07)	.00(.07)	-.00(.07)
Feedback	-.11(.09)	-.11(.09)	-.07(.09)	-.11(.09)	-.09(.08)
Alters' Job Crafting	-.02(.13)	-.01(.13)	-.00(.12)	-.01(.13)	-.07(.12)
Structural Holes		.00(.00)			-.04(.01)***
Structural Holes with High Crafting Alters			.02(.00)***		.05(.01)****
Structural Holes with Low Crafting Alters				.00(.00)	.01(.01)
F Model	4.59****	4.23****	4.94****	4.24****	5.06****
Δ F Model		.18	7.26***	.27	5.43****
Adj. R²	.18	.18	.20	.18	.24
Adj. Δ R²		.00	02	.00	.06

* p <. .1; ** p <. .05; *** p <. .01; **** p <. .001 Standard errors in parentheses. *Sample*: 290 employees

TABLE V (*continued*) - Regression Analyses for the Prediction of Job Crafting – *supervisor (unstandardized β)*

	Model 6c	*Model 7c*	*Model 8c*	*Model 9c*	*Model 10c*
Organization	.14(.20)	.14(.19)	.13(.20)	.15(.20)	.10(.20)
Gender	.33(.14)**	.33(.14)**	.33(.15)**	.34(.14)**	.30(.15)*
Age	-.01(.01)	-.01(.01)	-.01(.01)	-.01(.01)	-.01(.01)
Education	.02(.11)	.01(.11)	.02(.11)	.01(.11)	.03(.11)
Tenure Org (Y)	.05(.01)***	.05(.01)****	.05(.01)***	.04(.01)***	.05(.01)****
Tenure Position (M)	-.00(.00)***	-.00(.00)***	-.00(.00)***	-.00(.00)***	-.00(.00)***
Autonomy	.05(.06)	.09(.06)	.05(.06)	.08(.06)	.06(.06)
Variety	.10(.06)*	.13(.06)**	.10(.06)*	.12(.06)*	.11(.06)*
Significance	-.11(.09)	-.13(.09)	-.11(.09)	-.12(.09)	-.12(.09)
Identity	.03(.06)	.00(.06)	.03(.06)	.01(.06)	.02(.06)
Feedback	-.01(.07)	-.03(.07)	-.00(.07)	-.02(.07)	-.03(.07)
Alters' Job Crafting	.08(.14)	.06(.14)	.08(.15)	.07(.14)	.01(.15)
Structural Holes		-.01(.01)			-.04(.02)*
Structural Holes with High Crafting Alters			.00(.01)		.03(.01)*
Structural Holes with Low Crafting Alters				-.01(.01)	.00(.01)
F Model	4.54****	4.40****	4.16****	4.31****	4.06****
Δ F Model		2.05	.04	1.30	1.73
Adj. R²	.27	.28	.26	.27	.29
Adj. Δ R²		.01	-.01	.00	.02

* p <. .1; ** p <. .05; *** p <. .01; **** p <. .001 Standard errors in parentheses. *Sample*: 290 employees

	Model 6d	Model 7d	Model 8d	Model 9d	Model 10d
Organization	.62(.18)★★★	.62(.18)★★★	.60(.18)★★★	.63(.18)★★★	.55(.18)★★★
Gender	.02(.10)	.02(.10)	.02(.10)	.02(.10)	.02(.10)
Age	.00(.00)	.00(.00)	.00(.00)	.00(.00)	-.00(.00)
Education	.02(.08)	.02(.08)	.02(.08)	.02(.08)	.00(.08)
Tenure Org (Y)	.01(.01)	.01(.01)	.01(.01)	.01(.01)	.01(.01)
Tenure Position (M)	-.02(.00)★	-.00(.00)★	-.00(.00)★	-.00(.00)★	-.00(.00)
Autonomy	.03(.05)	.03(.05)	.01(.05)	.03(.05)	.03(.04)
Variety	.23(.05)★★★★	.24(.05)★★★★	.20(.05)★★★★	.24(.05)★★★★	.22(.05)★★★★
Significance	-.02(.06)	-.01(.06)	-.03(.06)	-.01(.06)	.00(.06)
Identity	.07(.05)	.07(.05)	.08(.05)★	.07(.05)	.07(.05)
Feedback	.13(.05)★★★	.13(.05)★★	.16(.05)★★★	.13(.05)★★	.14(.05)★★★
Alters' Job Crafting	-.13(.13)	-.14(.13)	-.13(.13)	-.15(.13)	-.20(.13)
Structural Holes		-.00(.01)			-.04(.01)★★★
Structural Holes with High Crafting Alters			.02(.00)★★★		.05(.01)★★★★
Structural Holes with Low Crafting Alters				-.00(.00)	.00(.01)
F Model	5.46★★★★	5.04★★★★	5.77★★★★	5.10★★★★	5.96★★★★
Δ F Model		.23	7.24★★★	.78	6.13★★★
Adj. R²	.21	.21	.24	..21	.28
Adj. Δ R²		.00	.02	.00	.06

★ p <. .1; ★★ p <. .05; ★★★ p <. .01; ★★★★ p <. .001 Standard errors in parentheses. *Sample*: 290 employees

TABLE V (*continued*) - Regression Analyses for the Prediction of Job Crafting – *self-report* (*standardized β*)

	Model 6a	Model 7a	Model 8a	Model 9a	Model 10a
Organization	.236**	.232**	.199**	.225**	.187*
Gender	.087	.087	.083	.087	.083
Age	.036	.035	.018	.026	-.021
Education	.036	.036	.030	.037	.016
Tenure Org (Y)	.189*	.184*	.151	.182*	.167*
Tenure Position (M)	-.281***	-.278***	-.240**	-.276***	-.228**
Autonomy	.308****	.304****	.273****	.300****	.274****
Variety	.155**	.150*	.132*	.149*	.171**
Significance	.086	.085	.069	.092	.077
Identity	.014	.018	.034	.032	.057
Feedback	-.146*	-.143*	-.121	-.137*	-.111
Alters' Job Crafting	.005	.009	.014	.011	-.036
Structural Holes		.025			-.528***
Structural Holes with High Crafting Alters			.175**		.460****
Structural Holes with Low Crafting Alters				.065	.251**
F Model	5.64****	5.19****	5.88****	5.28****	6.19****
Δ F Model		.13	6.68**	.90	6.39****
Adj. R²	.22	.21	.25	.22	.29
Adj. Δ R²		-.01	.03	.00	.07

* p <. .1; ** p <. .05; *** p <. .01; **** p <. .001 *Sample*: 290 employees

**TABLE V (*continued*) - Regression Analyses for the Prediction of Job Crafting – *job-average (standardized β)*

	Model 6b	Model 7b	Model 8b	Model 9b	Model 10b
Organization	.236**	.230**	.191*	.230**	.187*
Gender	.074	.073	.066	.073	.067
Age	.078	.076	.061	.072	.038
Education	.040	.041	.033	.041	.022
Tenure Org (Y)	.206**	.199*	.164	.201*	.178*
Tenure Position (M)	-.292***	-.288***	-.248***	-.289***	-.234**
Autonomy	.337****	.331****	.297***	.331****	.300****
Variety	.061	.053	.030	.056	.070
Significance	.006	.006	-.015	.012	-.020
Identity	-.003	.001	.007	.007	-.003
Feedback	-.113	-.107	-.071	-.108	-.087
Alters' Job Crafting	-.014	-.008	-.001	-.010	-.049
Structural Holes		.031			-.430***
Structural Holes with High Crafting Alters			.189***		.451****
Structural Holes with Low Crafting Alters				.038	.139
F Model	4.59****	4.23****	4.94****	4.24****	5.06****
Δ F Model		.18	7.26***	.27	5.43****
Adj. R²	.18	.18	.20	.18	.24
Adj. Δ R²		.00	02	.00	.06

* p <. .1; ** p <. .05; *** p <. .01; **** p <. .001 *Sample*: 290 employees

**TABLE V (*continued*) - Regression Analyses for the Prediction of Job Crafting – *supervisor (standardized β)*

	Model 6c	Model 7c	Model 8c	Model 9c	Model 10c
Organization	.101	.103	.098	.111	.075
Gender	.211**	.212**	.209**	.219**	.191*
Age	-.216	-.223	-.217	-.220	-.243
Education	.021	.014	.023	.015	.027
Tenure Org (Y)	.558***	.572****	.558***	.551***	.595****
Tenure Position (M)	-.519***	-.523***	-.517***	-.508***	-.509***
Autonomy	.126	.199	.113	.178	.139
Variety	.185*	.222**	.180*	.209*	.198*
Significance	-.193	-.219	-.189	-.201	-.209
Identity	.062	.016	.070	.037	.048
Feedback	-.024	-.074	-.017	-.052	-.063
Alters' Job Crafting	.063	.042	.062	.054	.012
Structural Holes		-.143			-.368*
Structural Holes with High Crafting Alters			.022		.266*
Structural Holes with Low Crafting Alters				-.112	.061
F Model	4.54****	4.40****	4.16****	4.31****	4.06****
Δ F Model		2.05	.04	1.30	1.73
Adj. R²	.27	.28	.26	.27	.29
Adj. Δ R²		.01	-.01	.00	.02

* $p < .1$; ** $p < .05$; *** $p < .01$; **** $p < .001$ *Sample*: 290 employees

TABLE V (*continued*) **- Regression Analyses for the Prediction of Job Crafting –** *job coding (standardized β)*

	Model 6d	Model 7d	Model 8d	Model 9d	Model 10d
Organization	.437★★★	.435★★★	.422★★★	.442★★★	.391★★★
Gender	.016	.016	.016	.014	.018
Age	.000	-.004	.003	-.003	-.031
Education	.021	.020	.018	.017	.003
Tenure Org (Y)	.150	.154	.127	.149	.137
Tenure Position (M)	-.212★	-.212★	-.185★	-.207★	-.160
Autonomy	.054	.060	.032	.063	.058
Variety	.444★★★★	.457★★★★	.381★★★★	.464★★★★	.416★★★★
Significance	-.034	-.025	-.050	-.017	.009
Identity	.117	.112	.137★	.114	.111
Feedback	.254★★★★	.243★★	.303★★★	.244★★	.257★★★
Alters' Job Crafting	-.088	-.093	-.089	-.096	-.132
Structural Holes		-.042			-.414★★★
Structural Holes with High Crafting Alters			.205★★★		.446★★★★
Structural Holes with Low Crafting Alters				-.070	.049
F Model	5.46★★★★	5.04★★★★	5.77★★★★	5.10★★★★	5.96★★★★
Δ F Model		.23	7.24★★★	.78	6.13★★★
Adj. R²	.21	.21	.24	..21	.28
Adj. Δ R²		.00	.02	.00	.06

★ p <. .1; ★★ p <. .05; ★★★ p <. .01; ★★★★ p <. .001 *Sample*: 290 employees

self-report measures, while *Hypothesis 7b* is confirmed in all cases. I reversed the order of entry of the variables in the regression models in order to assess possible stability and considering the possible instability effects caused by the potential multicollinearity among the structural hole variables, but the results tend to be stable regardless the order of entry. I also reversed the regression starting from the full model and taking off each single predictor through the *remove* procedure, but the results are confirmed to be stable. The structural hole variable tends to be slightly more significant when structural holes with low alters is removed from the equation.

Perhaps the most interesting finding is that, as expected, structural hole positions per se do not exercise in any case a significant predictive effect on job crafting, but when I include the indicators of structural holes with high and low alters, the variable in all cases becomes negative and significant. In other words, once I partial out the effect of ties between alters with high crafting and ties between alters with low crafting, leaving only the effect of pairs of ties between one high-crafting alter and one low-crafting alter, the negative effect of structural holes emerges. These findings are replicated in all four cases using different measures of job characteristics: self-report (β = -.06; p =.001), job-averaged (β = -.04; p = .006), supervisory (β = -.04; p =.08), and coded (β = -.04; p = .006). *Hypothesis 8* is therefore supported. The results show a contingent effect of structural holes on job crafting: when we consider ties among alters with high crafting, the effect of structural holes is strong and positive; when we consider ties among alters with low crafting, the effect of structural holes is weak and positive or null; when we consider ties between one alter having high crafting and one alter having low crafting, the effect of structural holes is strong and negative. Figure 23 portrays a diagram which summarizes the hypotheses and their empirical support.

It is possible to observe the stability of results across the two different organizations to assess how results are likely to be replicated and to provide evidence of the generalizability and strength of the theory. Results show some stability across the two different organizations, although the limited sample size combined with the correlations among the job characteristic variables or among controls allow us to capture significance only in some cases. In the prediction of structural holes in Organization 1,

FIGURE 23 – The Full Model
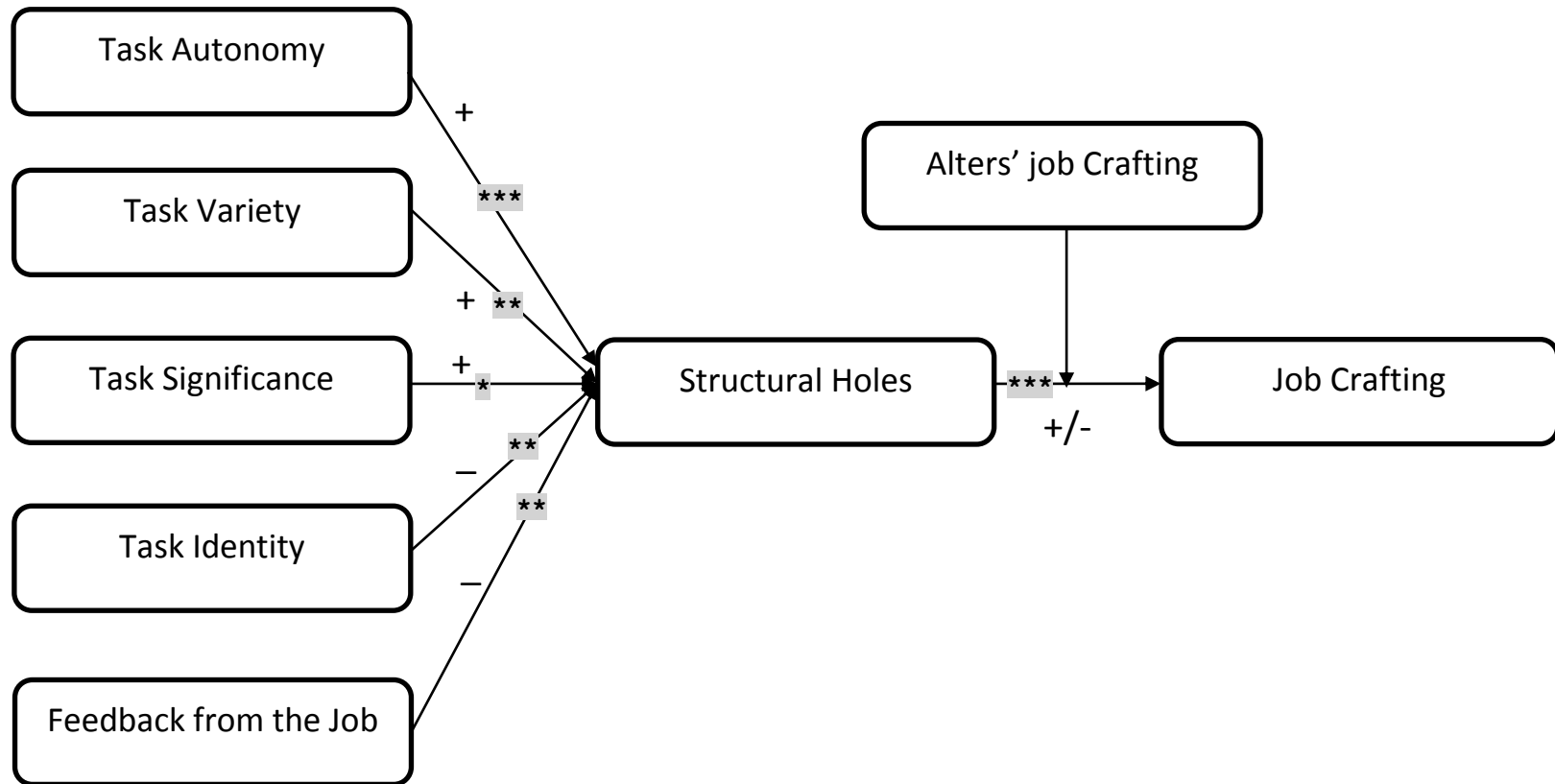
Average Empirical Support: ***** p <. .1; ****** p <. .05; ******* p <. .01; ******** p <. .001

the variables of autonomy, variety, identity and feedback show signs of the β values that are consistent with those of the predictions in all sixteen cases considering the four variables and the four measures. Interestingly, though, task significance shows a negative β sign, although the relationship is significant in only one case. Despite the reduced sample size and the correlations among variables the supervisory ratings of job characteristics show significant results for all five job characteristic variables. Furthermore, variety is significant for three measures, feedback is significant for supervisory and coded jobs, and autonomy is significant for supervisory and coded jobs. Results for the prediction of job crafting are less stable. There are no significant results, perhaps because job characteristics in Organization 1 already explain a large portion of variance and make it difficult for the model to explain additional portions of variance given the sample size. Nevertheless, it is worth noticing that without controlling for job characteristics, the *β* values show signs consistent with the hypotheses, and it appears that brokering alters with low job crafting is significant and structural holes is marginally significant ($p = .010$).

Concerning Organization 2, in the prediction of structural holes, each and all of the job characteristic variables show consistent signs of the β values which mirror the signs of the hypothesized relationships. The only case in which there is a different β among all twenty cases is for significance rated by supervisors. Despite the reduced sample size and the correlations among job characteristics, I detected significant effects for autonomy (supervisory rating), variety (job-averaged, supervisory, and coded ratings), feedback (job-averaged) and significance (coded rating). In the prediction of job crafting, in all four considered cases structural holes with alters having high crafting significantly explains job crafting (in all cases $p < .001$). In all four cases structural holes is initially non-significant and becomes significant and negative once controls are introduced. As a whole, the findings appear to be adequately replicated, given the limitations of sample size and correlations among variables, therefore suggesting the empirical strength and generalizability of the theory.

There is a last set of analyses that I performed to help interpret findings. It is important to specify that there could be a reverse relationship between job crafting and

job characteristics. Although I operationalized job characteristics in different ways to avoid the problems of reverse causation, such problems persist when it comes to self-report of job characteristics. However, the positions of researchers seem to diverge. Some scholars argue that job characteristics and job crafting exhibit a recursive relationship which results in job characteristics growing over time due to the cumulative effect of crafting behaviors (Fried et al., 2007). However, another position is that crafting behaviors affect the job without necessarily altering its constitutive nature and the job characteristics remain stable. Individuals may alter their tasks but the main source of variation across jobs remains related to the different and stable work requirements associated with the broader professional and occupational contexts (Dierdorff & Morgeson, 2007; Dierdorff, Rubin, & Morgeson, 2009; Morgeson, Dierdorff, & Hmurovic, 2010). In other words, even if a software programmer engages in job crafting while a CEO does not, the former will always exhibit substantially lower task variety than the latter and crafting will not alter jobs so much to change the relative comparison of job characteristics. Furthermore, if individuals engaged simply in task expansion, we would expect a possible increase in job characteristics but as task expansion seems to co-occur along with task reduction or task substitution, job crafting may "recompose jobs" without necessarily altering the levels of each job characteristic.

I performed two tests to provide some evidence of the possible stability or dynamism in job characteristics. First, I performed a set of regressions to assess if either tenure in the organization or tenure in the position were significantly explaining each single job characteristic. If job characteristics are supposed to expand over time because of the recursive relationship with crafting, we would expect that tenure would be significantly associated with higher job characteristics ratings. I found that only in the case of task autonomy, both tenure indicators show a marginally significant relationship ($p = .09$). However, it is possible that tenure is related to promotion and jobs with higher hierarchical position may be characterized by more autonomy. Once I control for the coded job characteristic, which should not reflect individual crafting, no self-report job characteristic is shown to increase with tenure. Second, I examined whether within the exact same job, individuals with higher tenure report higher (or lower) job characteristics as compared to individuals with lower tenure. I extracted a sub-sample of

145 respondents occupying the 18 most popular jobs, which had at least 5 respondents per job. I ran regressions including dummies for each job as controls. After controlling for each job, neither tenure in the organization nor tenure in the job position significantly explain any of the five job characteristic. A synthetic summary of the results of those regression tests is reported in Table VI. The findings provide some illustrative, though not conclusive, evidence on the lack of dynamic patterns in job characteristics over time, reinforcing the model.

TABLE VI – Regression Tests for the Prediction of Tenure on Self-Report Job Characteristics

	Tenure Organization		Tenure Position	
	β	p	β	p
Controlling for Demographic Variables:				
Task Autonomy	.026	.06	-.003	.07
Task Variety	.019	.17	-.002	.11
Task Significance	.022	.15	-.001	.49
Task Identity	-.004	.80	.000	.75
Feedback from the Job	.000	.97	.001	.32
Controlling for Demographics + Coded Job Characteristic:				
Task Autonomy	.019	.15	-.002	.22
Task Variety	.008	.57	-.001	.50
Task Significance	.016	.30	.000	.87
Task Identity	-.011	.50	.000	.56
Feedback from the Job	.004	.78	.001	.52
Controlling for Demographics + Jobs:				
Task Autonomy	.001	.98	.002	.58
Task Variety	.018	.66	-.00	.64
Task Significance	.018	.69	.00	.96
Task Identity	-.033	.45	.002	.66
Feedback from the Job	-.017	.63	.003	.37

Sample: 290 employees

4.7. Discussion

In this paper I developed and tested a theory exploring the mutual and ambivalent interplay between the task context and the social context. I hypothesized that job characteristics affect the development of structural hole positions and that structural hole positions affect job crafting behaviors of individuals. Using different measures that capture distinct aspects of the structure of jobs, I found that job characteristics explain a large portion of variance in structural hole positions and exercise divergent predictive effects: autonomy, variety and significance are positively related to structural holes while identity and feedback are negatively related to structural hole positions. Apparently, there is no mediating effect of structural holes on the relationship between job characteristics and job crafting, as I found evidence for a contingent, and not direct, predictive role of structural holes on job crafting. More specifically, I found that both structural hole positions with alters having high job crafting and with alters having low job crafting positively explain job crafting. Moreover, once I control for those two specific types of structural holes, the dark side of structural holes emerges and they show a negative predictive effect over job crafting. I provided some evidence of the robustness of the theory, showing how findings replicate using different measures of job characteristics and evidence of the generalizability of the theory, showing how findings replicate in two completely different organizational contexts.

In the prediction of structural holes shown on Table IV, results tend to be stronger from the left to the right, as we move from self-report measures to more "objective" measures. A reason for this difference may be found in the fact that so called "objective" measures partially eliminate the perceptual interpretations of individuals' jobs. Individuals know better their own job but have a reduced capacity to assess their job in relation to other jobs, leading to potential error. Individuals may rate what they do in relation to their experience and not in relation to others. For instance, some blue collar workers promoted as team leaders reported having the highest autonomy and variety, while the manager, as expected, assigned low autonomy and variety to their job.

Indeed blue collar team leaders may have less autonomy and variety comparatively to other employees but for them, who perhaps do not even know what others do and may have experienced an increase in responsibility with respect to what they were doing before, the job has high autonomy and variety. When the mechanisms triggered by job characteristics are related to the perceptual nature of the job, for instance in the case of motivational mechanisms, self-report measures are optimal (Hackman & Oldham, 1975): in order to be motivating a job must just be perceived as autonomous. However, mechanisms such as information exchange may be better captured by "objective" measures. It is not because a blue collar perceives his job to be autonomous that he will be capable of providing more information to others. The mechanisms described in the theory may generally be better captured by the different task requirements associated with the intrinsic nature of tasks. Although the hypotheses are replicated using diverse methods, differences across methods may explain why results are stronger or weaker depending on the instrument used.

Evidence also shows some interesting findings which were not hypothesized a priori in the core model but which could inform future research. Interestingly, I found that tenure in the organization is positively associated with job crafting and that tenure in position is negatively associated with job crafting. The tenure variables also have an effect on structural holes, but this effect is eliminated once I include job characteristics in the equation. These findings reveal a possible paradox that could be worth considering. The more individuals spend time in the organization, the more they acquire relevant global information about the working processes and workflow in the company which can ideally help their crafting behaviors. Nevertheless, it is when individuals get a new position in the organization that they have more uncertainty about the job, and uncertainty about what to do can motivate individuals to engage in crafting behaviors (Grant & Parker, 2009). The paper also replicates previous evidence that job crafting is predicted by the degree of autonomy (Leana et al., 2009). Self-report autonomy could be affected by the recursive effect of crafting on job perceptions, but the role of autonomy was supported even with job indicators less dependent on individual's behaviors. I found that task variety is positively related to crafting, showing that the more someone performs varied tasks, the more he or she engages in crafting behaviors. I also found

some evidence that feedback can exercise a predictive role on job crafting. This finding could be particularly interesting because the predictive value of feedback is divergent, being negative for structural hole positions while positive for crafting behaviors. The awareness of which activities lead to performance triggers corrective behaviors in individuals who may adjust their tasks on their own (Kluger & DeNisi, 1996). Employees may not need to venture into sparse networks, since they already know what to do, but they can adjust their tasks on the basis of the information that the job itself, not other individuals, provide. Last, it is important to acknowledge that I found that in the pharmaceutical organization task significance is negatively, rather than positively, related to structural holes. These findings suggest caution in interpreting the causality of task significance and perhaps suggest the possibility of contingent relationships. In stable and mechanistic organizations, the individuals who hold important positions may cluster together and form a dense clique which holds power and exercises control on the rest of the organization, embedded in sparser networks (Pearce & David, 1983; Tichy, Tushman & Fombrun, 1979).

The theory that I developed provides a substantial contribution to research in social networks. When the study of social networks was initially introduced into management research from sociology, the main concern of scholars was to support its importance in organizational settings. The justification to study the structure of relationships in organization was mostly built on the role that they play to explain relevant individual outcomes. Scholars developed therefore strong and solid explanations to justify how networks exercise a predictive role. Now that we have clearly established the importance of networks in organizations, it becomes relevant to focus our attention on what causes the network structure and on how individuals reach the structural positions assumed to be beneficial (Klein, Beng-Chong, Saltz, & Mayer, 2004; Kilduff & Tsai, 2003). Research in network antecedents has so far been limited because the common paradigm in network research is that structure causes behavior, attitudes or cognitions (Kilduff, Tsai, & Hanke, 2006). It is difficult to identify causal factors that may not entail a reverse causation. For this reason authors often focused on personality, which is generally assumed to precede networks, although scholars have also hinted at the hypothesis that personality is constructed by networks (Burt et al.,

1998). Even in this manuscript, reverse causation is contemplated, but the use of different measures and the lack of observed dynamic patterns in perceived job characteristics suggests some confidence in interpreting findings.

The arguments developed through this theory may also suggest revising our assumptions about the predictive role of structural hole positions. In fact, the theory reveals mechanisms that can suggest a contingent influence of structural holes on performance or on other relevant outcomes. The very same mechanisms that explain the association between job characteristics and structural holes could hint at a possible moderating effect of job characteristics on the relationships between structural hole positions and performance. When I discussed the relationship between task variety and structural holes I mentioned that individuals performing varied tasks can be tied to unconnected others because those individuals are less likely to get valuable information from each other. Similarly, when I discussed the relationships between task identity and structural holes, I mentioned that in a sequential chain of interdependence, a broker may link two contacts who have no informational benefit from being directly associated. A main reason why people are not directly tied to each other is simply because they do not need to be. However, if they do not need to be tied to each other, the benefits from brokering are weakened because the broker does not transfer or filter any information between the two separate parties. This argument suggests reconsidering the advantages of structural hole positions and developing a more contingent perspective. The relevance of a contingency perspective in the study of structural holes is also justified by findings concerning their predictive role in job crafting. The evidence shows that it does not generally matter to bridge individuals for crafting behaviors, but it matters to understand *who* someone is bridging. Bridging may be useless, beneficial or even deleterious depending on who is bridged by the broker: this new perspective can spur novel investigations in network research.

The present paper also offers significant contribution to research in job design. First, I shed more light on the relational predictors of job crafting, enriching job crafting theory and the proactive perspective in job design. Second, the paper contributes to research in job characteristics. Previous authors argued that, although most research in

job design has assumed that job characteristics affect behavioral outcomes through similar motivational forces, the characteristics of jobs could also trigger distinct mechanisms that need to be explored (Humphrey et al., 2007; Langfred & Moye, 2004; Morgeson & Humphrey, 2006). In this manuscript, I show how job characteristics trigger diverse and unique mechanisms which exercise divergent and unique predictive effects on network structure. Showing divergence in the predictive effects of job characteristics is relevant to research in job design. In fact, since Hackman and Oldham (1975) introduced the five job characteristics, most research has replicated or extended their original model assuming convergent and similar effects of the job characteristics (Humphrey et al., 2007) and consequently decreasing the need to study separately the unique mechanisms triggered by each of them. The present study expands the need to study job characteristics and highlights new arguments which could be used by other scholars in the study of other behavioral outcomes.

The findings have relevant implications for practitioners. For example, they show that designing jobs for high performance, following the classic job design model, and designing jobs for structural hole positions entail different normative prescriptions. Managers have to address the trade-offs between the two design approaches and understand in each specific case which approach could be more beneficial for the whole organization. Bridging job design research to the findings we can see how some variables, such as autonomy and variety, have similar beneficial effects on performance as well as on network structure. Managers could work on those characteristics to design appropriate jobs. However, other variables, such as identity and feedback seem to be positive for performance but have negative effects on the development of structural holes. Managers have therefore to assess each specific contingency and consider which choice is better to follow. Managers have also to consider that individuals are likely to alter the structure of their jobs and when influencing the design of jobs, they should *a priori* consider the possible dynamic implications that can develop over time.

The present work is affected by some limitations. As I mentioned, each measure of job characteristics is imperfect: self-report measures can be affected by reverse causality; supervisory measures were single-item and I could not assess inter-rater

reliability because supervisors generally rated distinct jobs; job coding was performed by a single researcher and lacking a standardized coding protocol for each job. It is relevant to notice that the different measures were not highly correlated to each other, especially the self-report and supervisory ratings, demonstrating that raters embrace different perspectives when assessing jobs. Although the measures complement one another allowing different insights, there is no perfect measure which can establish with absolute clarity the effect of job characteristics on networks and on job crafting. There is also a possible concern of endogeneity in the prediction of crafting as a function of the structural holes. Crafting may influence structural holes. However, the general assumption followed by most research in social network is that the network structure causes change behavior and not the contrary (Burt, 2004; Obstfeld, 2005; Perry-Smith, 2006). Furthermore, the lagged data structure partially helps assessing causal precedence. There could also be concerns due to the fact that I calculated the effect on individual crafting of network measures built on the crafting of alters, but I controlled for the association between individual and alters' crafting. Given that structural holes are also likely to be predicted by personality and previous structure, if I controlled for such variables, conclusions would have been stronger. Nevertheless, the questionnaire was already too long to include these additional variables.

To conclude, the present investigations explored the mutual and ambivalent interplay between jobs and networks. I provided evidence that the structure of jobs exercises divergent effects on the development of structural hole positions. Furthermore, I provided evidence of the contingent effect of structural hole positions on job crafting, which varies as a function of the crafting behaviors of alters in the network. The present theory contributes to research in social networks, illustrating the antecedents of structural hole positions along with their contingent consequences. The paper also contributes to research in job design, exploring the interplay between prescribed job structure and emergent job structuring, while providing insight on the role that social relationships play in relation to the structure of jobs. I merged a stream of research in need of resurgence, job design, with a stream of research that is mature and timely, social networks, deriving a theory that opens uncharted paths that other researchers may further develop.

Chapter 5:

THE SOCIAL STRUCTURE OF JOB CRAFTING: EXPLORING THE AMBIVALENT NATURE OF NETWORKS

Abstract

This paper elaborates a theory on the social network context of job crafting. In today's environment, jobs are no longer strictly defined a priori by management and individuals proactively craft their own jobs through interactions with their network contacts. Exploring the interplay between networks, job crafting and performance, the present theory explores the ambivalent nature of networks, showing how they both constrain and enable job change and how they may influence whether job change will be positive or negative for performance. While previous research assumed that network centrality measures exercise convergent and mostly overlapping effects, I found that betweenness and eigenvector centrality exercise divergent and unique effects on job crafting. While previous research assumed that job characteristics exercise convergent and often overlapping effects, I found that the job characteristics of network contacts exercise divergent and unique effects on job crafting. While previous research assumed that proactive behaviors are beneficial to performance, I found that job crafting traces a non-monotonic relationship to performance, being positive when network centrality is high and negative when network centrality is low.

Keywords: job crafting, social networks, proactive behaviors, individual performance

5.1. Introduction

Since the dawn of organizational research, scholars have developed theories to help organizations design jobs. Job design research, very productive during the '70s and '80s, occupied a crucial role in bridging the academic and the practitioner world. The job characteristics model developed by Hackman and Oldham (1976) emerged as a dominating theoretical framework, but solid cumulative evidence over the years closed the empirical case on job design, extinguishing research on this stream (Morgeson & Humphrey, 2006). Yet, the change of conditions in today's business environment calls for a reassessment of our previous assumptions and for the redefinition of new theories which could revitalize research in job design and reenergize one of the most vital streams of empirical investigation in management (Grant, Fried, Parker, & Frese, 2010; Grant & Parker, 2009; Morgeson & Humphrey, 2006; Oldham & Hackman, 2010).

A major change occurring in recent years relates to the dramatic increase of dynamism in the tasks performed by individuals (Grant et al., 2010). This change requires a reconsideration of previous assumptions: while previous job design research was built on the idea that jobs are defined and structured *a priori* by management on the basis of predefined and clear needs, nowadays management can no longer fully structure jobs *a priori* (Grant & Ashford, 2008). Individuals are called on to proactively construct their own jobs (Grant & Ashford, 2008; Wrzesniewski & Dutton, 2001). The individual behavior of proactively changing the boundaries of job tasks, altering the form, type and number of activities one engages in has been defined as job crafting (Wrzesniewski & Dutton, 2001). Job crafting is a leading new concept whose exploration can help revitalize job design research and foster new empirical investigations in the field (Grant et al. 2010; Grant & Parker, 2009).

Although the concept has received increasing attention, the question of what makes individuals engage in job crafting behaviors remains theoretically and empirically open. Since the definition of the construct by Wrzesniewski and Dutton (2001) a few recent empirical investigations attempted to shed light on motives and consequences of crafting behaviors (Berg, Grant & Johnson, 2010; Berg, Wrzesniewski & Dutton, 2010;

Leana, Appelbaum & Schevchuk, 2009). Wrzesniewski, Berg and Dutton (2010) posit that individuals engage in job crafting to increase job-person fit and turn the job they have into the job they want. Berg et al. (2010a) argue that individuals are motivated to engage in crafting behaviors to pursue unanswered callings, and because such behaviors trigger pleasant psychological states of enjoyment for work. Berg et al. (2010b) argue that individuals seek challenges in their jobs and crafting offers opportunities to respond to such challenges. Although individuals may see crafting as beneficial for themselves, the consequences of crafting for performance are unclear, since crafting jobs may lead to improvements as well as mistakes, or create problems for the functioning of the organization (Wrzesniewski & Dutton, 2001). Leana et al. (2009) found that collaborative crafting, in which team members together change team tasks, are beneficial to performance but individual crafting does not significantly explain performance.

Despite some differences in the theoretical positions of these empirical works, they have a singular similarity: they all raise the need to shed light on the social context in which job crafting behaviors unfold. Berg et al. (2010b) argue that job crafting behaviors are socially embedded and individuals engage in proactive crafting behaviors while being constrained or enabled by the social expectations raised by other employees in the organization. Berg et al. (2010a) claim that individuals can derive from their social environment information about opportunities to respond to occupational callings and alter their tasks. Leana et al. (2009) argue that, as employees need to coordinate their work with others, individuals' crafting can be facilitated or hampered by social relationships. Wrzesniewski & Dutton (2001) acknowledge that, as crafting behaviors are intertwined, the possibility of implementing crafting behaviors and of making crafting behaviors beneficial or not to performance depend on social interactions with others.

This paper theorizes that we can deepen our understanding of job crafting behavior by exploring its social context. In addition to job crafting theory, there is a second major theoretical perspective germane to job design research: the relational perspective (Grant & Parker, 2009; Oldham & Hackman, 2010). The relational

perspective considers that today's jobs are rarely isolated and that work is inextricably intertwined with interpersonal relationships which can affect individuals' perceptions of their jobs and individuals' behaviors about their jobs (Kilduff & Brass, 2010a). Job design research based on social information processing (Salancik & Pfeffer, 1978) has been arguing for a long time that relations can play a significant role in the way in which individuals experience their jobs. Wrzesniewski and Dutton (2001) acknowledge that jobs are not isolated and job crafting can emerge from the interaction, negotiation and exchange of ideas between employees. The insights of previous research invite researchers to combine the job crafting and relational perspectives on job design, investigating the social context of job crafting behaviors.

On these premises, this paper develops a theory of the social context of job crafting, applying the lens of social network theory. Social network theory appeals to the primacy of relations and proposes that behaviors, cognitions or attitudes of individuals in an organization are a function of the structure of relationships an individual is embedded in (Kilduff, Tsai, & Hanke, 2006). Investigating the interplay between social networks and job crafting not only improves our understanding of the latter, but can reveal unique and unexplored aspects of the structure of relationships, contributing to both streams of research. In fact, while social relationships are believed to exercise beneficial effects on individual outcomes, such as performance, promotions or creativity (Brass, Galaskiewicz, Greve, & Tsai, 2004), the role relationships play in job change behaviors can be ambivalent and needs further understanding. The next section of the paper introduces a theory explaining the influence of networks on job crafting and then elaborates the general theory at the specific level, developing a series of hypotheses, that are subjected to empirical testing.

5.2. The Ambivalent Influence of Networks on Job Crafting

The concept of job crafting was introduced by Wrzesniewski and Dutton (2001) to stimulate the resurgence of research in job design. The authors noticed that in today's business environment, companies are no longer involved in the rigid definition of job

descriptions and individuals proactively construct their job incorporating new tasks that are not expected from them, simplifying the tasks they are supposed to perform, or changing and substituting tasks. The idea that individuals influence the structure of their jobs is not new to research, as it has already been accounted for in the concepts of role behavior (Katz & Kahn, 1966), role innovation (Schein, 1971; Van Maanen & Schein, 1979), role-making (Graen & Scandura, 1987), task revision (Staw & Boettger, 1990), or idiosyncratic jobs (Miner, 1987). However, the concept of job crafting is different because it focuses on the individual job and it gives voice to the proactive initiative of altering jobs, rather than a reactive response to the need for adjusting jobs (Wrzesniewski & Dutton, 2001). In its original conceptualization, Wrzesniewski and Dutton (2001) included behavioral, cognitive and relational components of the concept, although later works have mostly focused on the behavioral aspect of job crafting (Berg et al., 2010a; 2010b; Grant & Parker, 2009; Leana et al., 2009).

Social networks can play a primary role in job crafting behaviors. Previous research has mostly portrayed social networks in a positive fashion. Empirical studies have provided concrete evidence of the beneficial effects of the structure of relationships on performance (Baldwin, Bedell, & Johnson, 1997; Sparrowe, Liden, Wayne, & Kraimer, 2001), job satisfaction (Roberts & O'Reilly, 1979), organizational citizenship behavior (Settoon & Mossholder, 2002), and turnover intentions (Krackhardt & Porter, 1985; Mitchell, Holtom, Lee, Sablynski, & Erez, 2001). Research has often downplayed the possibility that network relations could also be deleterious (Brass et al., 2004) or could exercise opposite and contrasting effects (Reagans & McEvily, 2003; Reagans, Zuckerman & McEvily, 2003). The relationship between social networks and job crafting can provide evidence of the possible ambivalent effects of network relations. In fact, while it is true that network relations could exercise an enabling force, providing information or advice that facilitates thinking about novel ways of combining work activities (Burt, 2004; Fleming, Mingo & Chen 2007), it is also true that network relations could exercise a constraining force: if someone changes his or her tasks, others may be consequently forced to modify their tasks as well and, if they are unwilling to adapt, they could raise opposition to the individual's crafting initiative (Wrzesniewski & Dutton, 2001).

The ambivalent effect of networks on job crafting emerges manifestly as we specify the explanatory mechanisms that justify this relationship. More specifically, there are four mechanisms hypothesized to explain the role of social relations in job crafting. The first mechanism is *information*. The social context an individual is embedded in provides information that enables the individual to alter the content of his or her tasks. Task crafting behaviors need information from the social context in order to be executed (Wrzesniewski & Dutton, 2001). Social relationships provide information for the identification of opportunities that could be pursued to alter job tasks (Burt, 1997; Burt, 2004). After the opportunities are identified, social relationships can provide information that may facilitate the execution of new tasks (Baldwin et al., 1997; Sparrowe et al., 2001). After the execution of tasks, social relationships can provide feedback information on the effectiveness of execution, promoting adaptation and continuous imrpovement (Hackman & Oldham, 2010; Morgeson & Humphrey, 2006). Last, social relationships can provide information on how to modify the execution of tasks in order to achieve better evaluations by supervisors and gain organizational rewards (Seibert, Kramer and Liden, 2001).

The second mechanism explaining the effect of social networks on job crafting is *resistance*. Individual jobs are not independent and the work environment is characterized by substantial interdependence, so that the tasks executed by an individual are likely to affect the tasks performed by other employees connected to him or her (Kilduff & Brass, 2010a). As a consequence of interdependence, if an individual engages in job crafting behaviors altering his or her tasks, his or her network contacts may be compelled to change their tasks as well. The social environment can embrace the task changes adopted by the individual without opposition, but it is plausible to assume that the social environment can also raise resistance and contest the individual's attempts to change, hindering task crafting behaviors (Wrzesniewski & Dutton, 2001). Previous work provides strong support for the idea that people tend to resist the adaptation of their tasks when change is originated by others and not by their own initiative (Ford, Ford & D'Amelio, 2008; Oreg & Sverdlik, 2011; Piderit, 2000). Furthermore, social exchange perspectives on envy have highlighted that individuals engage in social comparison processes and are likely to oppose behaviors in which

others could improve their relative condition as compared to themselves: individuals may oppose others' behaviors when they perceive that such behaviors enable others perform the job they want while they cannot do so (Cohen-Charash & Mueller, 2007; Mouly & Sankaran, 2002; Smith, Parrott, Ozer, & Moniz, 1994).

The third mechanism justifying the relationship between social networks and job crafting is *exchange*. Job crafting behaviors can be fostered if individuals negotiate and exchange tasks with each other, reallocating responsibilities over the execution of task activities (Grant & Parker, 2009; Wrzesniewski & Dutton, 2001). On one side, relationships could facilitate the exchange of tasks between connected individuals. Social relationships can provide occasions for exchanging tasks (Kilduff & Brass, 2010a). Social relationships also provide accuracy in perceiving the needs and requirements of contacts (Kilduff & Tsai, 2003; Krackhardt, 1990), so that task exchanges could ideally be more effective and satisfy mutual interest. On the other side, relationships can hamper the exchange of tasks between connected individuals. Relationships may constrain individuals, limiting their bargaining power for negotiating tasks and for altering the activities they would like to perform (Bonacich, 1987).

The fourth mechanism explaining the effect of social networks on job crafting is *motivation*. While the previous three mechanisms influence the capacity of an individual to perform job crafting behaviors, the last mechanism pertains to the willingness of an individual to engage in job crafting behaviors. On one side, social relationships could increase the motivation to craft jobs. Being connected to others can make individuals realize their potential impact on the organization and stimulate their motivation to contribute, as well as their persistence in searching for new ways to contribute through their job activities (Grant, 2007). On the other hand, social relationships could also decrease their motivation to craft jobs. Relationships can offer prominence, status and a positive reputation to some individuals (Kilduff & Krackhardt, 1994; Wong & Boh, 2010). When individuals are perceived as prominent and have an established positive reputation, they may be unwilling to engage in change behaviors which will generate perceptions of inconsistency, or that risk destabilizing perceptions of them and that

might compromise their positive reputation (Anderson & Shirako, 2008; Bromley, 1993).

The ambivalent role of social networks for job crafting stems from the idea that social relationships exercise divergent causal effects on job crafting behaviors depending on the way in which the explanatory mechanisms are activated. Explanatory mechanisms are activated in a dissimilar way by distinct network variables and therefore the effect of social networks on job crafting varies as a function of the specific network constructs considered. More conspicuously, some network constructs are likely to positively explain job crafting because they activate mechanisms that transfer positive causality while mitigating the influence of mechanisms that transfer negative causality. Vice versa, other network constructs are likely to negatively explain job crafting because, through the intermediating effect of the mechanisms introduced above, the negative causal influences are activated while the positive causal influences are not. Last, network constructs can result in non-linear relationships with job crafting depending on the way in which negative and positive causal mechanisms are activated.

In the following sections I expand this general theory elaborating specific arguments that show how social network variables affect job crafting activating the four explanatory mechanisms in dissimilar ways. More specifically, the paper focuses on two classes of predictors which reflect the most relevant network constructs introduced and developed by previous network research. The first class of network predictors relates to the structural position an individual occupies in the network of social relationships. The effect of the structural position of the individual is the core tenet of social network research and it has been studied in relation to a large variety of individual outcomes (Brass et al., 2004). The second class of network predictors relates to the characteristics of the network contacts an individual has. Studying networks through the characteristics of the individual's contacts represents a newer but growing stream of investigation which can open up valuable possibilities for research in social networks (Reagans & McEvily, 2003; Zaheer & Soda, 2009). Since this study develops a theory of job design, the characteristics of the network contacts considered are job characteristics: it is theorized that individuals craft their own jobs as a function of the jobs their contacts

have. To conclude the theory, the model of the social context of job crafting will discuss performance implications. The explanation of how and in which cases job crafting affects performance provides a justification for the empirical relevance of studying job crafting and its social context.

5.3. Network Structure and Job Crafting

The position of an individual in the structure of relationships is best captured by the concept of network centrality (Freeman, 1979). There are different types of network centrality which are likely to activate distinct mechanisms and explain outcomes through different causal paths. Although previous research has mostly provided empirical evidence showing that types of centrality exercise convergent effects on relevant individual outcomes (e.g. Brass, 1984; 1985), this empirical position may be challenged in the case of job crafting, for which there are relevant ambivalent forces triggered by social relationships, as explained.

A centrality variable which is particularly interesting to study in relation to job crafting is betweenness centrality. Betweenness centrality captures the extent to which an individual serves as a "go-between" for others, lying in the shortest path that connects any two other individuals in the organization (Freeman, 1979). First, betweenness centrality can be beneficial to job crafting because it gives access to valuable information. Mehra, Kilduff & Brass (2001) supported the beneficial empirical advantages of betweenness centrality and claim that when individuals lie between many others in the organization, large and intense flows of information pass through them, giving them the opportunity to access much more information than peripheral individuals. Second, betweenness centrality can be beneficial to job crafting because it increases the possibility of exchanging tasks. Another advantage of betweenness centrality is that it creates control and possibility of exercising power over others (Freeman, 1979; Wasserman & Faust, 1994). As individuals can impose their will over others through their network relations, they benefit from more possibilities of negotiation and exchanges with others, altering what they do according to their needs

(Brass, 1984; Burkhardt & Brass, 1990; Knoke & Burt, 1983). Third, betweenness centrality can be beneficial to job crafting because it fosters motivation to continuously alter tasks. Individuals that occupy brokering positions and span boundaries in the organization tend to develop an entrepreneurial attitude which is open to change and favorably perceives the exploration of new task activities, motivating search behaviors for new opportunities (Burt, 2004). Last, betweenness centrality could also be related to lower resistance. When individuals are placed between many others they can develop alternative ways for getting the same information, becoming less vulnerable to the possible opposition of contacts (Brass, 1981; Burkhardt & Brass, 1990). As a result of the way in which betweenness centrality activates the intermediating mechanisms identified, it is anticipated that betweenness centrality exercises a positive effect on job crafting.

Hypothesis 1: betweenness centrality is positively associated with the degree of job crafting

An alternative variable capturing the structure of the individual in a network exhibits a rather different explanatory value in relation to job crafting, as it activates the intermediating mechanisms in a completely different fashion. This network variable is eigenvector centrality, which measures the extent to which an individual is tied to others who are well connected (Bonacich, 1987). The centrality score of a focal individual depends on the number of his contacts weighted by the centrality of these contacts. The centrality of these contacts is calculated, through the same procedure, as the number of their own contacts weighted by the centrality of those contacts, and so on. Eigenvector centrality and betweenness centrality are two important measures of centrality in a network and they are often correlated (Kilduff & Tsai, 2003). It is in fact possible that individuals who are connected to highly tied contacts fall in the shortest paths connecting many nodes in a network. However, eigenvector centrality is generally assumed to trigger distinct explanatory mechanisms than betweenness centrality and it could exercise unique explanatory effects on individual outcomes.

First, eigenvector centrality can negatively affect job crafting because it decreases the motivation to engage in change behaviors. When individuals are tied to central

others they gain status and visibility (Bonacich, 1987) and are considered popular (Kilduff & Tsai, 2003). The prominence of the contacts defines the degree of prominence of the focal individual (Kilduff & Krackhardt, 1994). Although the debate is still ongoing, there seems to be a certain convergence on the idea that eigenvector centrality instead of betweenness centrality is associated with status, prominence and popularity (Bonacich, 1987, 2007; Bonacich & Lloyd, 2004; Kilduff & Tsai, 2003; Wasserman & Faust, 1994). Status is socially constructed as a function of the proximity to well-connected others who are objects of conversation and who others follow in the organization (Kilduff & Krackhardt, 1994; Wong & Boh, 2010). While individuals may not be aware of who is between who, eigenvector centrality is more "visible" to people and offers clearer signals of status which are diffused in a network (Bonacich & Lloyd, 2004). Individuals who are perceived to have high status, and to be popular or prominent are motivated to maintain their current perceptions and are reluctant to engage in change behaviors, because they do not want to risk destabilizing these established perceptions (Anderson & Shirako, 2008; Soda & Bizzi, 2012; Bromley, 1993).

Second, eigenvector centrality can have a negative effect because it decreases the possibility of exchanging tasks. The possibility of bargaining with others to obtain desired exchanges is a negative function of the centrality of contacts because central contacts have multiple alternatives for bargaining while contacts with low eigenvector centrality have fewer alternatives, giving more power to the focal individual for engaging in exchanging behaviors (Bonacich, 1987). The mechanism of control which represents one of the main advantages of network positions, and which is primarily activated by structural hole positions, is therefore not likely to benefit eigenvector positions, because the alternatives that contacts have decrease dependence on the focal individual.

Third, eigenvector centrality can negatively influence job crafting because it increases resistance to alter job activities. Not only is the individual tied to central contacts perceived as prominent, but the contacts themselves, being central, are likely to be perceived as more prominent than peripheral individuals (Kilduff & Krackhardt, 1994). Following the same rationale explained before, contacts may be unmotivated to

adapt their tasks to changes to keep their positive perceptions. Furthermore, central contacts are likely to be placed in highly interdependent positions in the workflow (Brass, 1981) and they may be resistant to change initiated by others as they absorb higher costs adaptation. Being tied to loosely connected others relates to lower adaptation costs absorbed by contacts, making resistance less likely.

It is important to acknowledge the counter-argument that eigenvector centrality could be associated with access to more information, which positively affects job crafting. Central individuals are likely to have more information than non-central individuals and being tied to central individuals increases the access to information (Bonacich, 1987). Networks give access to information but the extent to which individuals are likely to exploit access to information for performing certain behaviors depends on the motives individuals have (Brass & Burkhardt, 1993). Reinholt, Pedersen and Foss (2011) found that network centrality interacts with individual motivation to affect acquisition of knowledge: if individuals are not motivated to exploit access to information, network centrality is unexploited. It was explained that individuals with high eigenvector centrality, differently from other individuals, are not motivated to change their tasks. It is therefore unlikely that they will use access to information to perform behaviors they do not want to perform. Individuals with high eigenvector centrality will not use access to information to change what they do but to reinforce their already established positive stereotypes as popular people (Mehra, Kilduff & Brass, 1998). For the above-mentioned reasons, I anticipate divergent effects of the two forms of centrality on job crafting and I postulate that eigenvector centrality, differently from betweenness centrality, exercises a negative effect on job crafting.

Hypothesis 2: eigenvector centrality is negatively associated with the degree of job crafting

5.4. Network Job Characteristics and Job Crafting

Beside the structural position occupied by the individual, networks can exercise another antecedent effect on job crafting. Social network theory posits that an actor may be influenced by the network structure as well as by network composition, which focuses on the characteristics, or attributes, of alters tied to an ego (Wasserman & Faust, 1994). Previous studies on network composition have already focused on exploring how the characteristics of network contacts are likely to exercise an effect on the behaviors of an ego (Baum, Calabrese, & Silverman, 2000; Lincoln, Gerlach, & Ahmadjian, 2000; Reagans & McEvily, 2003; Shaner & Maznevski, 2011; Soda & Bizzi, 2012; Zaheer & Soda, 2009). The basic logic of this argument follows the core idea of network theory assuming a shift in the focus of the theorization from the individual to his or her network contacts (Brass et al., 2004). According to the core premises of network theory, the aggregate characteristics or attributes of network contacts are likely to influence the behaviors of each single node (Borgatti & Foster, 2003; Cross & Parker, 2004; Wasserman & Faust, 1994). In fact, even network structure could be theoretically conceptualized as a special case of network composition in which the characteristics observed of the nodes are their social connections. The core assumption of network composition models, as well as of whole network theory as a whole, is that the effect of the network on a single node is substantially stronger than the effect of each single node on the network and therefore the aggregate characteristics of network contacts are supposed to exercise an influence on each node's behavior rather than the opposite (Kilduff & Brass, 2010b; Kilduff et al., 2006; Kilduff & Tsai, 2003; Wasserman & Faust, 1994).

In the context of job design research, previous authors have shown that the structure of jobs, described by job characteristics, are not only likely to affect behaviors directed towards the individual himself or herself, but can also affect the behaviors directed towards the social contacts surrounding the individual (Grant, 2007; 2008; Grant & Parker, 2009). Merging the perspective on network composition and the perspective on social effects of job characteristics, I explore how the job characteristics of contacts influence the job crafting behaviors of individuals. As for network structure,

network composition, expressed as the job characteristics of contacts, is likely to trigger the four social mechanisms introduced before that link networks to individuals' crafting behaviors. To elaborate this argument and in order to offer a strong contribution that is relevant to a large and mature stream of investigation, the paper focuses on the five job characteristic variables introduced by Hackman and Oldham (1975), which are widely acknowledged as the most studied and most representative variables to describe the jobs of employees (Morgeson & Humphrey, 2006; Oldham & Hackman, 2010).

The first job dimension of the job characteristic model is task autonomy. Task autonomy is the amount of independence and discretion an employee has in carrying out his or her work assignments (Hackman & Oldham, 1975). The autonomy of the network contacts of an individual is likely to exercise an effect on job crafting. First, this will decrease resistance to job crafting behaviors. Autonomous individuals have multiple alternative possibilities for executing their tasks and they tend to be more adaptive to changes coming from the initiative of people other than themselves (Juillerat, 2010). If individuals lack autonomy in their job, they develop rigid work orientations and reject requests for task adaptation coming from others, while if individuals have autonomy they embrace a more flexible work orientation open to adaptation requests (Parker, Wall & Jackson, 1997). Second, the autonomy of network contacts is likely to positively affect job crafting because it increases the possibility of exchanges. Individuals that have no discretion on the way they can execute their job, cannot easily negotiate and exchange tasks with colleagues, while autonomy gives the possibility for interchanging tasks with others (Grant & Parker, 2009; Wrzesniewski & Dutton, 2001). Third, autonomy of contacts is related to the procurement of information for crafting: lack of autonomy exercises a narrowing effect on individuals' role, which decreases the motivation for providing information to others and for facilitating others' activities (Bizzi & Soda, 2011; Gellatly & Irving, 2001). Fourth, network contacts with high autonomy might motivate individuals to engage in crafting behaviors, since autonomy creates favorable orientations towards change which can be transferred to others (Parker, Williams & Turner, 2006). For the above-mentioned reasons, I hypothesize a positive relationship between the task autonomy of the individual's network contacts and job crafting.

Hypothesis 3: the task autonomy of an individual's network contacts is positively associated with the degree of job crafting

The second job dimension of the job characteristics model is task variety. Task variety is the degree to which a job requires employees to perform a wide and diversified range of tasks (Morgeson & Humphrey, 2006). First, network contacts with high task variety provide more information for crafting behaviors, because the variety of informational inputs an individual has access to increases the likelihood of developing novel ideas about work activities (O'Leary, Mortensen & Woolley, 2011; Perry-Smith, 2006). If an individual is tied to contacts that allow access to varied knowledge, he or she has more opportunity for combining knowledge and generate ideas about new activities to perform in the job (Rodan & Galunic, 2004). Second, the task variety of network contacts is likely to be beneficial because it increases the possibilities of task exchanges. If individuals perform many and varied tasks they could feel overwhelmed and in need to decrease their work pressure (Elsbach & Hargadon, 2006). Delegating tasks decreases the pressure on work (Leana, 1986) and therefore it is likely that network contacts with high task variety are open towards possible task requests advanced by the individual. Third, the task variety of network contacts decreases the possible resistance to individual's crafting initiatives. If contacts are involved in a wide array of task activities, their work is less likely to be dependent on specific tasks and they have more alternatives for performing activities, resulting in lower costs and risks for adapting to workflow modifications coming from outside (Brass, 1981). For such reasons, I anticipate a positive relationship between task variety and the degree of job crafting.

Hypothesis 4: the task variety of an individual's network contacts is positively associated with the degree of job crafting

The third dimension of the job characteristics model is task significance. Task significance reflects the extent to which a job has a substantial impact on the lives or work of others, whether inside or outside the organization (Hackman & Oldham, 1975). Network contacts with high task significance may raise particularly strong resistance to change for the individual's crafting. Individuals with high task significance perceive that

they occupy an important and influential social role in the organization, experiencing a sense of meaningfulness and purposefulness (Hackman & Oldham, 1976; Zalesny & Ford, 1990). They could potentially change their jobs on their own initiative, since task significance makes individuals perceive social worth, which motivates efforts for continuous improvement (Grant, 2008). However, they might be reluctant to endorse the change behaviors initiated by others as individuals who occupy important social roles in the organization are motivated to show consistency in behavior and want to maintain and cement their role (Anderson & Shirako, 2008; Bromley, 1993). Furthermore, network contacts with high task significance may be unmotivated to engage in task exchanges, as those who control significant tasks do not what to exchange them with others: individuals who control critical tasks that give them significance and importance in the organization tend to safeguard and protect such tasks, avoiding transfer of their source of influence to others, so that they can keep their personal influence (Mintzberg, 1983; Pfeffer & Salancik, 1978). It is relevant to notice that network contacts with high task significance may be a potential source of information useful for crafting tasks. Significant tasks are often the most salient, rich and useful in the organization (Grant, 2008). Nevertheless, network contacts with high task significance are not motivated to share information that enables others' task crafting behaviors, as they oppose them. For these reasons I anticipate that task significance of network contacts is likely to exercise a different effect on job crafting, as compared with autonomy and variety, displaying negative causality.

Hypothesis 5: the task significance of an individual's network contacts is negatively associated with the degree of job crafting

The fourth dimension of the job characteristics model is task identity. Task identity is the degree to which a job requires the completion of a whole and identifiable piece of work (Hackman & Oldham, 1976), which the employee follows from beginning to the end (Morgeson & Humphrey, 2006). Differently from the other variables, the network contacts' degree of task identity may have non-linear effects on individual job crafting. On the one hand, network contacts with very low task identity may be motivated to exchange tasks with others. It is when individuals lack integrity in their

job role and have unclear or fragmented behavioral expectations that they are willing to negotiate job changes, altering their tasks to improve their perceptions (Grant & Ashford, 2008). When individuals lack adequate task identity they will have unidentified and less specific goals, which are likely to create uncertainty and motivate intentions to revise tasks (Staw & Boettger, 1990). Having a fragmented job is often not a stable but a dynamic condition, which enables coping with requests for adaptation coming from others (Mintzberg, 1975; 2009). Contacts with a task identity below the average, therefore, may respond positively to the requests from the focal individual to exchange tasks.

On the other hand, also when network contacts have very high task identity, they may not raise resistance to those who initiate job crafting attempts. According to Parker et al. (1997) when employees "own" a large and identified work outcome they will become favorably oriented towards the requests of others. Considerable integrity in the activities performed in one's work can spur the formation of an identity about the self which creates confidence and a positive predisposition towards others (Dutton, Roberts, & Bednar, 2010; Sluss & Ashforth, 2007). Only when others' actions can challenge one's competence, an individual may perceive identity threat and engage in antisocial behaviors to obstruct others (Aquino & Scott, 2003). When contacts reach high identity, their job condition is more solid and stable, with a clear and identified responsibility: jobs are crystalized and individuals know precisely the beginning and end of their activities. As their condition is stable, individuals may not be motivated to initiate social or crafting behaviors themselves. However, as their condition is solid and stable, individuals may not feel a serious threat to their identity and if they do not perceive identity threat they will not oppose to change actions initiated by others (Petriglieri, 2011).

Contacts with high task identity may therefore not oppose to the crafting initiatives of the focal individual. Individuals with low identity too will not feel threat, simply because they do not have any identity to protect. Behaviors of opposition are a function of the possible damage that identity threat actions can have (Aquino & Douglas, 2003; Baumeister et al., 1996; Felson, 1992), and for individuals with already

lowest identity the perception of the identity condition may not substantially decrease as a result of others' actions. The intermediate situation may be the most vulnerable to perceptions of threat from others' change initiatives. For these reasons, it is anticipated that the conditions in which contacts have either low or high degrees of task identity can be particularly enabling of job crafting. I hypothesize hence that network contacts' task identity traces a curvilinear relationship with job crafting, so that job crafting is higher when task identity is either low or high.

Hypothesis 6: the task identity of an individual's network contacts traces a U-shaped relationship with the degree of job crafting

The fifth dimension of the job characteristics model is feedback from the job. Feedback from the job reflects the extent to which the job provides direct and clear information about the effectiveness of performance (Hackman & Oldham, 1976). Feedback from the job of network contacts is likely to exercise an effect on individual job crafting mostly because of the information mechanism. Feedback from the job provides knowledge of results, so that employees are capable of deriving clear information on which tasks are relevant or not (Hackman & Oldham, 1976). Feedback from the job stimulates individuals to reflect about how they do things, developing knowledge and task-specific information which can be useful to guide appropriate task adjustments and changes (Campbell, 1987; Dodd & Ganster, 1996). Feedback from the job facilitates learning and developing explicit information about the nature of workplace activities and how to modify them (Kluger & DeNisi, 1996). Feedback makes individuals gain informative cues on the correctness and appropriateness of task changes (Earley, Northcraft, Lee, & Lituchy, 1990). Individuals with high feedback from the job are hence likely to know their job

Contacts with high feedback from the job may already have the information they need to perform their own job and therefore do not need to send request for information to others. Nevertheless, when they are contacted to provide information, they can be a useful source. Feedback from the job improves information exchanges because individuals, knowing well their job, are capable of transferring clear information to those who ask for it (Earley, Northcraft, Lee, & Lituchy, 1990; Kluger & DeNisi, 1996).

On the contrary, individuals with low feedback from the job provide more ambiguous and uncertain information to those who request it. Receiving from others clear, unambiguous and structured information is important to understand the feasibility of change initiatives, stimulating and promoting the implementation of change behaviors (Dutton, Ashford, O'Neill & Lawrence, 2001; Dutton & Webster, 1988).

There could be an interesting paradox associated to feedback from the job and crafting behaviors. Individuals may be motivated to engage in job crafting because they want to acquire clarity about what to do, so if they already have knowledge about what to do, they will not engage in crafting behaviors (Grant & Ashford, 2008; Grant & Parker, 2009). Yet, individuals will not acquire clarity about what to do through unclear information received by contacts. Individuals engage in crafting behaviors to compensate their lack of clarity through the clarity provided by others. Therefore, although low feedback from the job may be a condition that enables individual crafting, high feedback from the job of network contacts facilitates crafting initiatives. I anticipate a positive relationship between network feedback from the job and job crafting:

Hypothesis 7: the feedback from the job of an individual's network contacts is positively associated with the degree of job crafting

5.5. Job Crafting and Performance

In order to show that the social context of job crafting is worth studying, it becomes relevant to explore the performance implications of job crafting. Are job crafting behaviors irrelevant, beneficial, or deleterious to individual performance? Some arguments seem to support a positive relationship between job crafting and individual performance. Job crafting is likely to make individuals perform better because, as individuals will ideally choose to perform the activities they know best, and it increases the fit between the job and the individual, adequately matching personal abilities with tasks (Parker & Collins, 2008; Wrzesniewski, Berg, & Dutton, 2010). Often individuals

have more local knowledge about the needs of their tasks and they can be capable of using their discretionary behaviors to better adapt the job to its requirements (Langfred & Moye, 2004). Job crafting may also exercise beneficial effects on performance because it contributes to motivation to perform, as it makes individuals attach a stronger meaning to "their" constructed job and give a better purpose to their action (Tausky, 1995). Changing tasks makes individuals develop self-efficacy and motivates efforts toward the execution of tasks (Frese, Garst, & Fay, 2007). Last, it is likely that supervisors give stronger evaluations to individuals who proactively change their work assignments, since such behaviors show tenacity, initiative and willingness to overcome difficulties at work (Frese & Fay, 2001; Frese, Fay, Hilburger, Leng & Tag, 1997).

However, job crafting behaviors may also lead to deleterious consequences in terms of individual performance. Individuals have a bounded understanding of how changes in tasks will result in performance improvements (Hackman & Oldham, 1975). Changes naturally entail a degree of risk and uncertainty and job crafting actions may jeopardize the possibility of performing the job well or put the organization at risk (Wrzesniewski & Dutton, 2001). Individuals may also be incapable of assessing the deleterious consequences of their task changes on contacts' tasks. As tasks are interrelated, the negative effects on the contacts' tasks may lead to counterproductive effects for the individual's performance. For instance, if an individual changes his or her tasks, the contacts may not be capable of adapting adequately their own tasks and provide incorrect informational and resource inputs which hamper the individual's performance. It was explained that job crafting behaviors may encounter resistance from contacts. Most research has been assuming that resistance to change is an irrational behavior motivated by selfish motives, but sometimes employees may raise resistance to others' change initiatives because they are better capable of understanding negative consequences than those who propose change (Ford et al., 2008). Individuals have also a bounded understanding of the efforts that they need to devote in order to make task changes lead to performance improvements. Individuals may be interested in altering and enriching their tasks, but changes in task activities necessarily require effort and considerable work (Wrzesniewski & Dutton, 2001) and if those efforts are underestimated, enriching tasks may lead to psychological stress and cognitive overload,

which will hamper effectiveness in the execution of tasks (Elsbach & Hargadon, 2006). Last, supervisors may fail to give credit to proactive task changes and punish them with poor evaluations because they may see them as a threat, a waste of time or an attempt to question their authority (Grant, Parker & Collins, 2009).

Since job crafting behaviors could exercise both positive and negative effects on individual performance, it is likely that job crafting and performance are not directly related but that the relationship between job crafting and individual performance is dependent on situational contingencies. In fact, in the only previous empirical study hypothesizing a relationship between job crafting and performance, Leana et al. (2009) did not find any significant effects linking the two variables, suggesting the possibility that job crafting traces a non-monotonic relationship with performance moderated by situational contingencies. More specifically, the relationship between job crafting and individual performance can be a function of the information the individual has access to. Only when individuals have access to adequate information to make the right decisions will the exercise of discretionary behaviors on the choice of tasks be beneficial and not deleterious (Langfred & Moye, 2004). Proactive job behaviors need the support of informational inputs to be implemented with success and lead to performance improvements (Thompson, 2005). The contingent perspective on task design assumes that dynamic task changes can be beneficial to performance only if they are matched with access to large and varied sources of information, while they could be negatively associated with performance, when they are not matched with the appropriate access to information (Donaldson, 2001; Schoonhoven, 1981). In other words, dynamic task changes are associated with high information processing requirements and need to be matched with high information processing capacity to be effective for performance otherwise changes will be inadequately implemented and lead to deleterious performance consequences (Tushman, 1978; 1979). Sinha and Van de Ven (2005) acknowledge the value of a contingency perspective on job design, according to which when dynamic task changes are associated with high access to information, they are likely to be adequately formulated and implemented, leading to beneficial consequences for performance, while when dynamic task changes are associated with low access to information, they are likely to be inadequate, confused and not integrated with the rest

of the organization, leading to deleterious consequences for performance. Changes in task activities may lead to advantages but also entail costs: depending on the conditions of fit with the information provided by the environment, task change efforts can be costly or beneficial (Siggelkow, 2001; 2002).

The social context could play another role in job crafting theory. A major tenet in network research is that network centrality provides access to information for the execution of tasks (Kilduff & Brass, 2010b; Sparrowe et al., 2001). Although network centrality has mostly been employed as determinant of performance, it is plausible to assume that it could also exercise an interacting effect, providing the informational context necessary to make individual characteristics exercise an effect on performance (Mehra et al., 2001). Previous authors have already theoretically acknowledged that network connections can exercise moderating effects on the relationship between performance and tasks requiring high-information processing requirements, such as dynamic and changing tasks (Brass, 1995; Perry-Smith & Shalley, 2003). Individuals that take initiatives for changing their tasks need the support of their social networks for the initiatives to be successfully pursued and be converted into positive performance (Thompson, 2005). Network relations provide the information processing capacity that needs to be matched with the information processing requirements to lead to performance (Pierce & David, 1983; Tichy, Tushman, & Fombrun, 1979).

On the basis of this argument, it is proposed that network centrality can play a moderating role on job crafting, beside the antecedent role. In the moderation effect, it is not predicted that betweenness and eigenvector play a distinct role as either of them can similarly interact with job crafting. As mentioned before, both betweenness and eigenvector centrality are likely to provide access to information. It was specified that individuals with high eigenvector centrality may not exploit the access to information to craft behaviors as they do not desire such behaviors. However, it may be assumed that performance is generally desirable for individuals in organizations. When it comes to performance then, individuals with high eigenvector centrality as well as individuals with high betweenness may exploit access to information to make crafting behaviors beneficial to performance. I hence hypothesize a non-monotonic relationship between

job crafting and individual performance, according to which under conditions in which network centrality is low, the relationship between job crafting and performance is negative, while under conditions in which network centrality is high, the relationship between job crafting and performance is positive. The prediction is identical for betweenness centrality and eigenvector centrality, but the variables are now hypothesized to exercise the same effect and not distinct effects with unique explanatory value.

Hypothesis 8: when betweenness centrality is low, job crafting is negatively associated with performance. When betweenness centrality is high, job crafting is positively associated with performance

Hypothesis 9: when eigenvector centrality is low, job crafting is negatively associated with performance. When eigenvector centrality is high, job crafting is positively associated with performance

5.6. Methodology

5.6.1. Sample

I administered questionnaires to employees and to supervisors of a division of a multinational pharmaceutical company which is involved in both the production and marketing of pharmaceuticals in North America. The organization does not develop pharmaceuticals directly, but purchases patents from independent research laboratories. Therefore, it does not have an R&D laboratory and it is mostly involved in the search for business opportunities, production, marketing and sales of products. The sampled organization has 151 total employees and usable answers were obtained for 138 of them (a response rate of 91%). There is substantial difference in the nature of tasks performed by individuals in the organization. The units are involved in a wide array of task activities such as business development, production, medical affairs, sales and marketing, quality control, finance, and human resource management. In the sampled organization, a high response rate was achieved, which is a necessary prerequisite for

network studies (Wasserman & Faust, 1994). The sample is composed of employees whose average age is quite high (46 years), typical of a mature organization in a relatively stable industry such as the pharmaceutical industry. The average employee also has a generally high tenure in the organization (11 years) and most employees have a bachelor's degree. There is substantially equal presence of men and women.

5.6.2. Measures

Social Networks. All employees were administered a network name generator survey in which individuals were asked to name the persons with whom they exchange information. In this research, the focus is on instrumental network relationships. The network variables were built from a network questionnaire asking respondents to report first and last names of persons with whom the respondent has been "regularly exchanging information about work-related issues several times a day". Individuals were free to name as many respondents as they wanted following a flexible-choice research design which is generally preferable over a fixed-choice research design which asks the name, for instance, of only the top five contacts (Mehra et al., 2001). Individuals were asked to report stable relationships that initiated at least six months *before* the administration of the survey. Individuals are assumed to be relatively accurate in the assessment of the duration of their relationships with others (Marsden & Campbell, 1984). Data on job crafting and on performance was measured over the most recent six months and through the same questionnaire. Discussions with management were held to ensure that the lagged structure of six months was appropriate to capture ad adequate range of time for job crafting behaviors. The lagged data structure allows stronger confidence in the interpretation of causality. Once relational data were collected I constructed an adjacency matrix "individual by individual" and I calculated the network variables using the formulas and algorithms in UCINET VI (Borgatti, Everett, & Freeman, 2002).

Betweenness Centrality. The betweenness algorithm in UCINET VI first calculates all possible geodesics in the networks. Geodesics are the shortest possible paths linking any two nodes in the network. Then, an indicator of betweenness centrality

is derived for each node, deriving an algorithm which measures the extent to which geodesics pass through the node. The algorithm computes an approximate estimate of the general extent to which a node passes through the geodesics and does not derive a calculation of the exact number of times that individuals are placed in geodesics because such a calculation is computationally expensive.

Eigenvector Centrality. The eigenvector algorithm in UCINET VI calculates the centrality of a node on the basis of the centralities of its contacts. The algorithm assigns to each node in the network a centrality indicator, constructs an adjacency matrix with the centrality indicators assigned and then calculates the centrality of the focal node as a function of the centralities of its contacts. The procedure extracts a high number of iterations until an optimal solution is reached. Details on the formulas to calculate eigenvector centrality can be found in Bonacich (1972).

Networks' Job Characteristics. To measure job characteristics, I used the work design questionnaire developed and validated by Morgeson and Humphrey (2006). The questionnaire has on average three or four items per job characteristic and the authors provide evidence for better psychometric characteristics as compared to the traditional Hackman and Oldham (1975) scale. Reliabilities for each job characteristic variable were adequate: autonomy (α = .88), variety (α =.88), significance (α =.83), identity (α =.87), and feedback (α =.89). I calculated the job characteristics for every individual in the organization. I then constructed an asymmetric adjacency matrix "individual by contacts" in which the tie linking each individual to each contact was expressed as the score of each job characteristic of the contact.

I computed the arithmetic mean of each job characteristic tie deriving an aggregated score for the job characteristics of the network contacts. I adopted an *additive* composition logic (Chan, 1998) to operationalize the job characteristics at the network level. The additive composition logic seems to be the most adequate option in this specific case. The additive composition logic based on the arithmetic average of job characteristics considers the effect of each and all contacts of an ego, gives each single contact the same weight in exercising an effect on individuals' behavior, is not influenced by the number of contacts any ego has (focusing exclusively on alters' job

characteristics), considers that each contact exercises an independent effect on ego, and does not account for the dispersion or consensus of contacts, which do not theoretically relate to the conceptualization used. In consensus forms of composition, such as direct consensus and reference shift consensus, within-group agreement of scores among individuals is a necessary condition for construct validity (Chan, 1998). For the studied variables, network alters do not need to share any agreement on their perceptions of job characteristics. Network alters are not members of the same group, where agreement among individuals may be important to derive a collective indicator such as, for instance, group self-efficacy. Network alters may belong to different units, may never engage in social exchanges and may even be unaware of the existence of one another.

Network studies have sometimes used dispersion composition logics in which the aggregate characteristics of networks were operationalized as the dissimilarity, or variance, among alters' characteristics (Bacharach, Bamberger, & Vashdi, 2005; Reagans & McEvily, 2003; Zaheer & Soda, 2009). However, in the present theory it is the extent of the job characteristics of contacts which is believed to trigger the intermediating mechanisms hypothesized and not their similarity or dissimilarity. A few studies have focused on the maximum score of network contacts instead of the average. For instance, Kilduff and Krackhardt (1994) found that the prominence of the most prominent alter influences the social perception of prominence of an ego. They argue that people in organizations do not have time or resources to accurately assess the reputation of others, and they make heuristics judgments of an ego's reputation as a function of the reputation of their most popular alter. However, in the present theory it is not only one alter who activates the mechanisms explaining job crafting, but all alters are likely to activate mechanisms as a function of their degree of job characteristics. This approach may also be empirically inadequate. In Kilduff and Krackhardt (1994), alters' prominence was calculated through their network centrality, which is not computed on a fixed Likert scale and allows the capture of an adequate variance in range. With a fixed-scoring format and accounting for all contacts, it may be more difficult to capture variance in the range of scores: in other words, considering all alters, many individuals are likely to have at least one alter with high autonomy. The above-

mentioned reasons justify the additive composition logic for deriving an index of alters' job characteristics.

Job Crafting. There is not yet a widely accepted scale to empirically measure job crafting. The only previously adopted scale to measure job crafting is the one developed by Leana et al. (2009). Their scale develops items specific to their empirical context, (childcare classrooms) while also borrowing and adapting items from the taking charge scale (Morrison & Phelps, 1999: 410). The taking charge scale offers some items which can be validly and reliably used to measure job crafting. Yet, the whole scale captures also different facets of individuals' initiative, including both proactive and reactive behaviors, focusing on actions that affect not only the individual job but also the organizational unit and the organization, and measuring behavioral attempts rather than performed behaviors. In the scale used in this work, items were borrowed from Leana et al. (2009) and from Morrison and Phelps (1999), while adding items that directly mirror the definition of job crafting proposed by Wrzesniewski and Dutton (2001). The authors identify three sets of crafting behaviors: task expansion, task change, and task simplification. I developed a 9-item scale of job crafting, measuring three items per set of crafting behaviors.[4] The logic of Wrzesniewski and Dutton (2001) and Leana et al. (2009) is that when individuals engage in job crafting behaviors, they more or less equally perform expansion, substitution and simplification activities which could hence be aggregated in the same common variable. Items show very high correlations among each other and the analysis of the 9-item variable reports the highest reliability observed in the dataset ($\alpha = .89$). Following Leana et al. (2009) the job crafting scale is a self-rated scale. The assumption behind the validity of using a self-rated scale to measure job crafting builds on the idea that supervisors are often incapable of understanding how the individual alters his or her job tasks, while the individual is better capable of assessing the degree of changes in his or her job (Grant et al., 2009). Adopting self-rated measures of job crafting is also more appropriate for the present model because it decreases common method variance. Using self-rated measures of job crafting does not create common method bias with network measures, which are constructed matching data from

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[4] Items are shown and discussed in Chapter 2

multiple respondents, and with performance, measured through supervisory rating. A supervisory rating of job crafting might share common method variance with the supervisory rating of performance.

Individual Performance. Individual performance was assessed through supervisory ratings. I had preliminary meetings with management of the company to identify the performance dimensions to be used for accurately operationalizing performance in the organization. I used the three-item performance indicators adopted by Brass (1981) in his study of networks and job design, asking supervisors to rate (1) *effort*, (2), *quantity of work output* and (3) *quality of work output* for each immediate subordinate. Each individual was rated on a 5-point Likert scale comparatively to his or her colleagues (1 = much below the average; 3 = average; 5 = much above the average). Although the performance indicators used are formative and do not need to be correlated with each other, responses on the items were quite consistent and show a good reliability (α = .85).

Controls. I included a series of controls to strengthen the empirical analyses. I controlled for *gender* (M = 1; F = 2), considering the possible differences between men and women's networks (Ibarra, 1992; 1993). I controlled for *age*, because young individuals may be more dynamic in networking as well as in crafting, although older individuals may have cumulated more networks and have more experience for crafting. I also controlled for *education* (1 = high school; 2 = bachelor; 3 = master; 4 = Phd) recognizing that it may give the capacity to network as well as to change tasks. I controlled for *tenure in the organization* (in years) and *tenure in the job position* (in months). Job crafting may be related to tenure in the organization (Fried, Grant, Levi, Hadani, & Slowik, 2007) as well as networks, since they may cumulate over time (Zaheer & Soda, 2009). Furthermore, in order to be sure of capturing the unique effects of the job characteristics of network contacts on job crafting, I controlled for the individual perception of job characteristics such as individual *autonomy*, *variety*, *identity*, *significance*, and *feedback*. It could be argued that, for instance, individuals with high autonomy tend to be tied to individuals with high autonomy and individuals with similar job characteristics cluster in the organization as they often belong to the

same unit or social group. Controlling for the individual job characteristics allows the exploration of the unique effect of network contacts, eliminating the effect of individual job characteristics. Last, the level of job crafting could be a function of the degree of *specialization* of individuals' jobs, since crafting tasks is ideally more possible for jobs requiring generalist knowledge than for job requiring specialist knowledge, and I also controlled for this additional characteristic. The specialization variable was also taken from Morgeson and Humprehy's (2006) work design questionnaire.

5.7. Analysis and Results

Table VII reports means, standard deviations and zero-order correlations among the variables in this study. As expected, there is a significant correlation among the different individual job characteristics, but this correlation is not so high as to create multicollinearity problems and does not require that the job characteristics be aggregated into a single variable. Note that the correlations among network job characteristics are lower than the correlations among individual job characteristics. It is interesting to note how each network job characteristic and the corresponding individual job characteristic are almost completely orthogonal. Correlations are never significant, very low and in all cases except for task identity, they are even negative in sign. The individual's task significance, for instance, is completely unrelated to network task significance, and employees do not tend to cluster as a function of their job characteristics. This finding is valuable as it shows how the study of network job characteristics offers a completely different perspective as compared to the study of individual job characteristics.

Table VIII reports the results of the OLS regression analyses predicting job crafting. Two sets of regression tests were run to confirm the predictions. The first set of regressions includes Models 1, 2, and 3 and does not consider the individual job characteristics as controls, while the second set of regressions includes Models 4, 5 and 6, with the individual job characteristics as controls. The first set of regressions provides a more accurate identification of the predictive role of network centrality (betweenness

TABLE VII – Descriptives and Correlations

	Mean	St. Dev.	1	2	3	4	5	6	7	8	9	10
1. Gender	1.45	0.50										
2. Age	46.35	9.51	.15									
3. Tenure Organization (Y)	11.92	15.40	.12	.32**								
4. Education	1.98	0.65	-.09	-.37**	-.37**							
5. Tenure Position (M)	84.99	93.94	.00	.43**	.50**	-.31**						
6. Specialization	3.81	0.88	-.11	.07	.14	.09	.08					
7. Autonomy	3.90	0.93	.10	-.08	.09	.13	-.08	.29**				
8. Variety	4.29	0.70	.07	.08	.12	.02	.02	.14	.49**			
9. Significance	3.93	0.84	-.16	-.14	.09	-.08	.07	.38**	.36**	.41**		
10. Identity	3.69	0.88	-.02	.15	.16	-.14	.12	.26*	.26*	.30**	.32**	
11. Feedback	3.93	0.82	.10	-.11	.11	-.03	.04	.43**	.37**	.32**	.52**	.39**
12. Identity ²	2.89	5.05	-.01	.12	.04	-.05	.04	-.12	-.24*	-.29**	-.15	-.53**
13.Betweenness	1.01	2.36	.22**	.13	.04	.04	.12	-.09	.04	.05	-.03	.02
14. Eigenvector	5.34	10.90	.07	.13	.06	-.12	.16	.07	-.20	.01	.16	-.19
15. Network Autonomy	3.93	0.65	.00	-.22	-.18	.02	-.26*	-.32*	-.15	-.11	-.24	-.17
16. Network Variety	4.45	0.45	-.02	-.16	-.01	-.10	-.13	-.25*	-.06	-.16	-.15	-.14
17. Network Significance	3.92	0.55	-.02	.02	.08	-.08	.11	-.15	-.26*	-.06	-.07	.04
18. Network Identity	3.80	0.56	-.23*	-.02	.19	-.19	.21	-.18	-.03	.00	.00	.10
19. Network Feedback	3.97	0.55	.05	-.09	-.01	.07	-.10	-.09	-.07	-.06	-.05	-.13
20. Network Identity ²	0.36	0.49	.09	-.15	-.17	.32**	-.16	.20	.06	-.04	.09	-.10
21. Job Crafting	3.18	0.77	.17	-.12	.10	.14	-.21*	.00	.43**	.26*	.13	.01
22. Performance	3.15	0.81	.04	-.47**	-.05	.02	-.19	.28*	.27*	.08	.17	.08

* p <. .05; ** p < .01

Note: given the size of the correlation table, only two significance levels are considered in order to simplify the representation. *Sample*: 138 employees

TABLE VII (continued) – Descriptives and Correlations

	11	12	13	14	15	16	17	18	19	20	21
12. Identity ²	-.25*										
13. Betweenness	.00	-.14									
14. Eigenvector	.08	-.15	.46**								
15. Network Autonomy	-.11	.14	-.13	-.28**							
16. Network Variety	-.14	.14	-.13	-.18	.42**						
17. Network Significance	-.01	-.07	-.06	.24*	.22*	.20					
18. Network Identity	-.13	.14	-.16	-.39**	.22*	.33**	.13				
19. Network Feedback	-.03	-.08	.00	.10	.20	.11	.34**	.13			
20. Network Identity ²	.21	.02	-.05	.26*	-.14	-.09	-.04	-.51**	-.21		
21. Job Crafting	.08	-.12	.07	-.33**	.25*	.05	-.31**	.05	.15	-.06	
22. Performance	.25	.23	-.18	-.24*	.05	.06	-.01	.09	-.13	-.02	.10

* p <. .05; ** p < .01

Note: given the size of the correlation table, only two significance levels are considered in order to simplify the representation. *Sample*: 138 employees

TABLE VIII – Regression analysis for Job Crafting (*unstandardized β*)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Gender	.36(.19)*	.25(.18)	.113(.17)	.46*(.22)	.39*(.21)	.11(.19)
Age	.00(.01)	.00(.01)	.010(.01)	.00(.01)	.00(.01)	.01(.01)
Tenure Organization (Y)	.01(.01)	.01(.01)	.014(.01)	.02(.01)	.02(.01)	.01(.01)
Education	.10(.17)	.00(.16)	-.084(.16)	.04(.19)	.04(.18)	-.10(.17)
Tenure Position (M)	-.00(.00)**	-.00(.00)*	-.002(.00)	-.00(.00)	-.00(.00)	-.00(.00)
Specialization				-.18(.13)	-.14(.12)	-.28(.11) **
Autonomy				.46(.13)***	.40(.13)***	.29(.11)**
Variety				-.04(.19)	.01(.18)	.20(.16)
Significance				-.02(.15)	.05(.15)	.12(.13)
Identity				-.02(.15)	-.15(.15)	-.03(.14)
Feedback				-.33(.15)**	-.28(.15)*	-.39(.13)***
Identity ²				-.07(.08)	-.05(.08)	-.06(.07)*
Betweenness		.07(.03)**	.07(.03)**		.06(.04)	.06 (.04)*
Eigenvector		-.02(.00)***	-.02(.00)**		-.02(.01)**	-.02 (.01)**
Network Autonomy			.33(.15)**			.35 (.15)**
Network Variety			-.04(.20)			-.07(.19)
Network Significance			-.49(.17)***			-.54(.18)***
Network Identity			-.05(.21)			-.12(.21)
Network Identity ²			.25(.15)			.56(.22)**
Network Feedback			.39(.22)**			.44(.14)***
Model F	2.45**	3.53***	3.60****	2.75***	2.92***	4.38****
Adj. R²	.11	.23	.36	.30	.35	.58
Adj. Δ R²		.12	.25		.5	.28

* p <. .1; ** p <. .05; *** p <. .01; **** p <. .001 Standard errors in parentheses. *Sample*: 138

employees

TABLE VIII (*continued*) – Regression analysis for Job Crafting (*standardized β*)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Gender	.240*	.169	.074	.288*	.247*	.069
Age	.093	.052	.118	.069	.040	.174
Tenure Organization (Y)	.253	.262	.184	.243	.288	.221
Education	.085	.003	-.069	.033	.032	-.075
Tenure Position (M)	-.489**	-.478*	-.311	-.309	-.260	-.064
Specialization				-.212	-.167	-.331**
Autonomy				.587***	.515***	.378**
Variety				-.037	.013	.178
Significance				-.022	.061	.137
Identity				-.029	-.186	-.036
Feedback				-.370**	-.313*	-.440***
Identity ²				-.142	-.102	-.121*
Betweenness		.307**	.306**		.208	.224*
Eigenvector		-.400***	-.345**		-.393**	-.352**
Network Autonomy			.292**			.306**
Network Variety			-.028			-.047
Network Significance			-.361***			-.405***
Network Identity			-.039			-.087
Network Identity ²			.173			.398**
Network Feedback			.302**			.334***
Model F	2.45**	3.53***	3.60****	2.75***	2.92***	4.38****
Adj. R²	.11	.23	.36	.30	.35	.58
Adj. Δ R²		.12	.25		.5	.28

* p <. .1; ** p <. .05; *** p <. .01; **** p <. . *Sample*: 138 employees

and eigenvector). In fact, Brass (1981) developed a theory and provided empirical evidence according to which the perception of individual job characteristics mediates the relationship between network centrality and behavioral outcomes. The perception of job characteristics is a mechanism through which network centrality affects behavioral outcomes. Brass's (1981) insights are confirmed by Ibarra and Andrews (1993), who support the antecedent role of network centrality on job cognitions. Including individual job characteristics in the equation is therefore likely to take away variance explained by network centrality on behavioral outcomes. While Model 1 only includes the control, Model 2 provides support for both Hypothesis 1 and Hypothesis 2 showing the positive and significant predictive value of betweenness centrality [*Hp1*] ($\beta = .07$; $p = .029$) and

the negative and significant predictive value of eigenvector centrality [*Hp2*] (β = -.02; *p* = .003). The two forms of centrality are likely to exercise unique predictive value on job crafting and improve the regression equation by explaining an additional 12 percent of variance. Model 3 includes the network job characteristics variables. The regression equation confirms the positive value of network contacts' autonomy [*Hp3*] (β = .33; *p* = .034), the negative value of network contacts' significance [*Hp5*] (β = -.49; *p* = .007), and the positive value of network contacts' feedback [*Hp7*] (β = .39; *p* = .014). Although Model 3 is not the most appropriate for testing the effects of the networks' job characteristics, it strengthens the predictive role of network centrality, showing that, even when network job characteristics are included in the equation, both betweenness centrality [*Hp1*] (β = .07; *p* = .026) and eigenvector centrality [*Hp2*] (β = -.02; *p* = .026) retain significant explanatory power. The equation including both centralities and network job characteristics explains an additional 25 percent of variance in job crafting. The prediction is strong and confirms the highly relevant role played by the studied variables on job crafting.

The second set of regression tests, Models 4, 5 and 6, provides a more accurate identification of the predictive role of network contacts' job characteristics because they partial out the effect of the individual job characteristics on the prediction of job crafting. Model 4 considers only the controls and shows how individual autonomy and feedback exercise positive and significant effects on job crafting. Results for autonomy are consistent with those of Leana et al. (2009). Model 5 tests again the role of the two forms of network centrality and, as expected, the predictive value is weakened and only eigenvector centrality remains significantly and negatively related to job crafting (β = -.02; *p* = .031). Model 6 includes the network job characteristics in the equation in order to assess their unique predictive value. Interestingly, both betweenness centrality and eigenvector centrality become significant, though modestly, when all variables are included in the equation. The network job characteristics exercise a very strong effect on job crafting. Hypothesis 3 on network contacts' autonomy is supported with significant

TABLE IX – Regression analysis for Individual Performance (*unstandardized β*)

	Model 7	*Model 8*	*Model 9*	*Model 10*	*Model 11*
Gender	.19(.25)	.21(.25)	.21(.21)	.23(.24)	.21(.22)
Age	-.04(.01)**	-.04(.01)**	-.04(.01)***	-.04(.01)*	-.04(.01)***
Tenure Organization (Y)	.01(.02)	.01(.02)	.04(.01)**	.02(.02)	.04(.02)**
Education	-.44(.26)	-.48(.27)	-.23(.24)	-.45(.26)	-.25 (.25)
Tenure Position (M)	-.00(.00)	-.00(.00)	-.00(.00)**	-.00(.00)*	-.00(.00)**
Network Autonomy	-.30(.23)	-.26(.24)	-.28(.20)	-.21(.23)	-.27(.21)
Network Variety	.35(.39)	.34(.40)	.07(.34)	-.06(.44)	-.00(.39)
Network Significance	.10(.27)	.03(.29)	.11(.24)	-.01(.27)	.09(.25)
Network Identity	.32(.30)	.32(.30)	.13(.26)	.32(.29)	.14(.27)
Network Feedback	-.19(.25)	-.13(.27)	-.12(.23)	-.03(.26)	-.10(.24)
Network Identity ²	.16(.29)	.21(.30)	-.04(.26)	.17(.29)	-.03(.27)
Betweenness	.03(.04)	.04(.04)*	-.10(.06)*	-.02(.05)	-.11(.06)*
Eigenvector	-.00(.01)	-.00(.01)	-.00(.01)	-.02(.01)	-.00(.01)
Job Crafting		-.15(.21)	-.31(.18)	-.23(.20)	-.32(.19)
Job Crafting x Betweenness			.36(.11)***		.33(.13)**
Job Crafting x Eigenvector				.01(.00)*	.00(.00)
Model F	1.69*	1.54	2.12**	2.15**	2.17**
Adj. R²	.01	.01	.29	.08	.26
Adj. Δ R²			.28	.07	.25

* p <. .1; ** p <. .05; *** p <. .01; **** p <. .001 Standard errors in parentheses. . *Sample*: 138

employees

TABLE IX (*continued*) – Regression analysis for Individual Performance (*standardized β*)

	Model 7	Model 8	Model 9	Model 10	Model 11
Gender	.144	.159	.159	.173	.163
Age	-.505**	-.507**	-.568***	-.520*	-.566***
Tenure Organization (Y)	.206	.194	.607**	.359	.613**
Education	-.421	-.457	-.225	-.425	-.237
Tenure Position (M)	-.387	-.432	-.595**	-.519*	-.603**
Network Autonomy	-.305	-.268	-.294	-.221	-.279
Network Variety	.247	.237	.055	-.045	-.002
Network Significance	.083	.028	.092	-.013	.076
Network Identity	.278	.279	.113	.277	.127
Network Feedback	-.177	-.119	-.113	-.030	-.091
Network Identity ²	.148	.191	-.042	.153	-.031
Betweenness	.174	.244*	-.610*	-.131	-.631*
Eigenvector	-.023	-.098	-.043	-.416	-.130
Job Crafting		-.164	-.348	-.255	-.355
Job Crafting x Betweenness			.947***		.863**
Job Crafting x Eigenvector				.644*	.165
Model F	1.69*	1.54	2.12**	2.15**	2.17**
Adj. R²	.01	.01	.29	.08	.26
Adj. Δ R²			.28	.07	.25

* $p < .1$; ** $p < .05$; *** $p < .01$; **** $p < .001$ *Sample*: 138 employees

and positive values (β = .35; p = .025); Hypothesis 5 on task significance is supported, with a significant and negative value (β = -.54; p = .007); Hypothesis 6 is supported and, after controlling for the linear effect of task identity, the quadratic term of task identity calculated over the mean difference shows a positive and significant value (β = .56; p = .005), confirming the U-shaped relationship between task identity and job crafting. Hypothesis 7 is supported as well, showing the positive and significant value of network contacts' feedback (β = .44; p = .018). The only hypothesis which is not supported is Hypothesis 4, according to which network variety is proposed to positively explain job crafting. Note that the inclusion of network job characteristics alone improves the equation by 23 percent. Both network centralities and network job characteristics are seen to be highly relevant in the prediction of job crafting.

Table IX reports the regression analyses for the prediction of individual performance. I included in the equation the variables used as predictors of job crafting in order to eventually account for possible mediating paths and to see whether those variables have a direct effect on performance transferred by job crafting. I did not include individual job characteristic variables in the set of controls. As mentioned, individual job characteristics are hypothesized to mediate the relationship between network centrality and behavioral outcomes, such as performance (Brass, 1981). Including them in the equations possibly interferes with the observation of the link between centrality and performance and makes it more difficult to interpret the interactive effect of centralities with job crafting. Differently, the network job characteristics are not assumed to play any direct role in the prediction of performance and controlling for individual job characteristics becomes less relevant.

While in Model 7, the regression equation includes only the controls, Model 8 adds job crafting to the equation. Job crafting alone does not linearly predict individual performance, consonantly with the prediction that job crafting would trace a non-monotonic relationship. No mediating paths are therefore detected. Model 9 considers the interaction term of job crafting and betweenness centrality, while Model 10 considers the interaction term of job crafting and eigenvector centrality. Finally, Model 11 simultaneously includes both interaction terms. Note that while in the previous table

both centralities were simultaneously inserted in the equation because unique and divergent effects were hypothesized, in this case it is assumed that the two forms of centrality exercise the same interactive effect on performance and therefore they are substitutes and not additive. Both betweenness centrality ($\beta = .36$; $p = .005$) and eigenvector centrality ($\beta = .01$; $p = .083$) significantly interact with job crafting in the prediction of individual performance. Hypotheses 8 is supported while Hypothesis 9 is only marginally supported. The interactive effect of job crafting and betweenness centrality is very high, uniquely explaining a large portion of variance (Adjusted $\Delta R^2 = .28$). Simultaneously including both variables in the equation does not lead to a better prediction and only betweenness centrality and job crafting remain significantly related to performance. The interaction terms are positive in all cases. The direct terms of centralities and job crafting show negative values, although only betweenness centrality exhibits a modestly significant relation to performance. In order to interpret the interaction I graphically illustrate the slopes in Figure 24 and Figure 25, elaborating on the results of the equations with standardized βs and following the procedure recommended in Aiken and West (1991). Both figures show the non-monotonic effects, so that job crafting is negatively related to individual performance when network centrality is low and is positively related to individual performance when network centrality is high. Moreover, I performed simple slope tests to better interpret the positive and negative slopes in the relationship between job crafting and performance. When betweenness centrality is below the mean, the gradient of the slope is constantly negative and with modest significance ($p > 0.1$). When betweenness centrality reaches the mean, the gradient turns from negative to positive. As betweenness centrality increases, the gradient of the slope becomes higher and the significance of the simple slopes constantly improves, reaching a significance level of $p < .05$ when the moderator is one standard deviation above the mean and a significance level of $p < .01$ when the moderator is three standard deviations above the mean. The analyses on eigenvector centrality, which show modest significance, did not yield any significant result for the simple slope tests.

FIGURE 24 – The Interactive Effect of Betweenness Centrality and Job Crafting on Individual
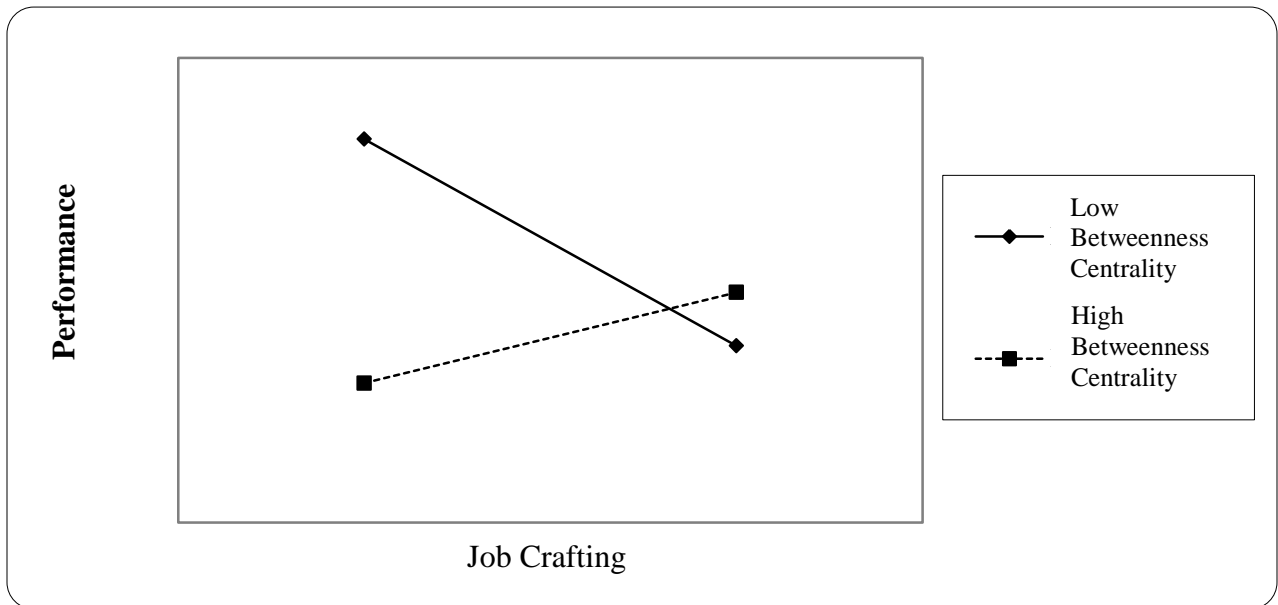
Performance

FIGURE 25 – The Interactive Effect of Eigenvector Centrality and Job Crafting on Individual

Performance
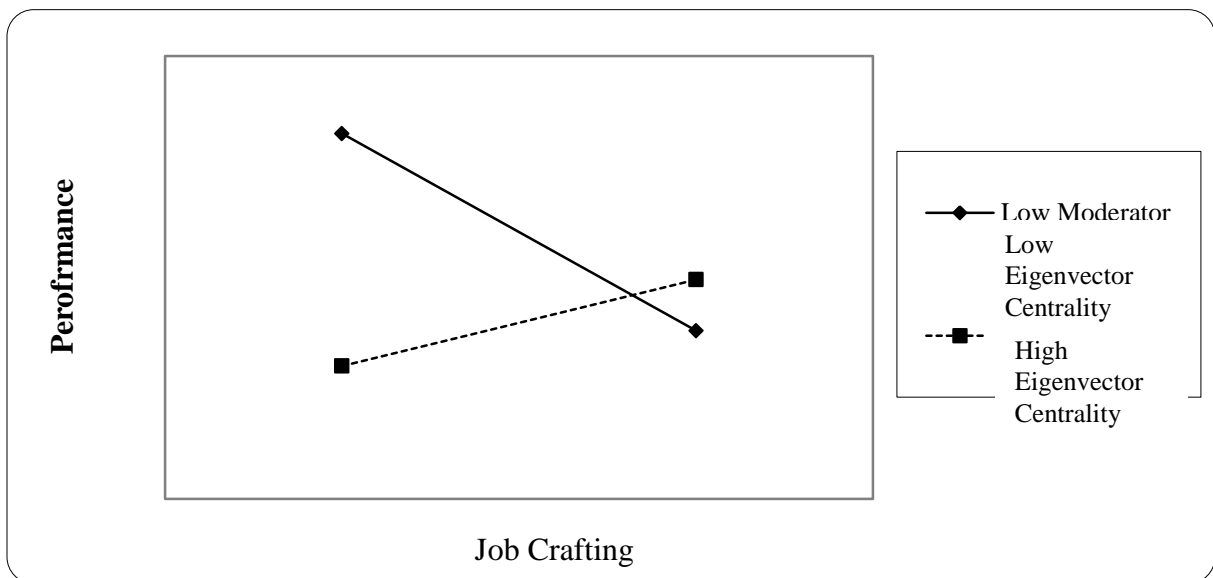
FIGURE 26 – The Hypothesized Model
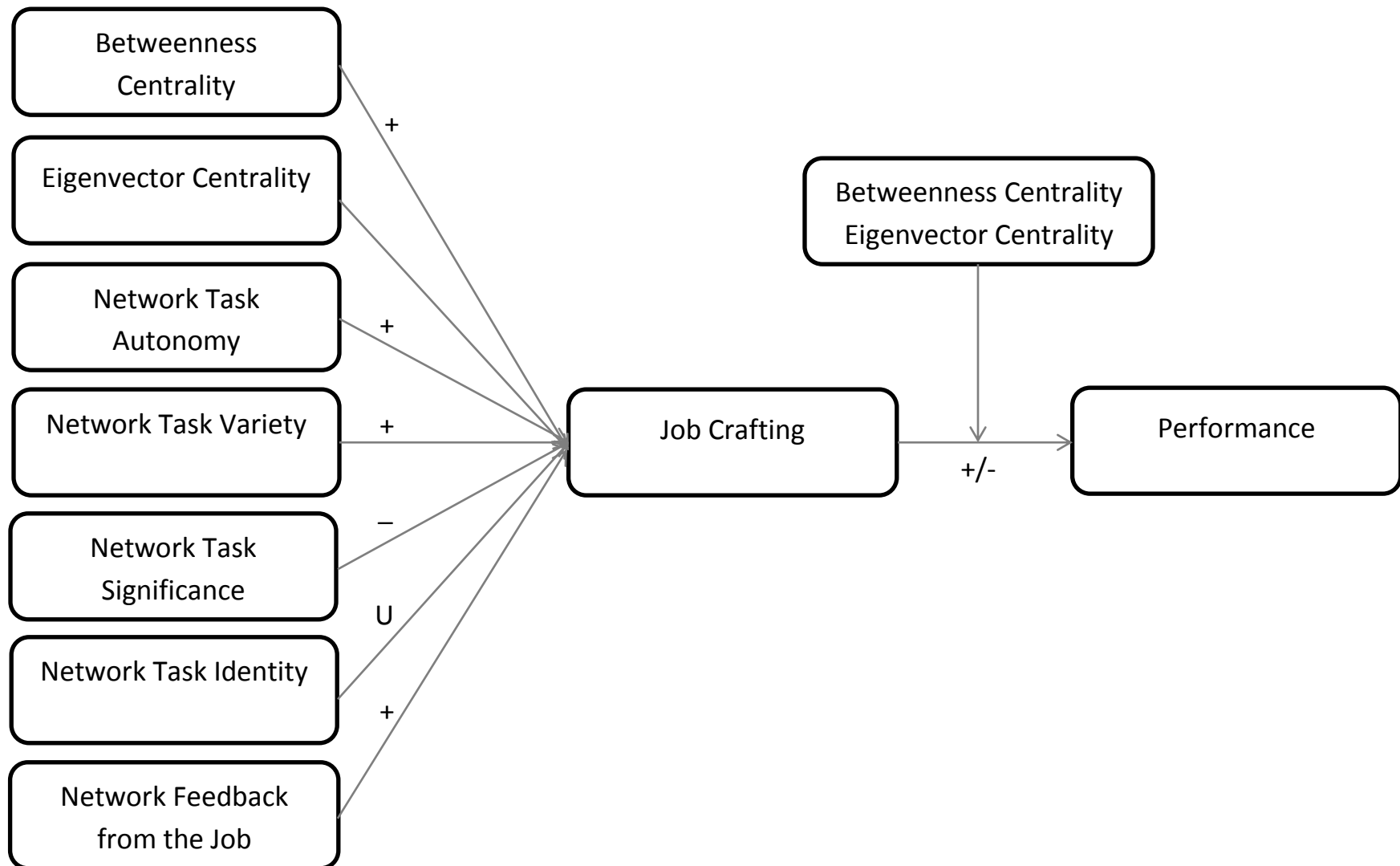
5.8. Discussion

The present paper develops and tests a theory linking elements of the social context to job crafting behaviors. Figure 26 provides a diagram showing the full model tested in this paper. Evidence was provided for the ambivalent role played by social networks. I found that betweenness centrality and eigenvector centrality exercise unique and divergent predictive roles on job crafting. These findings show how network position in the structure of relationships can both enable and constrain individual change. I found that the job characteristics of network contacts exercise as well unique and divergent predictive roles on job crafting. While previous job design research mostly hypothesized that job design variables affect outcomes through convergent effects, mostly through motivational mechanisms, I provide evidence for the unique and distinct predictive value associated with each single job characteristic variable. The only network job characteristic which I did not find to be significantly associated with job crafting is task variety. While, as anticipated, variety in network contacts may enable conditions for crafting jobs, Elsbach and Hargadon (2006) developed an argument which contrasts with previous research and according to which low variety and replication of tasks give less stress and release time to individuals to interact with others. The positive effects theorized could be contrasted with certain negative causal forces, which may explain the lack of significance in findings. Significant evidence was provided for a non-monotonic relationship between performance and job crafting, whose effect is contingent on the degree of network centrality. Last, although individual job characteristics were used as control and not hypothesized to have main predictive effects, some evidence was found for the effect of individual job characteristics on job crafting. It is particularly interesting to notice the divergent effects of feedback from the job: individual feedback from the job negatively predicts job crafting while network feedback from the job positively predicts it. This evidence supports the paradox about feedback from the job illustrated in the theoretical development.

This paper advances our understanding of job crafting theory. Studying the social context explains a very large portion of variance in job crafting behaviors. This study

expands previous theorizations of proactive behaviors that focused on the individual per se, exploring the predictive role of job design variables (Den Hartog & Belschak, 2012; Frese et al., 2007; Hornung, Rousseau, & Glaser, 2008) or of proactive personality traits (Chan, 2006; Major, Turner & Fletcher, 2006; Griffin, Neal & Parker, 2007). The investigation of the social context is valuable because it reveals the challenges of engaging in job crafting, since the social context tends to both constrain and empower proactive behaviors, pushing and pulling individuals in different directions, and making them strive for a balance in their social relationships which can be advantageous to their behaviors. Interestingly, this paper also reveals the contingent effects of job crafting on performance, showing how crafting can be either negative or positive as a function of the network relationships individuals are embedded in. These findings contribute to research in job crafting because they highlight its unique predictive value and characteristics. In fact, previous works explicitly found or implicitly assumed that proactive behaviors are beneficial to performance (Berg et al., 2010; Leana et al., 2009; Parker & Collins, 2008). Job crafting is seen to be a unique construct that explains individual outcomes in a unique way and through distinct mechanisms.

This paper provides substantial contribution to research in job characteristics. When Hackman and Oldham (1975) first introduced job characteristics theory, they identified the five factor model specifying the mechanisms activated by each of the five variables, which were hypothesized to explain unique portions of variance on relevant outcomes. Morgeson and Humphrey (2006) stressed the importance of studying the unique effect of each of the job characteristic. However, most empirical research on job characteristics hypothesized that the five variables exercise convergent and similar effects on behavioral outcomes (e.g. Griffin, Welsh, & Moorhead, 1981; Morgeson & Humphrey, 2006) and, given that the variables often did not explain unique portions of variance, several works aggregated the job characteristics into a single variable describing "enlarged", "complex" or "motivational" jobs (e.g. Brass, 1981; Edwards, Scully & Brtek, 2000). As long as the five variables exercise convergent effects on behavioral outcomes justified by the very same explanatory mechanisms, the need to theoretically distinguish among the five variables is weak. This manuscript reinforces research on job characteristics because not only does it show how each of the variables

activates explanatory mechanisms in a different way but it also shows the divergent effects of the variables on behavioral outcomes. It is important to specify that we hypothesized curvilinear relationships only in the case of task identity, while Xie and Johns (1995) have found curvilinear patterns with other job characteristics. The investigation of curvilinear patterns may need further attention by scholars. The association between job characteristics and change variables can reveal empirical insights which are still unexplored and which can drive future investigations in job design research.

This paper also provides contributions to research on the social information processing approach to job design. Studies on the social information processing and job design developed on the general idea that the social context influences the construction of cognitions about the job (Salancik & Pfeffer, 1978). However, the focus of previous research has been mostly on the individual rather than on the social context. Scholars have primarily focused their attention on describing the cognitive and behavioral processes through which an individual perceives the environment and constructs an interpretation of his or her own job from the social information received (Oldham & Hackman, 2010; Thomas & Griffin, 1983). This manuscript shifts the attention towards the social structure and the specific characteristics of the network contacts, assuming that the construction of jobs does not only depend on individual characteristics but is also a function of the social environment and its characteristics. Future studies could attempt to enlarge our insight exploring how individual and contextual characteristics combine in the prediction of job perceptions and crafting behaviors.

The present manuscript also contributes substantially to network research. The network research program has been openly criticized for not having fulfilled its promise (Salancik, 1995). When social network theorists in management started importing concepts and methodologies from sociology, the expectation was that the structural analysis of individuals in a company would have provided a wide array of perspectives and constructs capable of explaining the behaviors of individuals in organizations. The different centrality measures were believed to explain outcomes through distinct mechanisms and in a unique way (Wasserman & Faust, 1994). Yet, most empirical

studies supported similar effects of centrality measures on individual outcomes (e.g. Brass, 1984; 1985; Burt, 2007; Mizruchi & Stearns, 2001), developing in rare cases theories specific to one centrality measure (e.g. Mehra et al., 1998; Perry-Smith, 2006). Previous research has never identified divergent predictive effects, illustrating how one form of centrality is positive while another is negative. The conclusion of previous research seems to be that it generally matters to be central, regardless of the way in which centrality is measured. The present paper, supporting the unique and divergent effects of betweenness and eigenvector measures of centrality, reinforces the justification for studying the specificities of centrality measures and opens up new possibilities for empirical investigation.

Moreover, this paper expands research in social networks by giving emphasis to the study of the characteristics of the network contacts beside the structural position of individuals in the network of relations. Investigating the predictive role of the characteristics of network contacts may open a new avenue of possibilities for scholars interested in studying the dynamics of social influence. Roberson and Colquitt (2005) adopted the network approach to explain how justice perceptions of contacts are likely to shape justice perceptions of individuals and Kilduff and Krackhardt (1994) showed how the perceptions of prominence of contacts influenced the perceptions of prominence of the individual. Scholars can explore the aggregate mean characteristics of network contacts as well as dispersion characteristics, such as homogeneity or heterogeneity, of network contacts (Zaheer & Soda, 2009). Social influence on cognitions, attitudes and behaviors of employees can derive not only from the structural position of the individual in the network of relations but also from the cognitions, attitudes and behaviors of network contacts. This new perspective on networks can possibly spur future research endeavors in different fields.

The findings of this research have several practical implications. Research in job design stemmed from the practical imperative of providing indications to management on the way in which jobs should be designed to improve performance or favorable individual outcomes (Hackman & Oldham, 1975). Job crafting theory builds on the assumption that management nowadays does not engage as much in strict job analysis

and in writing job descriptions that guide or impose activities to individuals (Grant & Parker, 2009). This assumption justifies the relevance of studying proactive behaviors in which individuals construct their own jobs. Nevertheless, the idea that management does not invest as much time in designing *a priori* jobs as used to be the case does not imply that the structure of jobs has become less relevant for performance or for any other individual outcome. Management has to acknowledge that individuals have a direct role in designing their jobs. The role of management becomes to collaborate with employees in order to create flexible work arrangements and an environmental context that facilitates individuals' construction of jobs (Hornung et al., 2008). This paper shows how the social context surrounding the individual can be relevant to enable job crafting behaviors. Management can understand that the job of an individual emerges from the characteristics of the social context and hence work arrangements to increase productivity should not be designed considering separately any single individual, but operating from a systemic logic.

The current manuscript is affected by some limitations. There may be generalizability problems with the theory. The findings of this paper report only the evidence collected from one organization, but theoretical hypotheses were only marginally supported in a second organization in which data were collected. The theory may have some generalizability limitations when it comes to high dynamic organizations in which networks are highly unstable.[5] It is possible to assume that job crafting is influenced by job characteristics but also that job crafting influences the perception of job characteristics. Hence, job crafting behaviors could also influence the perception of job characteristics of contacts and the causality could be recursive. Nevertheless, the lagged structure of the data partially mitigates this problem. Furthermore, although in most cases, networks are likely to shape individual outcomes as well as individual outcomes are likely to shape network, network research is built on the tenable assumption that the effect of the structure on individuals outcomes is much stronger than the effects of individual outcomes on structure (Kilduff et al., 2006), weakening the problems of internal validity. Indeed, in the case of this study it is

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[5] Please find in the discussion section of this thesis and in the appendixes at the end of the thesis more information about the lack of replicated findings in the second organization.

reasonable to speculate that the effects of all network contacts on the crafting behavior of an individual are likely to be much stronger than the adaptation of job perceptions of all contacts stemming from the crafting behavior of a single individual.

Beside these two core limitations, there are other issues which need to be considered. Another limitation is that, although networks and crafting are lagged, crafting and performance are simultaneous. Even here, the assumption adopted by other scholars is that proactive behaviors generally precede performance evaluations by supervisors (Grant et al, 2009) and the latter are likely to depend on the former rather than the contrary. The findings are also limited because I did not measure mediators that could have shown how network variables actually get translated into crafting. Future research could try to shed more light on the mechanisms through which networks affect crafting. Last, findings could be affected by third variable causation. More specifically, personality could both explain networking and job crafting behaviors leading to a spurious relation. In the present context, it was impossible to measure personality variables. However, there is still ambiguity in research concerning the combination between personality, network structure and outcomes. Mehra et al. (2001) found that self-monitoring is associated with network centrality but centrality and personality additively affect performance outcomes. The argument of previous research exploring the interplay between personality and network structure acknowledges that networks do correlate with some personality characteristics but it also assumes that networks are likely to exercise an independent effect on behavioral outcomes which is not transferred only by personality characteristics (Burt, Jannotta & Mahoney, 1998; Kilduff & Oh, 2008; Mehra et al., 2001). Furthermore, the divergence in the effects of network centralities on crafting decreases the concerns for third variable causation.

To conclude, the present manuscript offered an investigation of the social context of job crafting substantially contributing to the advancement of knowledge. While previous research mostly assumed that network centrality measures exercise convergent and overlapping effects on outcomes, this study shows how they exercise divergent and unique effects on job crafting. While previous research mostly assumed that job characteristics exercise convergent and often overlapping effects on outcomes, this work

showed how the job characteristics of network contacts exercise divergent and unique effects of job crafting. While previous research assumed that proactive behaviors are beneficial to performance, this paper showed that job crafting could both be positive and negative as a function of the degree of network centrality. Overall, the findings provide rich insights which can inform new arguments on the linkages between job design and social networks and hopefully drive the development of further research.

Chapter 6:

THE DARK SIDE OF STRUCTURAL HOLES: MULTILEVEL EFFECTS ON JOB CRAFTING, SATISFACTION AND PERFORMANCE

Abstract

While previous research has explored the effects of structural hole positions through single-level models describing their positive effects, this paper develops a multilevel model and supports an antithetic theoretical position, revealing a dark side of structural holes. More specifically, it is theorized that group-level mean and group-level variance in individual structural hole positions are negatively associated with individual outcomes. The argument that justifies this association is that the individualistic, competitive, manipulative and power-oriented nature of individuals occupying structural hole positions may be beneficial when considering the single individual but it creates frictions and problems when it comes to collaboratively working in a group. The paper provides evidence for the negative effects of group composition variables, such as group-mean and group-variance in structural holes, on relevant individual outcomes, such as job crafting, satisfaction and performance. Findings provide support of the multilevel nature of networks and of their ambivalent characteristics, revealing a possible lack of isomorphic conditions across levels of analysis.

Keywords: structural holes, group composition, multilevel research

6.1. Introduction

In the last two decades, research in social networks has been strongly influenced by the theory of structural holes. According to Burt (1992), an individual, the ego, that bridges contacts, the alters, which are not tied to each other occupies a structural hole position, which is supposed to lead to advantageous consequences. A flurry of empirical investigations has supported Burt's theoretical position across different levels of analysis. At the individual level of analysis, Rodan and Galunic (2004) supported that occupying positions rich in structural holes is empirically associated with both performance and creativity. Burt (2004) found that good ideas, compensation and promotion depend on the degree of occupation of structural hole positions. Fleming, Mingo and Chen (2007) empirically supported that structural holes facilitate the recombination of knowledge. Seibert, Kraimer and Liden (2001) found that structural holes are beneficial to the attainment of career outcomes. At the group level of analysis, Oh, Labianca and Chung (2006) reviewed empirical evidence and arguments supporting the claim that structural hole positions brokering both vertical and horizontal relationships are beneficial to performance. Cumulative empirical confirmation seems to endorse the position that structural holes are advantageous both for individuals and for groups.

Yet, the theory of structural holes is built on the assumption of competitive behaviors. According to Burt's (1992, 1997) theory, structural holes are hypothesized to lead to beneficial outcomes because they allow the individual or the group to develop a *competitive advantage* in relation to other individuals or to other groups. Brokers, exploiting the absence of direct ties between their contacts, gain informational and control advantages over those they bridge and can pursue unique behavioral opportunities leading to higher performance or to other beneficial outcomes (Burt, 1992). Individuals spanning networks rich in structural holes exercise control over the most rewarding opportunities, exploit those opportunities and, consequentially, do not allow others to likewise exploit them (Burt, 1997). The informational and control benefits of structural holes are not absolute but exist to the extent that they are obtained *over others*, entailing a zero-sum game. According to Obstfeld (2005), structural hole

theory is built on the idea of adversarial relationships, on manipulating others for one's own personal benefit, on exercising individualistic behaviors, on filtering information, on impeding others' access to relevant knowledge and on playing people off against one another. Burt (1997) acknowledges the nature of competitive behavior in his logic, recognizing that "there is a tension here, but not the hostility of combatants" (Burt, 1997: 342).

Does the assumption of competitive behaviors hold in explaining the benefits of structural holes under all situations? Previous structural hole research endorses the idea that competitive behavior among individuals in the same organization could be beneficial. Likewise, research seems to suggest that competitive behavior among groups in the same organization may be beneficial as well. However, is competitive behavior among individuals in the same group beneficial? Work groups are believed to function effectively when members equally share knowledge with one another and collaborate instead of competing (Harrison, Price, Gavin & Florey, 2002; Stasser & Titus, 1985). So, would group members appreciate that someone within the group, as Burt suggests, withholds, filters, manipulates or controls information for his or her own benefit?

In order to address this question, the present paper elaborates a multilevel theory of structural holes and explores how individual structural hole positions aggregated at the group level explain individual behavioral outcomes. Addressing this question fills a significant research gap. Despite solid cumulative evidence concerning both the individual and the group levels of analysis, there is less empirical evidence on multilevel relationships and scholars have been calling for multilevel empirical studies in network research (Brass, Galaskiewicz, Greve, & Tsai, 2004; Moliterno & Mahony, 2011; Provan, Fish & Sydow, 2007). Although we have reached a good understanding of individual ego-networks, the question regarding how individual networks should combine to generate aggregate network structures remains theoretically and empirically open (Ibarra, Kilduff, & Tsai, 2005).

In order to elaborate the core argument of this paper, I study the predictive value of group-level network variables on relevant individual outcomes. The core idea of structural holes is that, through the mechanisms of access to information and control, they make it possible for individuals to recombine knowledge in unique ways, enabling

individuals' initiative and empowering innovative outcomes (Burt, 2004; Fleming et al., 2007). In this paper, I focus on job crafting, which reflects the individual's proactive initiative to engage in innovative behaviors that change the structure of one's job (Wrzesniewski & Dutton, 2001). Job crafting can be relevant to study in the context of structural holes because it entails both the independent initiative and the innovative character directly enabled by structural holes. However, the construct also has characteristics that make it particularly germane to study in the context of group network research. Considering that jobs between individuals are strongly intertwined (Kilduff & Brass, 2010) and especially that changes in a group member's task require adaptation of other member's jobs (Campion, Medsker and Higgs, 1993), it is plausible to assume that the group social dynamics may be relevant to explain the implementation of job change behaviors of individuals. In order to extend the predictive validity of the model and show how the mechanisms hypothesized to be triggered by group composition similarly affect different outcomes, this paper also considers attitudinal outcomes, and in particular satisfaction with the group. Attitudinal outcomes of networks can be important to study because we have reached substantial understanding of how network structures affect behaviors, but we still have an incomplete picture of how networks affect attitudes (Tottendell, Wall, Holman, Diamond, & Epitropaki, 2004). Individual satisfaction with the group may be particularly relevant to study in the context of group-level research because overall job satisfaction is significantly dependent on the degree to which individuals are satisfied to work with the members of the group in which they work (Kinicki, McKee-Ryan, Schriesheim, & Carson, 2002). Last, this study also focuses on individual performance, which is the final outcome that ultimately justifies the importance of studying structural holes in organizations (Burt, 2007).

6.2. The Dark Side of Structural Holes

The theory of structural holes was pioneered by Ronald Burt (1992) on the premises of the theory on the strength of weak ties introduced by Granovetter (1973) and focusing on the individual as level of analysis. Burt (1992) focused on elaborating

the argument about the benefits of sparse networks in which an individual bridges pairs of contacts that are not directly tied. Structural hole positions give access to non-redundant information, which could be beneficial to recombine knowledge in novel ways, leading to a modification in the task activities performed in the job (Fleming et al., 2007). The diversity of information that individuals in open networks with structural holes have access to lead to the generation of new knowledge combinations, which can promote the execution of new activities (Brass, 1995; Hargadon & Sutton, 1997). Individuals in closed networks are exposed to redundant information and they will receive the same pieces of information from multiple contacts, while individuals in open networks rich in structural holes access different pools of knowledge, which lead to access to non-redundant information and the possibility of garnering innovative insights that can be used to pursue novel approaches and develop personal initiatives (Granovetter, 1973). Furthermore, individuals occupying structural hole positions increase the control over unconnected others, being capable of exercising influence over their behaviors (Burt, 1992). The control advantages stemming from structural hole positions make individuals capable of negotiating better deals with others (Pollock, Porac & Wade, 2004). Individuals occupying structural hole positions benefit from the opportunities they have access to because they use their control advantages to gain bargaining power with others (Bidwell & Fernandez-Mateo, 2010). The information and control advantages of structural holes are believed to explain why at the individual level of analysis, structural hole positions can be beneficial for employees (Burt, 1997).

Yet, there could also be an explored dark side of structural holes. Kilduff and Tsai (2003) note that most research in social network has focused on exploring the beneficial effects of networks, but that there could also be deleterious network effects which have not been addressed by scholars yet, leaving a substantial gap in the literature. In order to justify his argument on the importance of structural holes, Burt (1992) appealed to the concept of *tertius gaudens* introduced by Simmel (1950). Simmel devoted substantial effort to studying the social dynamics in triads and observed that an individual connecting two others who are not directly tied could exploit the unfamiliarity between those individuals for his or her own benefit. Obstfeld (2005) noticed how the language in Simmel's (1950) discussion builds on adversarial behavior

between individuals as he explicitly mentions "colliding parties" or "quarrelling". While adversarial and competitive behaviors could be somehow beneficial to the single individual in the organization, they raise a question about the multilevel nature of relationships in a group where individuals should help each other's execution of tasks. Burt (1992) explains that in a network where structural holes are not present, information is evenly distributed and no individual can derive a competitive advantage over others. When there are holes in the structure, individuals can leverage information on their own interest and create a competitive advantage which is built on getting information for oneself while restraining information access to others. Individuals can then behave as gatekeepers and keep information for themselves, hence increasing their own outcomes, but at the same time decrease or manipulate information access to others, hence decreasing others' outcomes (Shi, Markoczy, & Dess, 2009). Therefore, it follows that for one individual is may be good to occupy a structural hole positions but being embedded in a group where other team members occupy structural hole positions may be problematic. Network brokers may also have a calculative and individualistic orientation (Buskens & van de Rijt, 2008; Obstfeld, 2005) and an orientation towards achieving personal power (Brass, 1984; Burt, 2007; Rodan & Galunic, 2004), which may create group-level problems which hamper the harmonious functioning of a group, eventually damaging each individuals' outcomes. The present paper examines this argument building a theory on the multilevel relationships between group-level network composition and individual level outcomes.

6.3. A Multilevel Network Model of Structural Holes

Although the investigation of multilevel questions in network research has been particularly called for by network theorists (Brass et al., 2004; Moliterno & Mahony, 2011), such questions have only been marginally addressed by previous scholars, perhaps due to the difficulty of putting together an empirical network dataset with a sufficient size of individuals nested within groups. In the multilevel approach to network research, the individual level can be conceptualized as the ego-network while the higher level can be conceptualized as the aggregate network structure of the group of

individuals (Ibarra et al., 2005). Scholars have previously examined the predictive role of group network density and network centralization, which can somehow be respectively conceptualized as within-group mean and within-group variance in network degree centrality. Balkundi and Harrison (2006) performed a meta-analytical study and found that density in both instrumental and affective networks relate to aggregate performance. Reagans and Zuckerman (2001) found that group density in the communication network positively predicts productivity. Parise and Rollag (2010) performed a simulation and found that work and friendship density at the group level is associated with the initial performance of the group. Sparrowe, Liden, Wayne and Kraimer (2001) and Cummings and Cross (2003) found evidence that centralization negatively relates to group performance.
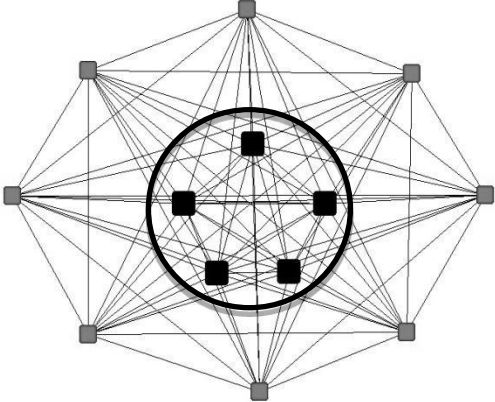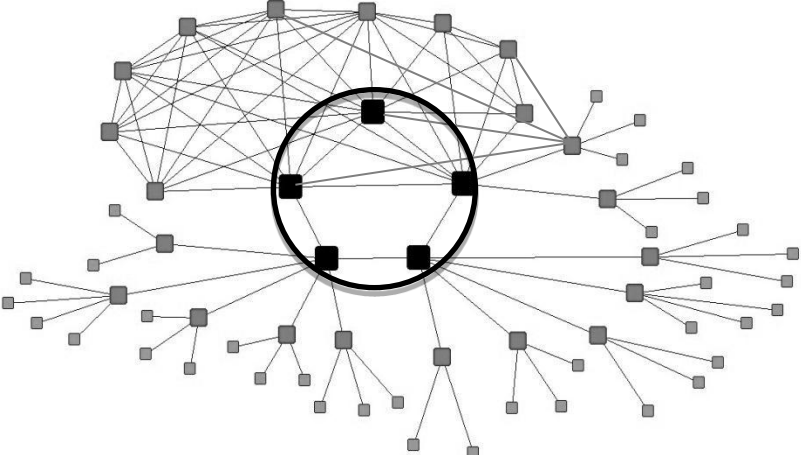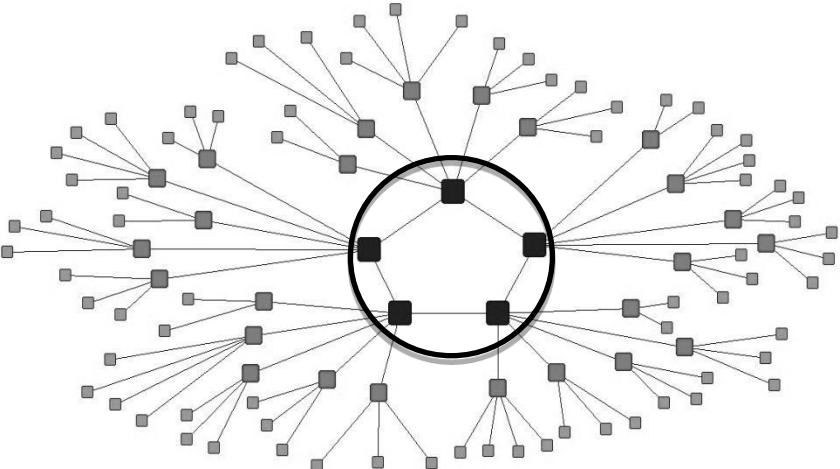
However, these studies examine the group network composition in terms of aggregate individual networks and describe the multilevel structure of networks in terms of their nested nature (Ibarra et al., 2005), but they are fundamentally single-level empirical studies, since both dependent and independent variables are measured at the group level. Moliterno and Mahony (2011) note that although previous studies used the term "multilevel" because they were addressing the nested nature of individual networks in groups, they were not empirical studies employing multilevel methodology and exploring the cross-level association between variables and different levels of analysis. This paper elaborates a fully cross-level model in which group composition variables based on individual attributes predict individual outcomes. Furthermore, despite the core relevance of structural hole theory in social network research, no previous research has to my knowledge attempted to develop a multilevel investigation of structural holes and their correlates.

In order to fill the gaps in the multilevel exploration of structural holes and in the investigation of the possible dark sides of structural holes, this paper proposes a model to study how the group composition of individual structural hole positions affects individual outcomes. It is important to specify that the present theorization develops a general argument on the composition of individual structural hole positions within the group without specifying whether structural holes are bridged inside or outside the group. The paper aims to craft a general argument on the multilevel effects of structural

holes relaxing the constraint on the locus of holes within the organization. Intra- or inter-group brokerage represents specific cases developed from the general argument on the aggregate effects of individual structural hole positions at the group level. There are two group-level variables which can be derived from the aggregation of individual structural hole positions at the group level. The first variable that can be studied is the group-level mean in structural holes. Group-level mean in structural holes follows an additive composition logic which assumes that the higher level construct is derived from the aggregation, or arithmetic sum, of the lower level constructs (Chan, 1998). This variable can be conceptualized as a construct analogue to group density for indegree centrality: as group density is derived from the average of the standardized individual centralities within the group, group-level mean in structural holes can be derived from the average of the individual scores in structural hole positions. Additive composition variables in network research, such as group density, may be theoretically important to study because they may explain the information flow between members in the same group, the formation of emotional responses and attitudes about the group, or the functioning dynamics of the group, that can affect individual as well as aggregate group behaviors (Balkundi & Harrison, 2006; Parise & Rollag, 2010). Group-level variables that aggregate the individual-level network characteristics go beyond the individual mechanisms and provide unique mechanisms which have distinct theoretical meaning (Ibarra et al., 2005).

Figure 27 shows the three main possible structural configurations of work groups as a function of the structural hole positions of individuals. *Configuration* 1 shows the scenario in which no individual bridges structural holes and all individuals in the group are embedded in closed networks while *Configuration 3* shows the opposite case in which all individuals span structural holes and do not share any overlapping tie. In the first case group mean in structural holes is low, while in the second case it is high. The group mean in structural holes may affect individual outcomes both through aggregate individual-level mechanisms and through group-level mechanisms. In the first case, the behaviors of a person in a group may be influenced by the individual behaviors of each of the other team members. For instance, each individual spanning structural holes may manipulate and constrain the access to information to others, while each individual in a

FIGURE 27: Configurations of Group Network Structures

Configuration 1: **Closure** Group-Mean of SH: LOW Group-Variance of SH: LOW	
Configuration 2: **Structural Holes & Closure** Group-Mean of SH: AVERAGE Group-Variance of SH: HIGH	
Configuration 3: **Structural Holes** Group-Mean of SH: HIGH Group-Variance of SH: LOW	

closed network may openly share information with others (Obstfeld, 2005; Coleman, 1990). Consequently, if we consider the case of an ego in a group where everyone spans structural holes, after controlling for the effects of the ego's own structure on outcomes, we could see that each single other member may limit the information access to ego, leading to deleterious effects. Ego will benefit from spanning their own structural holes but he or she will not benefit from the other members spanning structural holes. In the second case, the whole group composition creates group-level mechanisms which affect each member's outcomes. For instance, as will be explained, the composition of individuals in the group may influence the development of a favorable or unfavorable group climate which affects each individual's behaviors.

The second variable which can be studied to observe the group composition of individual structural holes is group-level variance in structural holes. Group-level variance in structural holes follows the dispersion composition logic which assumes that the variance in the scores at the lower level defines the construct at the higher level (Chan, 1998). This variable can be conceptualized as a construct analogue to group centralization for indegree centrality: as group centralization is derived from the dispersion of the standardized individual centralities within the group, group-level variance in structural holes can be derived from the dispersion of the individual scores in structural hole positions. Network dispersion measures, such as centralization, have theoretical meaning as they capture and describe the relative role that every individual plays in the whole network structure comparatively to the other individuals (Cummings & Cross, 2003; Sparrowe et al., 2001). Individuals may prefer working with others similar to themselves (McPherson, Smith-Lovin, & Cook, 2001) or may develop tensions with others having the same network structures (Burkhardt, 1994), making the study of group dispersion in individual network positions interesting. The whole group's functioning may be influenced by the dispersion of individual network characteristics (Cummings & Cross, 2003; Sparrowe et al., 2001). The dispersion of individual network characteristics is likely to affect individual outcomes through group-level mechanisms. For instance, as it will be illustrated, group dispersion of structural hole positions may create group-level conflict among members, negatively affecting each member's outcomes. *Configuration 2* in Figure 27 shows the scenario in which a group has high

variance in structural holes and is composed of both individuals embedded in a closed network and individuals who bridge structural holes.

Both group-level mean and group-level variance in structural holes are elaborated following the same composition logics of the two most studied group-level network variables, group density and group centralization, but shifting the focus from centrality to structural hole positions. In the following sections, the multilevel effects of structural holes on individual outcomes will be explored, theorizing similar effects on three individual outcomes observed, such as job crafting, satisfaction and job performance. In the first section, the predictive effect of group-level mean in structural holes will be described. It is important to acknowledge that the arguments developed explain the *unique* effects of group mean in structural holes on the individual outcomes *beyond the individual effect*, so after the effect of one's own individual structure is partialled out. The analyses will isolate the effect of individual and group structure on individual outcomes allowing the identification of the levels at which structural holes influence individual outcomes. The second section addresses the predictive effect of group-level variance in structural holes, concluding the conceptualization of the multilevel nature of structural holes.

6.4. Group-Level Mean in Structural Hole Positions

The first argument developed is that the group-level mean in structural hole positions affects individual job crafting. Being an individual who spans structural holes may empower initiatives because of information and control advantages (Burt, 2003). However, being a member of a group with individuals spanning structural holes can lead to information and opportunity disadvantages. Individuals bridging structural holes withhold information for themselves, filter the information that is supposed to go to others for their own advantage and decide to keep the most valuable opportunities for themselves instead of giving them to contacts (Burt, 1992). These behaviors may indeed be beneficial for each single broker, but may be deleterious for all the other team members who receive restricted information and are not allowed access to opportunities. Individuals who bridge structural holes tend to keep others separate even when they

would benefit from being connected, limit their advantages, while an individual who joins others and creates closed structures, creates benefits for those surrounding him or her (Obstfeld, 2005). The benefits of structural holes for individuals are manifested only if the individuals keep the information and opportunities for themselves, restricting access to others (Buskens & van de Rijt, 2008). Furthermore, individuals who span structural holes create condition of dependence of others on them (Burt, 1997), which improves the opportunities for the broker but at the same time decreases the opportunities for others who depend on him or her. Hence, it can assumed that for a single individual it may be beneficial to occupy structural hole positions, but being part of a team where the other members span structural holes decreases the information and opportunity advantages for the individual. Access to information and to opportunities is fundamental to engage in job crafting behaviors because changing tasks requires substantial information that the individual does not have and exposure to opportunities for changing tasks (Grant & Parker, 2009; Wrzesniewski & Dutton, 2001). Individuals who want to change their tasks need the informational inputs from their close colleagues so that they can engage in change adaptations which fit the working environment (Morrison & Phelps, 1999).

Furthermore, group members spanning structural holes may not only constrain job crafting behaviors because they limit their enablers, such as information and opportunities, but also because they directly oppose the pursuit of other's crafting behaviors. Structural hole positions, allowing control over others and independence from the control of others, allow individuals to develop individual power and political advantage (Burt, 2007; Rodan & Galunic, 2004; Seibert et al. 2001). In a team with individuals seeking personal power, there may be a climate with power struggles, tensions, defensive and aggressive behaviors (Greer, Caruso & Jehn, 2011; Greer & Van Kleef, 2010) that hinder the pursuit of individual initiatives. In an environment in which all individuals seek to span structural holes, every individual may try to restrict and oppose the initiative of others because he or she does not want others to increase their base of power and personal control, consequently decreasing one own control (Buskens & van de Rijt, 2008). Individuals that see others as competitors could obstruct others' initiatives because they are jealous of them and they envy the fact that they may obtain

the job they want (Cohen-Charash & Mueller, 2007; Mouly & Sankaran, 2002; Smith, Parrott, Ozer, & Moniz, 1994).

Differently, when group members are embedded in closed networks they could facilitate each other's crafting behaviors because of a favorable group climate. With the single individual as point of reference, the competitive orientation of structural holes may be beneficial, but with the group as point of reference, individuals' initiative is enhanced if team members embrace a collaborative orientation in which they share each other's access to information, enabling the reciprocal pursuit of initiatives (Cohendet & Simon, 2007; Paulus, & Huei-Chuan, 2000; Pirola-Merlo & Mann, 2004). Group members who are exchange-oriented tend to inhibit each other's learning opportunities and obstruct others' initiatives, while group members with a communal orientation share the advantages deriving from their personal position for the benefits of others and attempt to enable others' personal initiatives (Chen, Lee-Chai & Bargh, 2001; Vegt, Van der Jong, Bunderson, & Molleman, 2010). For the above-mentioned reasons, it is anticipated that the group-level mean in structural hole positions negatively affects job crafting.

Hypothesis 1: the group-level mean in structural hole positions is negatively associated with individual job crafting

The group-level mean in structural holes is also likely to affect individual satisfaction. Individuals are likely to derive dissatisfaction from working in a group where members occupy structural hole positions as compared to the case in which members are embedded in closed networks. Buskens and van de Rijt, (2008) argue that individuals spanning structural holes substitute a logic of social obligation with a logic of calculation and personal gain. According to Watts (1999) networks become a "device to be manipulated consciously for an actor's own ends". A group in which team members share a collaborative orientation is likely to have more satisfied individuals than a group in which all team members share a calculative orientation. The collaborative orientation of individuals in a team creates a climate of group harmony in which every individual experiences personal gratification in work (Bell, 2007; Eby & Dobbins, 1997). When team members are collaborative and share their sources of information amongst each other, they can influence each other's cognitions, leading to

the formation of group shared beliefs that reinforce the contentment of individuals (González-Romá, Peiró, & Tordera, 2002; González-Roma, Peiro, Lloret & Zornoza, 1999). When all team members have overlapping contacts they develop shared group perceptions which reinforce a positive sense of belonging to a common group instead of a sense of being separate individuals forced to work together (Zohar & Tenne-Gazit, 2008).

Furthermore, a group composed of members that span structural holes is likely to develop relational conflict leading to lower individual satisfaction with the group. This argument builds on the same premises that individuals spanning structural holes tend to be calculative and oriented towards personal gain while individuals in closed networks develop a more collaborative orientation (Buskens & van de Rijt, 2008). Relational conflict in a group emerges when team members are self-interested and motivated to pursue personal gain, while cooperative behaviors and mutual help are achieved when team members share a communal and collaborative orientation (Eby & Dobbins, 1997). Relational conflict at the group-level is likely to trigger negative affect at the individual level because each individual may become less confident in the information provided by the other members, develop frustration from misspent time and efforts, and be less interested in working with others (Jehn & Bendersky, 2003). When the group develops high levels of relational conflict, members develop disrespect towards others and perceptions that others have sinister intensions, which lead to lower conditions of overall satisfaction (Jehn, Rispens, & Thatcher, 2010). Chen, Sharma, Edinger, Shapiro and Jiing-Lih (2011) found that group-level relational conflict explains individual-level affective states, making individuals less happy to work. For the above-mentioned reasons, it is hypothesized that groups composed of individuals bridging structural holes will be associated with lower individual satisfaction with the group.

Hypothesis 2: the group-level mean in structural hole positions is negatively associated with satisfaction with the group

The group mean in individual structural holes may also be related to individual performance. The mechanism of access to information that affects job crafting is likely to influence also individual performance. Because brokers keep information for themselves and restrict access to information to their contacts (Burt, 1992), having many

brokers as team members will result in lower access to information for the single individual. Each single broker will be capable of deriving advantages by exploiting his or her own structure, but will not be capable of deriving any advantage from exploiting the structure of the team members, because they are less likely to share information. Differently, each single individual in a closed network structure will be capable of deriving lower informational advantage from his or her own structure, but will be capable of deriving advantages from exploiting the structure of team members, who will be more likely to share their sources of information.

Moreover, the competitive and collectivist orientations embraced and reinforced by individuals with different network positions are likely to influence individual performance. As stated, individuals bridging structural holes are likely to embrace and develop a competitive orientation while individuals in closed networks are likely to embrace and develop a collaborative and collectivist orientation (Obstfeld, 2005). Groups composed of team members who embrace collectivist orientations, who develop reliance on others and who accept social norms are likely to function better and enable any single individual to better execute the assigned tasks (Dierdorff, Bell, & Belohlav, 2011). In a meta-analysis of field studies, Bell (2007) showed that groups composed of team members characterized by collectivist orientations are strongly associated with better functioning and performance implications as compared to groups composed of individuals characterized by competitive orientations. Furthermore, competitive orientations among team members may be particularly deleterious when team members are associated by mutual dependence. A structural hole position creates dependence of others on the broker because contacts need the intermediation of the broker in order to access a particular source of information (Burt, 1992). Differently, when individuals are embedded in closed networks, there are lower conditions of dependence because if one individual decides not to provide information to his or her contacts, such contacts may find substitute and alternative ways to obtain information (Coleman, 1990). When a group is characterized by conditions of mutual dependence of members for the access to relevant information, competitive orientations in which members seek personal gain and are less keen on sharing information with each other lead to group functioning problems which hamper the performance of each single individual in the group as well as of the

group as a whole (Beersma et al., 2003; Deutsch, 1949; Stanne, Johnson & Johnson, 1999).

The last mechanism which is likely to affect the relationship between group-level mean in structural holes and individual performance is related to power. As previously mentioned, structural hole positions allow individuals to develop a personal base of power and to derive an orientation toward exploiting that personal power, while individuals in a closed networks gain less personal power and become less interested in seeking it (Burt, 2007; Rodan & Galunic, 2004; Seibert et al. 2001). A team with individuals holding high power may experience conditions of higher process conflict which hampers the productivity and performance of individuals (Greer et al., 2011). A group with individuals having high power may experience lower interpersonal trust, which hampers performance (Greer & Caruso, 2007). Groups composed of individuals with high power are characterized by conditions of power struggle and conflict because high-power individuals show dominant behaviors and require submissive behaviors from others: multiple parties characterized by dominant behaviors in the same social environment clash with each other, compromising group functioning and hindering everyone's execution of tasks (de Reuver, 2006; Tiedens, & Fragale, 2003). Furthermore, Flynn and Wiltermuth (2010) posit that brokers, gaining personal power, tend to become more focused on themselves and less sensitive to others' views, which could eventually lead to clashes in the team and mutual hindrance of behaviors. For these reasons, it is anticipated that group-level mean in structural hole positions negatively affects individual performance.

Hypothesis 3: the group-level mean in structural hole positions is negatively associated with individual performance

6.5. Group-Level Variance in Structural Hole Positions

Beside the group-level mean in structural hole positions, group-level variance in structural hole positions is likely to affect individual job crafting. According to the social information processing argument, individuals in the social environment provide information about the salience and appropriateness of job activities and of initiatives in

jobs (Salancik & Pfeffer, 1978; Thomas & Griffin, 1983). Individuals have an imperfect understanding of the activities they should perform in the job and cues from social sources help to build an understanding of which task activities it is important to perform (Blau & Katerberg, 1982; Morgeson & Campion, 1997; Thomas & Griffin, 1983). Individuals bridging structural holes and individuals in a closed network might develop conflicting perceptions about the salience of job changes. For Podolny and Baron (1997) individuals with high and low structural hole positions differ substantially in terms of normative expectations and believe in the appropriateness of different roles. For a broker it might be salient to engage in new job activities and discuss opportunities for novel tasks, while for someone embedded in a closed network it might be more salient to respect established norms, engage in tasks expected for him or her to perform and limit the pursuit of opportunities for new tasks (Burt, 2000). For a broker, task adaptation might be important while someone embedded in a closed network might be more rigid and less prone to adapt tasks to changing situations (Gargiulo & Benassi, 2000). A broker may stress the importance of discretional job behaviors while someone in a closed network may not (Gargiulo, Ertug & Galunic, 2009).

The decision to perform a crafting behavior is a risky decision because job crafting behaviors are not universally perceived to be positive and some individuals in the organization may see proactive behaviors as beneficial while others may see them as deleterious (Parker, Williams & Turner, 2006). Given the risk associated with such behaviors, for individuals it becomes important to derive consistent information about the appropriateness of engaging in proactive change behaviors from the social environment surrounding them in order to become convinced about the choice and reach impetus for the change action (Grant, Parker & Collins, 2009). If individuals obtain from their surrounding environment similar and consistent social cues concerning the salience of task activities, they are more likely to reach a precise understanding of how to alter tasks. In contrast, if individuals receive from their social environment diverse, conflicting and ambiguous cues on the salience of task activities their job initiative may be paralyzed and they may be incapable of understanding how to adapt their jobs (Dean & Brass, 1985; Morgeson & Campion, 1997). In a group with high variance in structural characteristics, both the brokers and those in closed networks will receive conflicting

interpretations about the appropriate tasks adaptations to perform because their own perceptions contrast with those of other team members and because team members give salience to different activities and job dimensions. It is therefore proposed that variance in the social structure of individuals in a group produces conflicting behavioral expectations which lead to a lower understanding of how task changes could be performed. I hence anticipate that group-level variance in structural holes is negatively related to individual job crafting.

Hypothesis 4: Group-level variance in structural hole positions is negatively associated with individual job crafting

Group variance in structural hole positions may exercise an effect on overall satisfaction with the group. The idea that within-group variance in structural holes might affect satisfaction springs from the application of homophily theory. According to homophily theory, individuals derive higher satisfaction from being associated with others similar to them (McPherson & Smith-Lovin, 1987; McPherson, Smith-Lovin, & Cook, 2001). More specifically, individuals derive satisfaction from being associated with others who share similar values and beliefs (Lazarsfeld & Merton, 1954). An individual bridging structural holes and an individual in a closed network are likely to embrace and reinforce different values and beliefs. According to Coleman (1990), individuals in a closed network develop an understanding of the importance of collaborating and the value of creating a cooperative image. They reinforce each other's sense of belonging to a group that mitigates risks through the progressive development of mutual trust and obligations. According to Burt (1992), individuals bridging structural holes learn how to exploit entrepreneurial opportunities and can become more comfortable with navigating in areas of uncertainty and risk. They might become more inclined to competitive behaviors instead of collaborative ones. According to Obstfeld (2005), bridging structural holes makes brokers end up embracing a behavioral orientation to play people off against one another. Burt (2008) argues that people in closed networks want protection from the outside world and desire an environment in which their own views are reinforced by others, while individuals bridging structural holes believe in expanding their horizons.

Multiple research streams have elaborated separate theoretical positions which lead to the same conclusion that group differences in values or attitudes are likely to generate negative attitudinal effects, such as lower satisfaction. Research in group composition posits that diversity in personal values within groups is likely to trigger negative affective outcomes, such as lower satisfaction, both at the individual and at the aggregate group level (Milliken & Martins, 1996). Research in relational demography has developed arguments to suggest that diversity in values might hamper group integration because it decreases the interpersonal liking of individuals in the group, making each individual less gratified and satisfied to work in the group (Byrne, 1971; Harrison, Price & Bell, 1998). Research in self-categorization posits that individuals derive their self-identity as a function of the characteristics of others in the group and differences will promote less attachment to the social collective and lower gratification with working in a group (Tsui, Egan, & O'Reilly, 1992). As people uncover differences in what they believe, in what they value and in what they care for, it becomes less pleasant and satisfying to work together (Harrison et al., 1998). Applying the logics of these lines of reasoning, if people derive higher satisfaction from being associated with others having similar values, individuals in a group with high variance in structural hole positions will consequently experience less satisfaction than individuals in a team with low variance in structural hole positions. I hence hypothesize that within-group variance in structural holes is negatively related to with the group .

Hypothesis 5: group-level variance in structural hole positions is negatively associated with satisfaction with the group

Group-level variance in structural hole positions may also have effects on individual performance. One mechanism underlying this relationship is information sharing imbalance. Ideally, brokers embedded in a sparse network have access to non-redundant information which spans widely while an individual in a closed network is exposed to the same type of information which recirculates redundantly inside the clique (Granovetter, 1973). Following this argument, an individual bridging structural holes can potentially contribute by providing more information to the group than an individual in a closed network. On these premises, Oh et al. (2006) proposed that groups would function well if brokers span outside connections and bring the outside knowledge

inside the group for the benefits of everyone. Nevertheless, are brokers naturally motivated to share the informational advantage of their position with their group colleagues if such colleagues belong to a closed network? The idea that brokers benefit from their information depends on the fact that they are used to withholding such information for themselves, filtering it and hence gaining control (Burt, 1992; Obstfeld, 2005). Logically, if a broker passed all information to his or her unconnected contacts, such contacts would be exposed to the very same opportunities for entrepreneurial behavior and the broker would be merely a transmitter with no gatekeeping control and no advantage. If a broker transfers information about unique behavioral opportunities to a team member embedded in a closed network, such information will be easily spread to all of his or her dense network contacts, diluting any potential for competitive advantage and gain. On the hand, individuals in a closed network become used to sharing the information they acquire from their contacts for the benefits of the networks in which they are embedded (Coleman, 1990; Gargiulo & Benassi, 2000). It could be inferred then that they might have less access to novel information but be more motivated to share it. Thus, a group with diversity in structural hole composition will be characterized by individuals with high access to novel knowledge but be less motivated to share it and individuals with low access to novel knowledge but more motivated to share it. It is plausible to assume that those individuals will conflict with one another, potentially hampering the execution of each other's tasks. Previous research provides substantial support to the argument that team members work well together and perform adequately if they share information in a similar fashion and likewise face difficulties when some share information for the group's purposes while others withhold information for their own interests (Hinsz, Tindale, & Vollrath, 1997; Marks, Mathieu & Zaccaro, 2001; Marks, Sabella, Burke, & Zaccaro, 2002).

There is a further explanatory mechanism related to the perception of the locus of control. Since brokers are likely to exercise more control over others while being less controlled by others (Burt, 1992), it is reasonable to assume that they might develop the perception of an internal locus of control which depends on the individuals' belief that they can actively influence the external environment while being relatively independent from it (Anderson & Schneider, 1978; Spector, 1982). Contrarily, it is reasonable to

assume that individuals in a cohesive network, as their behavior is continuously monitored by others (Coleman, 1990), will develop the perception of an external locus of control, which derives from the individuals' belief that behavioral discretion and the possibility to regulate one's behavior are limited by the monitoring and perceived constraints imposed by the social environment (Boone, De Brabander, & Witteloostuijn, 1996; Rotter, 1966). Groups with dispersion in the locus of control and composed of both external and internal individuals experience fragmentation, develop group tensions and do not facilitate the execution of each other's tasks, with the ensuing likelihood of deleterious effects on performance behaviors (Boone, Olffen & Witteloostuijn, 2005). As a result of the above-mentioned arguments, I theorize that that group-level variance in structural holes is negatively associated with individual performance.

Hypothesis 6: group-level variance in structural hole positions is negatively associated with individual performance

6.6. Methodology

6.6.1. Sample

Given the necessity of reaching a sufficient sample of individuals nested in groups, I collected empirical data administering the same surveys to employees and supervisors of two distinct organizations. This practice is common in multilevel network research (Balkundi & Harrison, 2006; Sparrowe et al., 2001). The two organizations are different in terms of operations and markets, decreasing the concern that findings are contingent on a specific industry and have low external validity. One organization is mechanistic and bureaucratic while the other is organic and dynamic. The first organization is a company involved in the production and marketing of pharmaceuticals in North America. The company has 151 total employees and usable answers were obtained for 138 of them (a response rate of 91%). There is substantial variety among units in the organization, as units each deal with separate production processes, including business development, sales and marketing, human resource management, finance, and quality control. The second organization is a division of a videogame company with operations in North America that is involved in the development of

videogames marketed all over the world. This organization has 191 total employees and viable answers for 152 of them (response rate 80%) were collected. Also in this organization there is a substantial variety of tasks performed by the units: some units have engineers and programmers; some units have creative and artistic teams; some units have marketing and sales specialists; some units deal with quality control; and some units are responsible for traditional staff functions, such as human resource management and administration. In both organizations, I managed to achieve a very high response rate, which is a necessary prerequisite for network studies (Wasserman & Faust, 1994). I aggregated individuals by their unit groups and I removed from each sample management, staff employees and all individuals who did not belong to a formal group, although their responses were retained for the network dataset. Overall, the network dataset is composed of 290 individuals (138 in the first organization; 152 in the second organization), the sample of individuals for the regression analyses is composed of 245 individuals (122 in the first organization; 123 in the second organization) and the sample of groups is composed of 50 groups (22 in the first organization; 28 in the second organization).

6.6.2. Measures

Social Networks. All employees were administered a network name generator survey in which individuals were asked to name the persons with whom they exchange information. In this research, I focused on instrumental network relationships. The variables on structural holes were built from a network questionnaire asking respondents to report first and last names of persons with whom the respondent has been "regularly exchanging information about work-related issues at least several times a week". Individuals were free to name as many respondents as they wanted following a flexible-choice research design which is generally preferable over a fixed-choice research design which asks the name, for instance, of only the top five contacts (Mehra, Kilduff & Brass, 2001). Once I collected all relational data, I constructed two matrices, one for each organization, and I calculated within-group variance and within-group mean in structural hole positions. Data on networks for the independent variable were six months lagged with respect to data for the dependent variables. More specifically, the

questionnaire asked respondents to report regular relationships formed at least 6 months before the survey administration and the job crafting behaviors, satisfaction, and performance were measured over the most recent six months. Discussions with management were held to ensure that the lagged structure of six months was appropriate.

Structural holes. Structural holes were measured using the Network Constraint Index (*C* Index) developed by Burt (1992) and adopted by many previous scholars to operationalize structural holes. Network constraint in one person is high if the person's contacts are densely connected to one another directly, while it is low if the person's contacts are not connected to one another. Network constraint measures the lack of brokerage and it is hence a reverse indicator of structural holes. From the constraint measure, I derived the composition variables of within-group mean and within-group variance indicators and following additive and dispersion aggregation logics, as specified at the beginning of the paper (Chan, 1998). Clearly, while within-group mean in constraint, calculated as simple arithmetic average, represents the reverse indicator of within-group mean in structural holes, within-group variance in constraint, calculated through the squared distances over the average, equals within-group variance in structural holes and is not a reverse indicator.

Job Crafting. Since there is not a widely accepted scale to measure job crafting, this paper developed a scale, borrowing and adapting items from other scales. More specifically, a 9-item scale was developed taking items from Leana, Appelbaum and Schevchuk (2009) and from Morrison and Phelps (1999). The scale measures the behaviors of task expansion, task simplification and task substitution as suggested by Wrzesniewski and Dutton (2001). The logic of Wrzesniewski and Dutton (2001) and Leana et al. (2009) is that when individuals engage in job crafting behaviors, they more or less equally perform expansion, substitution and simplification activities which could hence be aggregated in the same common variable. Items show very high correlations among each other and the analysis of the 9-item variable high reliability (α = .89). Following Leana et al. (2009) the job crafting scale is a self-rated scale. The assumption behind the validity of using a self-rated scale to measure job crafting builds on the idea that supervisors are often incapable of understanding how the individual alters his or her

job tasks, while the individual is better capable of assessing the degree of changes in his or her job (Grant et al., 2009).

Satisfaction with the Group. I adopted a single-item measure of satisfaction which directly asks a general assessment and does not differentiate among multiple facets of satisfaction, as suggested by Scarpello and Campbell (1983). The item used is: "I am very satisfied to work in my subunit". Subunit was defined on the same page as the group working under the same immediate supervisor. The item was assessed on a 5-point Likert scale. Scarpello and Campbell (1983) argue that asking a straight question provokes a direct and frank reaction to satisfaction judgments which better captures the essence of the construct as compared to multiple-item scales with different facets. The popular Job Descriptive Index (Smith, Kendalì & Hulin, 1969) asks different facets of satisfaction (with the job itself, with the pay, with coworkers, with the supervisor…) and then aggregates those facets in a unique index. Nevertheless, the validity of the aggregate index has been criticized because individuals may give different weights to the facets of satisfaction (for instance be more concerned with the job itself and do not care of the pay or co-workers): therefore an aggregate index may provide an inaccurate appreciation of overall satisfaction (Nagy, 2002).

An important argument developed by Nagy (2002) is that satisfaction questions are not neutral questions. Individuals do not appreciate being asked about their satisfaction, especially if they are unsatisfied with their job. Repetitious questions about satisfaction may induce a negative reaction of employees, introducing biases in the measurement and even possibly creating adversarial attitudes towards the questionnaire which undermine the accuracy of all measures. These concerns are particularly relevant in the case of questionnaires which are not anonymous and in which individuals even have to identify all personal relationships they have. Management itself of one company was reluctant to include the satisfaction question but finally agreed. Single-item questions have natural problems of reliability but satisfaction is a substantially stable and unreliability concerns are not significant. While for most psychological constructs a single-item measure is undesirable, the use of single-item questions to measure overall satisfaction constructs was shown to lead to more robust empirical findings than multiple-item scale measures (Wanous, Reichers & Hudy, 1997). They have been

heavily employed by scholars and represent accepted practice in management research (Wanous et al., 1997). Therefore, in the specific context of this study, I which questionnaires require much personal data, I decided to opt for the single-item format.

Individual Performance. Individual performance was measured through supervisory ratings. The immediate supervisor rated the performance of his or her employees. Performance was measured as the comparative evaluation of the employee in relation to the average of his or her colleagues in the organization. Management of one company suggested this option in order to decrease possible leniency problems. Responses ranged from 1 (much below the average) to 5 (much above the average) with 3 as the average. In order to facilitate the task of comparing the focal employees with their colleagues, I had a series of preliminary meetings with management of the companies and we discussed together the dimensions to use for effectively measuring performance in the organization and allowing a valid comparison between employees belonging to different group. For the pharmaceutical company we concluded that, given the characteristics of the company, three general dimensions (effort, quality of work and quantity of work) could effectively captured performance and allowed the comparison of employees belonging to distinct units. The three general indicators are the same as those used to measure performance in the network study by Brass (1981). In this organization, performance evaluations were included in the supervisory questionnaire in which supervisors also reported their networks. In the second organization, performance requirements were different and management identified a larger set of core dimensions used to describe performance and to comparatively assess all employees belonging to different units. Such core dimensions include efficiency, determination, market-orientation, creativity, innovation, and collaboration. Management independently collected ratings from supervisors and distributed the results to us. The use of organization-specific dimensions to capture performance allows a more valid measurement of the construct and effective comparison across employees in the same organization.

It could be argued that different performance instruments might create limitations when it comes to aggregating responses of the two organizations. Yet, given the comparative nature of performance assessments, the problem of the difference in

performance indicators between organizations is mitigated. This problem could be substantial when scores capture distinct phenomena. In the case of this research, despite the underlying performance dimensions specific to each organization, in both organizations a 3 indicates an average performance compared to colleagues and a 5 measures a significantly above-average performance compared to colleagues. Scores in both organizations reflect the same comparative assessment of employees on the basis of what constitutes performance in the organization. The different items in the performance assessment do not create incongruity in the way in which performance ratings are measured across the two organizations. The use of a general performance appraisal scale, for instance, the widely employed Williams and Anderson's (1991) scale, would have entailed the same problem. In Williams and Anderson's (1991) scale, supervisors are asked to assess how individuals meet "formal performance requirements". Formal performance requirements differ from one organization to another and reflect the specific indicators that I included after discussing with management. Eliciting the indicators, supervisors' comparative assessments of employees is facilitated and, given the comparative nature of assessments, the aggregation of supervisory ratings while controlling for the organization does not compromise the solidity of the empirical analyses.

  Controls. I included a series of demographic variables at the individual to better isolate the effect of networks on the studied individual outcomes. First, I included a dummy for the *organization* to control for differences across the two organizations. Controlling for the organization type may be relevant since the sample is composed of one mechanistic and one organic organization. The patterns of relationships can vary across those two types of organizations (Shrader, Lincoln, & Hoffman, 1989; Tichy & Fombrun, 1979), as well as the degree of changes in task activities performed by individuals (Miles, Snow, Meyer & Coleman, 1978). Furthermore, controlling for the organization becomes important given that performance indicators in the two organizations were different. I also controlled for *gender* (M = 1; F = 2), because individual networks may vary substantially in men and in women (Ibarra, 1992, 1993) and to account for possible gender effects on satisfaction, performance and crafting. I also controlled for *age*, assuming that young individuals may be more dynamic in

networking and in crafting tasks, or have more enthusiasm and satisfaction with their job, although they may leverage less previous working experience for performance. I controlled for *education* (1 = high school; 2 = bachelor; 3 = master; 4 = Phd) to account for the possible effect education can play on the capacity to network, craft jobs and perform better than others on the job. I also included two controls for tenure: *tenure in the organization* (in years) and *tenure in the job position* (in months). Controlling for these variables could be relevant because job crafting may be related to tenure in the organization (Fried, Grant, Levi, Hadani, & Slowik, 2007) and because it may have different types of relationships with performance (Ng & Feldman, 2010) or with satisfaction (Lee & Wilbur, 1985). Networking could also be a function of cumulated experience in the organization (Nebus, 2006). Last, I controlled for *structural holes* at the individual level of analysis, in order to isolate the unique effects at the group level.

6.7. Analysis and Results

Tables X, XI, and XII show means, standard deviations and zero-order correlations among variables considered in this paper. Table X shows the scores in the aggregate sample. Table XI shows the scores in the subsample of the pharmaceutical company. Table XII shows the scores in the sample of the videogame company. It is possible to see that there, given the fundamental differences between the two organizations, there is a strong and significant correlation between the organizations and demographic controls such as age and tenure. The videogame organization has younger individuals with lower tenure. The correlations among the controls could create multicollinearity problems that decrease the quality of the regressions, weakening the possibility of supporting the hypotheses. Nevertheless, I performed a series of robustness checks and observed that altering the composition of controls does not substantially change the empirical findings observed. The two group-level composition variables, as expected, are significantly correlated to each other in both subsamples and the mean and standard deviation values differ in the two subsamples, although not much. It is interesting to notice that in the videogame sample, individual structural holes

TABLE X: Descriptive Statistics and Zero-Order Correlations – *Full Sample*

Individual-Level Variables	M	SD	1	2	3	4	5	6	7	8	9
1. Organization	1.44	.49									
2. Gender (Male)	1.29	.45	.28**								
3. Age	38.10	10.27	.69**	.19**							
4. Tenure Org. (Years)	7.85	11.46	.33**	.15*	.43**						
5. Tenure Position (Months)	52.74	74.96	.45**	.10	.57**	.57**					
6. Education	2.02	.54	-.01	-.05	-.15*	-.24**	-.16*				
7. Constraint Index (SH)	.55	.28	-.12*	.00	-.19**	-.18*	-.16*	.09			
8. Job Crafting	3.32	.74	-.19**	-.06	-.12	.04	-.15*	.10	-.04		
9. Satisfaction	4.14	.90	.10	.11	.06	.04	.04	.05	-.12	.11	
10. Performance	3.21	.66	-.10	.00	-.35**	-.14	-.16*	.01	.09	.10	.16*

Group-Level Variables	M	SD	1
1. Constraint Index (SH) - Mean	.55	.17	
2. Constraint Index (SH) - Variance	.07	.06	.57**

* p < .05   ** p < .01   *Sample*: 245 employees in 50 groups

TABLE XI: Descriptive Statistics and Zero-Order Correlations – *Pharmaceutical Company*

Individual-Level Variables	M	SD	1	2	3	4	5	6	7	8
1. Gender (Male)	1.43	0.50								
2. Age	46.23	9.57	.17							
3. Tenure Org. (Years)	12.29	16.14	.12	.31**						
4. Tenure Position (Months)	91.82	99.24	-.03	.46**	.51**					
5. Education	2.01	0.62	-.16	-.37**	-.34**	-.24*				
6. Constraint Index (SH)	0.51	0.28	.05	-.15	-.14	-.15	-.00			
7. Job Crafting	3.15	0.78	.08	-.10	.12	-.09	.14	.13		
8. Satisfaction	4.25	0.82	.07	-.11	.06	.03	-.02	.17	.14	
9. Performance	3.14	0.78	.00	-.49**	-.07	-.12	.08	.23*	.09	.24*

Group-Level Variables	M	SD	1
1. Constraint Index (SH) - Mean	.49	.16	
2. Constraint Index (SH) - Variance	.05	.05	.63**

* p < .05   ** p < .01   *Sample*: 245 employees in 50 groups

TABLE XII: Descriptive Statistics and Zero-Order Correlations – *Videogame Company*

Individual-Level Variables	*M*	*SD*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1. Gender (Male)	1.17	0.38								
2. Age	31.91	5.28	-.31**							
3. Tenure Org. (Years)	4.50	3.04	-.19*	.26**						
4. Tenure Position (Months)	23.35	21.62	-.03	.16	.43**					
5. Education	2.03	0.48	.05	.10	-.10	-.07				
6. Constraint Index (SH)	0.58	0.28	.03	-.12	-.32*	-.17	.18			
7. Job Crafting	3.45	0.68	-.11	.21*	.19*	.00	.04	-.27**		
8. Satisfaction	4.07	0.95	.11	.09	-.11	-.14	.11	-.27**	.15	
9. Performance	3.28	0.52	.09	-.18	-.21*	-.17	-.07	-.09	.10	.14

Group-Level Variables	*M*	*SD*	*1*
1. Constraint Index (SH) - Mean	.59	.15	
2. Constraint Index (SH) - Variance	.08	.07	.48**

* p < .05   ** p < .01   *Sample*: 245 employees in 50 groups

are positively and significantly related to job crafting and to satisfaction (the constraint index is negative).

Given the nested nature of the dataset for this paper and the cross-level nature of the hypotheses explored, I performed a series of hierarchical linear model (HLM) regressions adopting HLM 7 as statistical software. The first step of the HLM analysis is to determine whether the use of hierarchical linear models is appropriate for the empirical structure of the data collected. In order to do so, I calculated the η^2 from a one-way analysis of variance, following the recommendation of Klein and Kozlowski (2000). The η^2 provides an estimation of the extent to which variation at the individual level in the variable of interest can be explained by group level units. The precondition for predicting individual performance, satisfaction and job crafting through multilevel models is that there is variance between groups, because if all variance in performance, in job crafting and in satisfaction is within groups, multilevel models have no capacity to provide any explanatory value. The analysis of the η^2 provides evidence of a high portion of individual variance attributed to group difference: 31% of variance in individual performance is between-groups, while 68% of variance is within-group. The results for job crafting are quite similar: 30% of variance in job crafting is attributed to differences between groups, while 70% of variance is within group. The results for satisfaction are very good as well, with 34% of variance in satisfaction attributed to differences between groups, while 66% of variance remains within the groups. All values correspond to a high effect for a η^2 value, according to the rules of thumb proposed by Cohen (1988). Furthermore, the F tests for individual performance ($F =$ 1.50; $p = 0.041$), job crafting ($F = 1.41$; $p = 0.056$), and satisfaction ($F = 1.55$; $p =$ 0.024) give positive results. The second test that I performed to explore whether hierarchical linear modeling is appropriate given the present empirical dataset is to run a null model in which only the dependent variables are considered, the intercept is specified as randomly varying, while predictors at both level 1 and level 2 are excluded, as recommended by Hofmann, Griffin and Gavin (2000). Evidence for the appropriate conditions of adopting HLM was found, as the intercept as fixed effect is significant (p <.001) as well as the residual variance of the intercept as covariance parameter (p <.001).

TABLE XIII: Hierarchical Linear Model Predicting *Job Crafting* - Final estimation of fixed effects with robust standard errors (HLM 7)

Fixed Effect	Coefficient γ	Standard error	t-ratio	p-value
For INTRCPT1, β_0				
INTRCPT2, γ_{00}	3.205859	0.327741	9.782	<0.001
Level 1:				
For ORGANIZ slope, β_1				
INTRCPT2, γ_{10}	0.008103	0.150617	0.054	0.957
For GENDER slope, β_2				
INTRCPT2, γ_{20}	-0.101624	0.124014	-0.819	0.415
For AGE slope, β_3				
INTRCPT2, γ_{30}	-0.002220	0.008733	-0.254	0.800
For TENUREORG slope, β_4				
INTRCPT2, γ_{40}	-0.003500	0.019021	-0.184	0.854
For TENUREPOS slope, β_5				
INTRCPT2, γ_{50}	-0.001948	0.001236	-1.576	0.119
For EDUCATION slope, β_6				
INTRCPT2, γ_{60}	-0.026275	0.124451	-0.211	0.833
For CONSTRAINT slope, β_7				
INTRCPT2, γ_{70}	-0.298230	0.238122	-1.252	0.214
Level 2				
MEAN- CONSTRAINT, γ_{01}	0.844242	0.640215	1.319	0.196
VAR- CONSTRAINT, γ_{02}	-3.725403	0.974762	-3.822	<0.001

Sample: 245 employees in 50 groups

TABLE XIV: Hierarchical Linear Model Predicting *Satisfaction with the Group* - Final estimation of fixed effects with robust standard errors (HLM 7)

Fixed Effect	Coefficient γ	Standard error	*t*-ratio	*p*-value
For INTRCPT1, β_0				
INTRCPT2, γ_{00}	3.655591	0.422465	8.653	<0.001
Level 1				
For ORGANIZ slope, β_1				
INTRCPT2, γ_{10}	0.320425	0.224679	1.426	0.158
For GENDER slope, β_2				
INTRCPT2, γ_{20}	0.271275	0.170987	1.587	0.117
For AGE slope, β_3				
INTRCPT2, γ_{30}	-0.019048	0.014927	-1.276	0.206
For TENUREORG slope, β_4				
INTRCPT2, γ_{40}	0.037171	0.018944	1.962	0.054
For TENUREPOS slope, β_5				
INTRCPT2, γ_{50}	-0.003983	0.002340	-1.703	0.093
For EDUCATION slope, β_6				
INTRCPT2, γ_{60}	0.238695	0.171615	1.391	0.168
For CONSTRAINT slope, β_7				
INTRCPT2, γ_{70}	-0.423703	0.420265	-1.008	0.317
Level 2				
MEAN- CONSTRAINT, γ_{01}	1.391381	0.761124	1.828	0.076
VAR- CONSTRAINT, γ_{02}	-4.059629	1.981951	-2.048	0.048

Sample: 245 employees in 50 groups

TABLE XV: Hierarchical Linear Model Predicting *Performance* - Final estimation of fixed effects with robust standard errors (HLM 7)

Fixed Effect	Coefficient γ	Standard error	t-ratio	p-value
For INTRCPT1, β_0 INTRCPT2, γ_{00}	2.728941	0.214383	12.729	<0.001
Level 1				
For ORGANIZ slope, β_1 INTRCPT2, γ_{10}	0.263304	0.118169	2.228	0.029
For GENDER slope, β_2 INTRCPT2, γ_{20}	0.111606	0.137010	0.815	0.418
For AGE slope, β_3 INTRCPT2, γ_{30}	-0.025991	0.007485	-3.472	<0.001
For TENUREORG slope, β_4 INTRCPT2, γ_{40}	-0.023130	0.015219	-1.520	0.133
For TENUREPOS slope, β_5 INTRCPT2, γ_{50}	0.000608	0.001494	0.407	0.685
For EDUCATION slope, β_6 INTRCPT2, γ_{60}	-0.141945	0.106163	-1.337	0.185
For CONSTRAINT slope, β_7 INTRCPT2, γ_{70}	-0.293288	0.282838	-1.037	0.303
Level 2				
MEAN- CONSTRAINT, γ_{01}	1.007513	0.372044	2.708	0.010
VAR- CONSTRAINT, γ_{02}	-1.021699	0.868327	-1.177	0.247

Sample: 245 employees in 50 groups

On the premises of the previous results, I therefore performed a set of hierarchical linear model regressions to test the hypotheses. Results of the HLM regressions are reported in Tables XIII, XIV and XV. For each dependent variable in the first step, I developed random coefficient models at Level 1 including the control variables at the individual level and calculating the intercept γ for the slope β of each Level 1 variable. The individual-level variables were grand-mean centered in order to decrease possible problems of collinearity between levels of analysis and in order to be capable of better assessing the incremental effects of the group-level variables above and beyond the effect of the individual level variables (Hoffman & Gavin, 1998). In the second step, I developed means-as-outcomes models at Level 2, including the two variables of structural holes at the group level as fixed effects and calculating the intercepts of the Level 2 variables.

Table XIII shows the results of the hierarchical linear model predicting job crafting. From the analyses of the random coefficient model at Level 1 we can see that no variable at the individual level is significantly related to crafting.[6] In the means-at-outcomes models of the Level 2, we can see that group-mean in structural holes is not significantly related to job crafting, while group-variance in structural holes show a strong negative relationship (γ = -3.72; p <.001). Hypothesis 1 is not supported while Hypothesis 2 is. Although the other structural hole variables are not significant for job crafting, it is interesting to observe how the signs of the coefficient changes from the individual level, in which structural holes are positively related (constraint is negative), to the group level, in which structural holes are negative related (constraint is positive). Table XIV shows the results of the hierarchical linear model predicting satisfaction. Here we can see that tenure indicators show a marginally significant relationship with satisfaction. In the means-as-outcomes models for the Level 2 analyses, both group-mean in structural holes and group-variance in structural holes show significant and negative relationships. The relationship is marginal for group-mean in structural holes (γ = 1.39; p = .07) and moderate for group-variance in structural holes (γ = -4.05; p = .048). Hypothesis 3 is marginally supported while Hypothesis 4 is supported. Note that a

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[6] The findings for the control variables in the other papers predicting job crafting are different because of the methodological approach and because of the differences among samples (this study only includes employees in bottom level units and excludes all employees who are not working for a specific unit).

positive coefficient in the group-mean constraint means that the group-mean in structural holes is negatively related to satisfaction, while a negative coefficient in the group-variance means that group-variance in structural holes is negatively related to satisfaction (variance constraint and variance in structural holes are the same). Last, Table XV shows the results of the hierarchical linear model predicting performance. Here results provide considerable support for the negative role of group-level mean in structural holes ($\gamma = 1.00$; p .010), while there is no support for the negative effect of group-level variance. In all three cases considering the different dependent variables, the individual-level variable of structural holes is non-significant and shows an opposite sign as compared to the group-level aggregate variable. Hypothesis 5 is supported while hypothesis 6 is not.

In order to corroborate the findings on the negative effect of group-mean in structural holes on individual outcomes, I also performed a set of OLS regressions. As explained in the hypotheses, the structure of the group is likely to influence the individual both for group-level mechanisms and for aggregate individual level mechanisms. In the latter case, being in a group in which *other members* occupy structural hole positions can be deleterious because every other team member can individually restrain access to information to the focal individual. Following the basic premises of network methodology (Wasseman & Faust, 1994) it is possible to consider the group as an affiliation network – a network where the tie is affiliation to the same social entity – and construct a network indicator based on the average degree of alters' structural hole positions. I constructed a symmetric affiliation matrix and, for each individual, I calculated the mean degree of structural hole positions occupied by all and only the other members in the group. I therefore computed a variable reflecting the *colleagues' structural holes* for each individual. This variable does not capture the exact same phenomena as group-level mean in structural holes, which also depend on the contribution of the individual to the group climate and functioning, but offer interesting additional information to assess the dark side of structural holes. Using the same set of variables of the HLM models, I ran three OLS regressions. The variable on the *colleagues' structural hole positions* is negatively and significantly related to all three outcome variables: job crafting is marginally significant (constraint $\beta = .673$; $p = .08$),

satisfaction is moderately significant (constraint $\beta = .893$; $p = .011$), and performance is moderately significant (constraint $\beta = 1.310$; $p = .021$). In all three cases, ego's structural hole position is not significantly related to any of the observed variables. Results are partially replicated but the difference may be explained by the fact that, although OLS does not have some features of HLM, it can provide useful information in a context, such as that of this research, where some groups are small and the capacity of HLM to derive accurate slopes for each group may be reduced. OLS is limited though because it does not account for the possible problems due to the lack of independence in the individual level variables. This complementary analysis adds information to the theory of the negative effect of structural hole positions.

6.8. Discussion

The present investigation elaborated a multilevel theory of network structure and supported the importance of studying the group composition of individual structural hole positions showing their predictive validity. I argue that the group-mean and group-variance in structural hole positions triggers deleterious consequences at the individual level. Groups with members bridging structural holes, with their competitive, calculative and manipulative behaviors, generate conflicts that constrain individual behaviors and attitudes. Groups with both members bridging structural holes and members embedded in a closed network develop different work behaviors and attitudes that are not compatible and can result in deleterious consequences. I found evidence of the negative effects of group-mean in structural holes on individual performance and on satisfaction and evidence of the negative effects of group-mean variance in structural holes on job crafting and on satisfaction. The present theory hints at a possible lack of isomorphism across levels of analysis and invites scholars to explore the possible dark side of structural holes.

It is relevant to acknowledge that although the paper finds some evidence of the aggregate effects of structural holes on individual outcomes, no significant effects of structural holes were found at the individual level. More specifically, I could not replicate the findings that structural holes are beneficial for performance, which

represents one of the core tenets of research in structural holes (Burt, 2000). This lack of confirmation of the positive effects of structural holes for performance is in fact not uncommon in previous network research which generally endorses the positive effects of structural holes but is still characterized by some mixed or inconclusive results (Fleming et al. 2007). The lack of individual-level relationships between structural holes and satisfaction or job crafting may have a theoretical justification due to the specific characteristics of those variables. Individual structural holes have a clearer effect on behaviors than on attitudes: while it is true that individuals in structural holes may develop enthusiasm and satisfaction because they may feel empowered by their networks and gratified by the possibility of pursuing entrepreneurial behavioral opportunities (Burt, Jannotta, and Mahoney, 1998), it is also true that bridging unconnected others may be stressful and lead to negative emotional responses (Mehra & Schenkel, 2008). Likewise, there may not be a significant relationship between structural holes and job crafting at the individual level. While structural holes could be beneficial to crafting because they empower individuals' creativity through access to non-redundant information (Burt, 2004; Perry-Smith & Shalley, 2003), they could also be deleterious to crafting, because change initiatives need social support for their implementation which is more difficult to mobilize when occupying structural hole positions (Obstfeld, 2005). When it comes to job crafting and satisfaction therefore, on the basis of the evidence collected in this study, the effects of structural holes are more likely to manifest at the aggregate group level, rather than at the individual level.

This paper answers the calls by Brass et al. (2004) and by Moliterno and Mahony (2011) to devote more empirical attention to the exploration of multilevel relationships in network research. Multilevel network studies are difficult because it is challenging to obtain a sufficient sample of individuals nested in groups. The groups need to have sufficient size to capture meaningful variations within the group but if they are too large collecting a large group sample becomes demanding. In addition, response rates at the individual level needs to remain very high so that aggregate network measures are valid. Often previous research had satisfying individual level data but small group-level data, making the detection of significant relationships possible only if the effects are rather strong. Sparrowe et al. (2001) collected data on 190 employees in 38 groups in 5

organizations. Oh, Chung and Labianca (2004) collected data on 60 groups in 11 organizations. Given its difficulties, the exploration of multilevel relationships in network research is still underdeveloped but it can lead to the identification of empirical findings that substantially enlarge our understanding of social networks (Brass et al., 2004; Moliterno & Mahony, 2011). This study contributes to network research showing that the exploration of multilevel relationships can lead to unique theoretical insights and the identification of empirical phenomena that single-level analyses do not allow.

The insight that group-level mean in structural hole positions can be deleterious challenges the core premises of theory in structural holes and suggests a need to revise our current assumptions and the belief in the positive nature of structural holes (Burt, 1992). Note that this paper does not lead to the conclusion that groups with individuals bridging structural holes are always less performing than groups with individuals embedded in closed structures. This paper separates the individual-level effects and the group-level effects. According to previous research, each single individual derives personal benefits from occupying structural hole positions but the effect of the group aggregate structural holes is negative. Hence in a group where members occupy structural hole positions each member will draw on the positive effects of his or her individual structure and the negative effects of the aggregate group structure. This paper contributes to isolating a dark side of structural holes at the group level but the conflicting and ambivalent nature of structural holes needs to be further explored by examining the conditions under which the positive individual or the negative group effects prevail in determining individual outcomes.

The theory that group-level variance in structural hole positions can be deleterious offersa significant contribution to extant network research. The idea that individuals bridging structural holes conflict with individuals in closed networks could suggest a contingent view on social networks which fosters new explorations in this direction. The findings challenge the insight by Burt (2007) that the benefits of social structure are concentrated within the immediate surroundings of an individual and that considering only the ties among the direct contacts of ego provides sufficient information to describe the effects of social networks. We could extend the

understanding and the explanatory power of social networks if we also take into account the structure of relationships of group members who are in the surroundings of ego.

This study contributes to research in job crafting as well. Leana et al. (2009) suggested that job crafting should not only be studied at the individual level but also at the group level because individual and group dynamics associated with job crafting differ fundamentally and there could be diverse implications. This paper builds on the same premises and shows that, while individual-level structural holes are not related to job crafting, group-level variance in structural holes exercises a strong predictive value on crafting. These findings seem to suggest that group dynamics are relevant when studying job crafting and that it is important that the group is balanced and has a harmonious climate for individuals to be capable of implementing their crafting initiatives. Although crafting may still depend on individual differences, this paper shows that, since the individual change initiative inevitably requires adjustments at the group level (Wrzesniewski & Dutton, 2001), it is difficult for individuals to implement job crafting initiatives without endorsement from the group.

This research provides arguments that extend our understanding of how networks shape individual attitudes. The study develops insights on how networks contribute to the development of attitudinal states by extending the idea that relationships are a source of affective responses (Morrison, 2002). However, while the study of networks gathered cumulative evidence by examining individual behaviors, evidence on the relationship between network structure and attitudinal outcomes is mixed (Tottendell et al., 2004). From the results of this study it could be speculated that one of the reasons why there may be mixed and inconclusive relationships between individual social structure and attitudes stems from the fact that attitudes are influenced by the nested nature of networks at multiple levels instead of the simple individual networks. This study shows that attitudes are not only influenced by an individual's relationships but also by the relationships of an individual's team colleagues. Through multilevel network studies we may develop an enlarged appreciation of how relationships influence attitudes and affective responses.

This study also offers a contribution to research in group composition. Previous authors devoted substantial effort to understand whether aggregate composition and

variance of individual characteristics within a group is beneficial or deleterious to the attainment of individual or aggregate outcomes, with conflicting empirical results (Boone et al., 2005; Campion et al., 1993; Jehn, Northcraft, & Neale, 1999). Such investigations often lacked depth, focused on simple demographic attributes such as age, gender, or ethnicity and neglected to tap into deeper sources of homogeneity or heterogeneity that could have strong explanatory value (Harrison et al., 2002). This paper expands research on team composition by shifting the investigation over the network structural properties of teams and proposing networks as a major factor to be considered when studying team composition. Note that findings have also direct relevance for practitioners. Team composition is a factor that management controls directly and network analyses are becoming popular among practitioners and consultants to detect and correct functional problems within the organization (Cross & Parker, 2004). Companies could perform a social network study and identify, through the explanations provided, a reason for the ineffectiveness of individuals in groups. Management could then directly intervene by recomposing groups, reallocating responsibilities, redesigning tasks or by directly attempting to influence the structure of relationships among individuals in the same group.

The results of this paper have some limitations. First of all, the sample size at the group level of analysis is relatively small as well as the number of individuals in each single group. However, as mentioned before, this limitation is not uncommon in multilevel network research since it is difficult to obtain a large sample of individuals nested in groups given the constraints of obtaining a high response rate. Another limitation, as mentioned, derives from the performance indicators which are adapted to both organizations. Yet, the adaptation of performance instruments allows for better measurement validity while limitations are mitigated by the relative comparison among employees and would have been present even if a single performance scale was used. The study could have been stronger if I had measured additional ties instead of only instrumental ties, but both companies were concerned about overloading the questionnaires and preferred a focus on instrumental exchanges. In addition, the paper focuses only on individual outcomes and does not consider group outcomes, such as

group performance or cognitions about the group. Future efforts could try to extend the present theorization and consider group outcomes as well.

To conclude, the present investigation elaborated a multilevel model to explore the predictive validity of group-level composition variables on individual outcomes. It was found that group-level mean and group-level variance in structural holes create deleterious effects on job crafting, satisfaction and performance. The paper contributes by exploring the multilevel characteristics of social networks as well as their controversial nature. The present theory also provides insights that inform group composition research, research on networks and attitudes, and research on job crafting. These contributions can fuel new investigations in the field and advance our understanding of social relationships in organizations.

Chapter 7:

DISCUSSION AND CONCLUSION

7.1. Introduction

This concluding chapter of the thesis returns to the arguments presented in the introductory chapter and explains how these arguments have been empirically supported by the three papers of the thesis. The introductory chapter introduces the main research topic and describes four ways to specify the relationships between jobs and networks. These approaches are addressed by the three papers. Each specific paper incorporates theoretical arguments that describe the relationship between jobs and networks but constructs its problematization around specific research questions and not around the same generic question concerning the relationship between jobs and networks. The concluding chapter of the thesis readdresses again the four general ways to specify the relationship between jobs and networks and summarizes how the evidence collected supports these theoretical specifications. The introductory chapter also identified the research areas in job design and network research characterized by substantial research gaps. The concluding chapter of the thesis returns to these research areas and shows how the evidence collected through the three empirical studies helps fill those gaps and offers substantial contributions to the advancement of knowledge. The chapter also discusses the practical implications of each of the contributions. Last, the chapter discusses the general limitations of the thesis and offers a brief conclusion.

7.2. The Social Context of Jobs: Merging New Perspectives in Job Design and Social Networks

7.2.1. Networks Influence Jobs

The first way to specify the relationship between networks and jobs, as I mentioned in the introduction, hypothesizes that networks affect the proactive nature of jobs, captured by job crafting behaviors. This theoretical position reflects the main tenet

of the thesis and is the only one addressed in different ways by all three papers. The articles provide substantial empirical evidence that confirms the explanatory role of networks in the prediction of job crafting behaviors. Several network variables were studied in association with job crafting. Paper 2 has the largest set of predictors of job crafting and proposes a model in which seven network variables are hypothesized to exercise a predictive role. The full model in which all antecedents are simultaneously considered in the equation provides support for the significant predictive value of five out of the seven anticipated relationships. It is quite uncommon for a network paper to be capable of providing such broad support, especially given the reduced statistical power. The evidence collected in Paper 2 therefore provides some confirmation to the substantial role that network relationships play on determining the degree of job crafting performed by individuals. This role is corroborated and reinforced by the analyses of the other two manuscripts, which provide different angles of inquiry but reach similar conclusions. More specifically, Paper 1 does not anticipate a direct relationship between networks and job crafting, but it proposes that networks combine with alters' characteristics in the prediction of job crafting. The paper suggests that bridging structural holes may be positive or negative depending on the job crafting of alters tied to the focal individual. The empirical evidence provides support for this observation and divergent effects of structural holes on crafting are identified as a function of the crafting behaviors of alters in the ego-network of the focal individual. Paper 3 extends the argument on the association between job crafting and networks exploring the multilevel relationships between group networks and individual crafting. The evidence shows that group-level variance in individual structural holes negatively relates to crafting behaviors. Overall, the three papers provide strong evidence for the predictive role of networks, showing how job crafting is predicted by different centrality measures, by structural holes, by network composition and by group-level networks. The first way to specify the relationship between jobs and networks therefore finds robust confirmation and offers arguments on which future scholars could build to further advance research in networks and job design.

The evidence of Papers 1 and 2 on the relationship between network structure and job crafting needs to be combined and discussed to clarify the theoretical nature of

the empirical associations. Paper 2 anticipates that betweenness centrality is positively associated with job crafting, while Paper 1 anticipates that structural holes are not directly relate to job crafting, but the relationship is contingent on the nature of alters bridged. Betweenness centrality is hypothesized to exercise a predictive effect on individual outcomes through the mechanisms of information and control (Mehra, Kilduff & Brass, 2001), and structural holes are postulated to exercise a predictive effect on individual outcomes through the same mechanisms of information and control (Burt, 1997). The variables are generally correlated and therefore some authors have suggested the possibility of considering them as different indicators underlying a similar latent construct (Brass, 1985; Kilduff & Tsai, 2003). The evidence collected in the two papers and the different empirical positions developed suggest that betweenness centrality and structural holes are indeed different constructs and should be considered as such, according to the suggestion by Burt (1992). Individuals who find themselves in structural hole positions are "between" their alters. However, the core difference between structural holes and betweenness centrality is that structural hole positions are network positions derived from the local structure of an individual, while betweenness centrality is a network variables derived from the position in the global network of the organization. In other words, structural hole positions consider exclusively the lack of ties among direct alters of the ego, while betweenness centrality looks at how someone falls between relevant flows of information, regardless of the direct persons someone is tied to. This core difference between a "local" and a "global" perspective triggers mechanisms in different ways so that the effects on the studied outcomes may differ. More specifically, while being between others in the whole organization has been assumed to be positive (Brass, Galaskiewicz, Greve, & Tsai, 2004; Mehra, Kilduff & Brass, 2001; Kilduff & Tsai, 2003), occupying structural hole positions is generally recognized to be positive but it may trigger both advantages and disadvantages (Benassi & Gargiulo, 2000; Fleming, Mingo & Chen, 2007; Xiao and Tsui, 2007). Such ambivalent mechanisms may explain in the case of Paper 1 the disordinal effects captured. The literature on structural holes along with the advantages of structural positions has also addressed the problems of inter-personal conflict or distrust which can depend on directly bridging unconnected others (Coleman, 1990). Such problems have

not been addressed by the literature on betweenness centrality, which tends to focus on the informational advantages stemming from network position.

It is possible to speculate that the "global" characteristic of betweenness centrality may neutralize or at least mitigate negative mechanisms. Those negative mechanisms, such as distrust and conflict, are related to direct relationships between actors. An individual occupies a betweenness position only in part because of his or her direct relationships and mostly because of the structure of the whole network. Someone can keep the exact same contacts but suddenly fall on the shortest path linking different groups just because of changes in parts of the networks he or she is not even aware of. Conflict may happen between separate parts of the organization, which the focal individual is only indirectly bridging through the intermediation of several other nodes. Therefore the distrust or interpersonal conflict stemming from direct relationships may have lesser effects in the case of betweenness centrality than in the case of structural holes. The difference in empirical evidence between Paper 1 and Paper 2 does not provide any confirmation of this logic, which remains merely speculative. However, the difference in empirical evidence may reinforce the need to consider betweenness centrality and structural holes as separate concepts and to investigate the distinctive and unique consequences associated with both.

7.2.2. Jobs Influence Networks

The second way to specify the relationship between networks and jobs, as I mentioned in the introduction, hypothesizes that jobs affect networks and more specifically that the structure of jobs affects the formation and maintenance of network relationships in the organization. This second theoretical position is addressed by Paper 1, in which I examine the predictive role of job characteristics on structural hole positions. This position finds solid empirical confirmation thanks to the use of multiple operationalizations for the job characteristic variables. More specifically, I use four alternative measures of the structure of jobs and I replicate evidence on the hypotheses, illustrating the different predictive role of job characteristics on the formation and maintenance of structural hole positions.

This second way to specify the relationships between jobs and networks has not been combined with the first way in any of the three papers. In other words, the papers do not discuss possible mediating effects in which job characteristics affect networks and then the same networks affect job crafting. The evidence collected does not seem to support a significant mediating effect. Paper 1 explores the relationship between job characteristics and structural holes and between structural holes and job crafting. Nevertheless, while I find support for the direct effects of job characteristics on structural holes, I hypothesize and find support for non-monotonic relationships between structural holes and job crafting. In other words, structural holes are not assumed to have a direct effect on job crafting, but the effect on job crafting changes from positive to negative. The lack of a direct relationship between structural holes and crafting suggests that structural holes do not transfer the direct effect of job characteristics on job crafting. In Paper 2, the individual job characteristics were considered in the regression models as control variables. When the network variables were included in the regressions, there is no evidence for significant mediating effects linking job characteristics and crafting through networks. Even in Paper 2 therefore I do not provide evidence of a mediating effect. It seems that, although the structure of jobs affect networks, both the structure of jobs and networks exercise additive predictive roles on job crafting. The lacking mediation may be explained by the fact that the predictive role of job characteristics on networks as well as the predictive role of networks on job crafting show divergent relationships. There is no simple positive or negative association between the considered variables but multiple and ambivalent logics combining the variables. These ambivalent effects may hinder the possibility of anticipating straightforward mediating roles. Future efforts should be devoted to examining possible mediating paths linking job characteristics, networks and job crafting.

7.2.3. Jobs Interact with Networks

The third way to specify the relationship between networks and jobs, as I mentioned in the introduction, hypothesizes that jobs interact with networks in the prediction of individual outcomes. Paper 2 is the one which most elaborates on this idea. In this paper, the relationship between job crafting and individual performance is shown

to be contingent on the degree of betweenness and eigenvector centrality. In other words, when betweenness or eigenvector centralities are low, job crafting is deleterious to performance, while when betweenness or eigenvector centralities are high, job crafting becomes beneficial to performance. The paper provides empirical evidence to support this position, showing disordinal relationships with either network variable considered.

The findings on the interaction between network centrality and job crafting in the prediction of performance need to be discussed in relation to other pieces of empirical evidence collected in the papers. Paper 2 hypothesizes an interactive model although the previous hypotheses anticipate a direct influence of network characteristics on job crafting. The other two papers of the thesis also support a direct relationship between networks and job crafting. Although Paper 2 finds simultaneous support for all hypotheses, it is possible that the first and the third ways to specify the relationship between jobs and networks may be competing theoretical positions. In fact, the more networks are directly associated with job crafting, the more difficult it becomes to investigate an interactive model because the interacting variables are not independent. In other words, if betweenness centrality is too strongly correlated with job crafting, the observations are distributed only in the two diagonal quadrants of the data space in the interaction matrix and there are no variance conditions for testing interactive models. In Paper 2, centrality measures directly explain a significant portion of variance in job crafting, but this portion is not so high as to impede the variance conditions for testing the interactive model. Hence, empirical support was found for all hypotheses. However, there is inevitably a tension between the first and the third way in which the relationship between jobs and networks are specified. If a future paper finds strong support for the direct relationship between networks and job crafting at the same time it would not find any support for the interactive model. This condition is not uncommon to research in design. The argument for the interaction of crafting and networks is built on the contingency theory of design, according to which the fit between information processing requirements and information processing capacities determines the effect on performance (Donaldson, 1992; Galbraith, 1977; Tushman, 1978). However, even the interactive variables in the contingency theory of design often tend to be correlated to

one another because the information processing requirements of some task environments directly drive the pursuit of strategic actions to improve information processing capacity, leading to a condition of congruence rather than independence among interactive variables (Miller, 1992; Schoonhoven, 1981). The existence of this paradoxical relationship between jobs and networks does not decrease the validity of the theoretical reasoning but it invites scholars to further investigate the conditions under which the direct network-crafting or the interactive network-crafting models are likely to apply.

7.2.4. Jobs and Networks at Multiple Levels of Analysis

The fourth and last way to specify the relationship between networks and jobs, as I mentioned in the introduction, hypothesizes that networks influence jobs through multilevel relationships. More specifically, I anticipate that group-level networks can influence individual level-crafting. This fourth way to specify the relationship between networks and jobs can be seen as an extension of the first way across levels of analysis. Paper 3 addresses this specification. More conspicuously, it is anticipated that group-level variables of mean and variance in structural holes negatively influence individual job crafting. The logic behind these hypotheses is that individuals occupying structural holes clash with each other and that heterogeneity in the group composition results in imbalance and lack of harmony, decreasing individuals' initiative. Empirical results provide support for the negative effect of group variance in structural holes but do not confirm the significant effect of group mean in structural holes. Results also tend to confirm the conclusions from Paper 1, according to which there is no direct and significant relationship between structural holes and job crafting at the individual level. Results and theoretical insights from Paper 1 would suggest that considering more complex variables in the composition of groups, accounting for attributes of group members and their alters, may improve the explanatory value of group-level variables of individual job crafting. However, the consideration of more complex variables goes beyond the purpose of Paper 3 and such variables could be explored in future work. The findings of this paper generally suggest the importance that group-level dynamics play in the determination of individual crafting behaviors, but more evidence is needed to

reach a conclusive understanding of the association between group-level network variables and job crafting. It is relevant to acknowledge that job crafting was only one of the three dependent variables studied in Paper 3, because Paper 3 builds its contribution around the possibility of replicating the same predictions with different outcomes. Job crafting though is the variable for which the heterogeneity in individual structural hole positions at the group level exercises the strongest effect. Further investigations of multilevel networks and crafting may ideally enrich the preliminary insights developed through Paper 3.

7.3. General Contributions of the Thesis

Six new research streams within which potential contributions might be made were presented in the introduction of thesis. This section of the concluding chapter goes back to those six streams and shows how the empirical evidence collected through the papers provides contributions to each of them.

7.3.1. Proactive Job Design

The first new research stream characterized by literature gaps and potentially contributing to the advancement of knowledge relates to proactive job design research. In the introduction, proactive job design was identified as one of the new research streams in job design and job crafting was introduced as a core new construct capable of capturing proactive behaviors on the job (Grant & Parker, 2009). The introduction of the thesis as well as the three papers already provided a long discussion of the importance of studying the social context of job crafting for the advancement of job crafting research. Along with the identification of the social predictors of job crafting, the thesis contributes to the conceptualization and measurement of job crafting theory. Job crafting is the core construct of the thesis and the only specific construct which is used in all three papers. The thesis highlights the constitutive and unique elements which compose job crafting behaviors and which differentiate job crafting from other proactive behaviors. The present thesis proposes a more focused conceptualization of job crafting,

which considers the actual behaviors of altering job content, as suggested by Wrzesniewski and Dutton (2001). While the authors initially elaborated a more complex conceptualization, also including cognitive and relational aspects, this thesis reinforces the need to focus on the theoretical aspects that may offer the core contribution to research in job design.

The thesis also elaborated the construct of job crafting making it susceptible to quantitative inquiry. Wrzesniewski and Dutton (2001) initially elaborated an articulated concept which included interpretive elements. Some initial work on job crafting developed qualitative studies to capture the rich nature of crafting behaviors (Berg, Wrzesniewski, & Dutton 2010; Berg, Grant & Johnson, 2010). Other work proposed a more quantitative view of job crafting behaviors and suggested systematically studying their consequences and antecedents (Grant & Parker, 2009; Leana, Appelbaum and Schevchuk, 2009). In this thesis I elaborate the construct in a fashion which is more amenable to quantitative research. I nevertheless acknowledge the importance of reinforcing also the qualitative stream of investigation and of making the two streams complement and help each other rather than creating opposite competing and incommensurable positions. Understanding the social mechanisms through which job crafting behaviors emerge can help qualitative scientists better describe the processes through which job crafting activities unfold. On the other hand, the rich interpretations of qualitative papers may help survey studies clarify the ambivalent and paradoxical forces through which social relations affect job crafting behaviors.

The thesis contributes to the operationalization of the construct developing a scale which shows good psychometric properties and could be beneficially employed by other scholars to measure the variable. In this paper the full 9-item scale for operationalizing the construct was considered, although the 8-item construct dropping the last item could represent an alternative and valid option given the factor structure suggested by the exploratory factor analysis. A limitation of the thesis is that alternative proactive job behaviors were not measured, making it impossible to assess whether the antecedents and consequences of job crafting are unique to the construct or overlap with those of similar constructs. Unfortunately, the questionnaire was already too long to

include other proactive behaviors. Future studies should try to simultaneously measure the different proactive behaviors and identify the unique portions of variance in individual outcomes explained by job crafting and the unique predictors of job crafting.

The contributions concerning proactive job design also have implications for practitioners. This thesis increases the salience of job crafting as a relevant element to consider in the job design process. Managers may note that spending a large amount of resources in job analysis and job design may be inefficient given the dynamic nature of jobs. Indeed, strict job analysis could be unproductive because it constrains individuals' independent initiatives. Paying external consultants to engage in job analyses may be an expensive and imperfect solution given the proactive nature of job activities. Managers also need to understand that job crafting may be either positive or negative for performance. Given that jobs are intertwined, if an individual changes tasks, he or she may inhibit the task execution of others. Management should not a priori constrain individuals' initiatives. However, it could be useful to identify which areas of the organization may benefit of individuals' initiatives and which areas should remain stable, while focusing on efficiency and on task repetition. Once the organization is mapped, management could define an incentive system to promote initiatives where they could lead to performance improvements, while promoting efficiency or group collaboration in areas where independent change decisions may be deleterious to performance. Job crafting and social behaviors tend to be considered as extra-role behaviors, which are not explicitly rewarded by the organization. Whenever job crafting and social behaviors lead to performance improvements, management should give adequate credit to job crafting behaviors through an appropriate reward system. Furthermore, as job crafting behaviors may require time and energy, management should consider allocating time and resources for the pursuit of independent change initiatives. Some technologically advanced companies, such as 3M or Google, give a portion of free time for individuals to pursue their own initiatives, which are evaluated and rewarded.

7.3.2. Social Job Design

The second new research stream characterized by literature gaps and potentially contributing to the advancement of knowledge relates to social job design research. As explained in the introductory chapter, social job design research represents the second new area of investigation in job design (Grant & Parker, 2009). Social job design ideas sprang from a limitation in early job design research, which was criticized for being concerned too much with single individuals and their internal motivational states while neglecting interactions with the social environment (Oldham & Hackman, 2010). Scholars have therefore attempted to develop an approach to job design that recognizes the importance of the social context of jobs. This thesis does not develop new job characteristics assumed to prescribe the social environment of the job, but all three papers contribute to the social perspective in job design by studying how jobs shape and are shaped by social relations. This circular relationship between jobs and networks invites scholars to explore possible longitudinal dynamics. Social network theorists are more and more interested in exploring the evolutionary dynamics of networks (Ahuja, Soda & Zaheer, 2011) and job design theorists are also becoming interested in studying jobs longitudinally (Parker, 2003; Parker, Griffin, Sprigg & Wall, 2002). The mutual relationships between social relations and jobs theorized in this research can inform future studies examining the evolutionary patterns of jobs and relations over time.

This thesis also contributes to research in social job design by showing the insights that can be derived from applying the social network approach. Brass (1981) and Kilduff and Brass (2010) already suggested using social network analysis to investigate questions in social job design research. This thesis expands their insights, introducing new arguments that can be further investigated by future studies. First, the network perspective on social job design is expanded by considering the differential effects of specific network variables, instead of the overall causal association between the task context and the network context. Second, the network perspective on social job design is expanded because I theorize different causal combinations between networks and jobs, offering multiple theoretical angles to examine social job design. Third, the unique and divergent effects of single job characteristic variables on social relations were considered instead of generally aggregating job characteristics in a single variable

measuring "enlarged jobs". The social network perspective on social job design clearly has potential because when we consider networks as consequences, we can see how job characteristics exercise unique and distinct predictive effects and are worth studying as separate constructs.

The contributions to social job design perspective also have implications for practitioners. The thesis generally raises the importance of performing social network studies to embrace a social job design perspective. Social network studies can help diagnose the areas in the organization where communication is problematic or where it is redundant. Social network studies can help companies assess the social effects of their interventions in job design and therefore promote continuous feedback adjustments and improvements. Social network analysis could be seen as a simple and useful tool to assess the quality of job design. Networks could be measured before and after job design interventions in order to see whether relationships actually changed in the desired direction or not. Social network analyses help understand the degrees of inertia to job design changes. Network analyses can provide a legitimation to perform job design changes and help employees accept changes. Often employees may be reluctant to change jobs because they cannot concretely see and understand why their jobs should be changed. Social network analyses can provide concrete information that helps management justify the need to intervene and communicate the effectiveness of interventions to employees.

7.3.3. Network Antecedents

The third new research stream characterized by literature gaps and potentially contributing to the advancement of knowledge relates to network antecedent research. As mentioned in the introduction, previous research in social networks has mostly focused on the outcomes of network relationships neglecting the factors that allow an individual to occupy a particular network position (Brass et al. 2004). In this thesis, Paper 1 focuses on exploring the antecedents of structural hole positions. I tentatively performed ests to explore whether the structure of jobs could also predict centrality measures, but the analyses yielded unconvincing results. Previous research on network

antecedents mainly focused on the prediction of structural hole positions (Burt, Jannotta, & Mahoney, 1998; Oh & Kilduff, 2008; Sasovova, Mehra, Borgatti & Schippers, 2010). The reasons for the possible lack of empirical evidence in the prediction of centrality measures can be explained by the global properties of centrality measures as compared to the local properties of structural holes. As mentioned before in this chapter, centrality measures are calculated over the whole network structure in the organization and may depend less on the behaviors of the single individual who occupies such positions. Therefore, the job characteristics of the focal individual may exercise little influence on centrality positions. Differently, structural hole positions, built on the "local" network of an individual are more likely to be directly influenced by activities enabled or hindered by the structure of the job.

This thesis contributes because it introduces a new class of predictors which management can directly manipulate to empower the social networks in an organization. The thesis has therefore relevance not only for theorists but also for practitioners. The thesis suggests that management can directly intervene through the design of jobs to facilitate the emergence of networks which could be beneficial for individual and organizational outcomes. This idea is not incompatible with the assumptions of job crafting theory that management today is less involved in designing jobs. The premises of job crafting theory are that the dynamic nature of tasks in today's organizations makes it less feasible for management to design jobs *a priori* (Wrzesniewski & Dutton, 2001). These premises do not entail that management cannot design jobs at all, but that the purposes of job design change: while before management was designing jobs to prescribe behaviors that employees had to execute, now management can design the boundaries of tasks to enable the proactive and social behaviors of individuals (Grant & Parker, 2009). The findings of this thesis may open up a new area of empirical investigation concerning design options that influence the emergence of networks. Such a research stream could be particularly beneficial because it can help bridge the gap between academics and practitioners.

There are some other practical implications which stem from the findings of this thesis. Previous research supported convergent positive effects of job characteristics on

individual outcomes and suggested a holistic and configural perspective on job design. This thesis finds divergent predictive roles of job characteristics and therefore suggests a tailored approach to job design in which the possible conflicting effects of specific job dimensions should be considered when designing jobs. The conflicting effect of a single job dimension on outcomes should also be considered. For instance, feedback from the job may improve task execution but be deleterious to structural holes. Individuals with high feedback from the job may therefore focus more on exploitative behaviors to better execute the assigned tasks instead of engaging in exploratory behaviors to develop new relations and eventually change tasks. Which one is better? It depends on the situational contingencies. Management has therefore to evaluate the priorities for each situation in order to establish how to influence job dimensions in a way that ultimately leads to better performance.

In general, the thesis helps practitioners because it shows the ambivalence of job characteristics when it comes to network formation and maintenance. Previous research developed different predictions and endorsed the idea that motivating job characteristics are always beneficial for individuals. The present thesis shows that in some cases when individuals have poor job characteristics, for instance low task identity, they can *react* engaging in social networking behaviors. Social networking behaviors, according to the social buffering approach, can be used as a way to cope with dissatisfying conditions. The ambivalence in the effect of job characteristics on networks makes it more complex for managers to understand how to approach job design, but at the same time it raises the importance of adopting a fine-grained approach to design instead of an all-encompassing approach.

The ambivalent effects of job characteristics also suggest that managers should prioritize the objectives they have for employees in order to decide how to influence the job structure. For instance, if previous research hypothesizes that job characteristics are generally beneficial for all outcomes, the recommendation for managers is not to invest in prioritizing objectives, because enabling characteristics will be universally valid. Now we have hypothesized that the same characteristic may have different effects on outcomes: for instance task identity may be beneficial to motivation but deleterious to

social networking behaviors. The divergence in outcomes forces managers to understand which objectives they would like to prioritize for their employees. The recommendations change if managers want to generally motivate employees or if they wish that they develop structural hole positions.

7.3.4. Dark Side and Ambivalence

The fourth new research stream characterized by literature gaps and potentially contributing to the advancement of knowledge relates to research on the dark side and ambivalence of networks. As mentioned in the introduction, previous research has been mostly concerned with the exploration of the positive nature of networks, while the possible dark side of network relationships needs to be considered by scholars (Kilduff & Tsai, 2003; Lechner, Frankenberger, & Floyd, 2010). The thesis provided strong evidence of a possible dark side of networks in all three papers, confirming the importance of studying how network relations trigger positive as well as negative mechanisms. Paper 1 shows that structural holes exercise both positive and negative effects on crafting behaviors as a function of the crafting characteristics of alters in the ego-network. Paper 2 shows that networks exercise divergent effects on crafting. More specifically, betweenness centrality is positively related to crafting while eigenvector centrality is negatively related to it. Furthermore, five network composition variables were studied in relation to job crafting. Task autonomy and feedback from the job were found to have positive predictive value. Task significance was found to have a negative predictive value and task identity was found to trace a curvilinear relationship with job crafting. Last, Paper 3 shows that group-level variables in structural holes exercise deleterious effects on individual outcomes. More specifically, the evidence shows that group-level mean in structural holes negatively affects performance and satisfaction, while group-level variance in structural holes negatively affects job crafting and satisfaction. The evidence concerning the dark side of networks and the consequent ambivalent positive and negative causal effects on individual outcomes is one of the strongest tenets of this thesis, being addressed by all three papers. The evidence collected suggests the need to consider the possible constraining forces exercised by

network relationships, which can go beyond the positive mechanisms triggered by informational or control advantages. This research invites scholars not only to explore the negative correlates of networks, but also to examine the contingencies under which the positive or the negative mechanisms prevail in the determination of individual outcomes.

The contributions concerning the ambivalence of networks may also have implications for practitioners. A general assumption on which managers often rely is that lacking communication is deleterious while more communication is beneficial. Since networks provide information, and information is always good to make better decisions, it is assumed that the more companies implement policies that encourage exchanges, the higher the benefits are going to be. The evidence collected in this thesis challenges the assumption of the universal benefits of network relations. It has been shown that networks can also be constraining. For example, someone tied to central others has a lower likelihood to change tasks. This thesis proposes a contingent perspective which accounts for the possible double-sided effects of networks. The contingent perspective suggests tailored and fine-grained interventions in the management of social relations instead of all-encompassing policies. For instance, managers could decide to delayer the organization in order to increase horizontal exchanges, decentralize decision-making and ideally make the company more dynamic and adaptive to change. Nevertheless, increasing horizontal relationships can make some individuals occupy excessively high eigenvector central positions. Individuals could gain informal network status, becoming attached to their source of informal power and unwilling to change. Alternatively, increased connectivity could create conditions of excessive mutual dependence which hampers change. Increasing connectivity may therefore either improve or deteriorate capacities for change as a function of the specific situations in which the organization is involved. In general, the ambivalent effects of networks on individuals challenge the assumption that in organizations managers should always try to simply increase relations neglecting the structure of relationships.

7.3.5. Network Composition

The fifth new research stream characterized by literature gaps and potentially contributing to the advancement of knowledge relates to network composition research. As explained in the introduction, most previous research in social networks focused on the structure of relationships but there could be high potential in exploring the role that the attributes or characteristics of alters play in influencing individual outcomes. The present thesis examined this proposition in Paper 2, showing that it does not only matter to have particular job characteristics for engaging in job crafting behaviors, but the characteristics of the persons someone is tied to may also play an additional role. Evidence was reported for positive, negative and U-shaped relationships associating alters' job characteristics and individual job crafting. Paper 1 considers the interaction between the individual network structure and the job crafting of alters in the prediction of individual job crafting and finds that structural holes could be positive or negative depending on the characteristics of alters in the ego-network.

Exploring how the characteristics of alters explain ego's outcomes and shifting the focus from individual attributes to network attributes could represent a new stream of investigation with high potential for network research. As explained in the introduction, previous authors already tentatively tried to explore the attributes of the network although the structural approach to network research has dominated most of the academic debate. Paper 2 shows the predictive role of network composition variables, developing a broad set of hypotheses and showing how the attributes of the network have explanatory value beyond the same attributes at the individual level. Salancik (1995) noticed that the structural approach to network research has indeed led to interesting results but has only in part realized the promise of network research. Network composition variables can be a valuable new class of predictors for management research. Not only work characteristics, but also personality variables of alters could be studied in relation to individual outcomes. Alternatively, the job characteristics of alters could be combined with the job characteristics of the individual to examine possible interactive effects. Furthermore, in this thesis the characteristics of alters were extrapolated considering only additive composition models, but alternative composition models could be considered to depict the social environment in a much

richer a fashion. This thesis contributes because it informs scholars about the potential value that could be derived from exploring network composition variables in job design research as well as in other major research streams.

The findings of this study on network composition have implications for practitioners. More specifically, this thesis suggests that the behavior of an individual is not only influenced by his or her own job but it is also influenced by the design of jobs of the persons the individual is tied to. A practical recommendation could be that job design practices should not be based on designing individual jobs but on designing jobs together. This study focuses only on job crafting and it would be important to assess other outcomes in order to verify the extent to which the job characteristics of alters impact ego's behaviors. However, the findings provide an initial suggestion that it is important to design jobs holistically rather than in isolation. Let us consider the case of a unit in which one individual has to perform an autonomous job while the close colleagues of this individual need highly structured jobs. Considering jobs in isolation it will be sufficient to assign more discretion to the focal individual while assigning less discretion to colleagues. However, considering jobs holistically would suggest that an excessive lack of autonomy of colleagues may constrain an individual's behavior. Managers should therefore find a compromise and design solutions that account for gains and losses resulting from the synergies among jobs. Jobs should be designed assembling bundles of tasks through a process in which management does not deterministically define jobs but multiple actors cooperate, produce job requirements and send those requirements for job design specifications (Cohen, forthcoming).

7.3.6. Multilevel Networks

The sixth and last new research stream characterized by literature gaps and potentially contributing to the advancement of knowledge relates to multilevel network research. As explained in the introduction, previous network research mostly focused on one level of analysis and although acknowledging the nested nature of network relationships it rarely examined multilevel models with variables at different levels of analysis (Moliterno & Mahony, 2011). Paper 3 elaborates a multilevel network paper

exploring cross-level hypotheses in which group-level network variables are hypothesized to exercise effects on individual outcomes. The multilevel approach shown in this thesis may offer substantial contributions to the study of networks across levels of analysis. First, it does not only show that group-level networks exercise a unique effect on individual outcomes beyond the individual networks, but it hints at the possibility that networks exercise non-isomorphic relationships across different levels. Paper 3 does not provide evidence for this lack of isomorphism because only relationships at the group level of analysis were found to be significantly related to individual outcomes. However, combining the evidence collected through Paper 3 with the theoretical positions developed by the literature, the possibility for non-isomorphic relationships across levels of analysis becomes concrete and future studies should try to capture the difference between individual and group effects on individual outcomes.

The present study also opens up opportunities for studying the interaction between individual level and group level network variables in the prediction of individual outcomes. The present thesis did not formulate interaction hypotheses because it was focusing on group-level predictors. I also conducted exploratory analyses with random slopes models to explore possible cross-level interaction models, but the analyses did not yield any significant results. However, the possible tensions between individual and group levels of analysis as well as the evidence for the effect of network heterogeneity on individual outcomes may hint at the possibility of interplays between individual networks and group networks which could be explored in future studies. The thesis could not provide any evidence of the effect of group-level networks on group-level outcomes, such as group performance. It would be interesting in the future to compare cross-level effects of group predictors on individual outcomes with group-level effects of group predictors on group outcomes. Diverse aggregation logics (Chan, 1998) could also be considered developing alternative specifications of group-level network characteristics. To sum up, the thesis offers numerous insights for the exploration of multilevel network research questions which could be useful to scholars for future research endeavors.

These findings also have practical implications for managers. Social network analysis can provide a key to understand possible dysfunctions in teams. The evidence collected does not suggest which structure is best or worst because there are possible conflicting effects between individual and aggregate dynamics. There is perhaps no easy universal solution to the design of teams but managers could use data on social network analyses to explore possible frictions inside the group. Social network analysis can guide decisions to allocate human resources to groups. Individuals could be moved from one group to another in order to expand the potential access to external relationships, in order to decrease possible internal conflicts or in order to facilitate the emergence of a positive group climate. Social network analysis may also suggest the vulnerability of groups to changes and the possible risks which could ensue should management alter the composition of groups in the company. Reallocating resources from one group to another group could be beneficial or risky because, if newcomers keep the old relations they previously developed, they can dramatically alter the network structure of a group and its social dynamics. Managers should be aware that reallocating individuals in groups can empower the network reach of a group but at the same time create possible conflicts within each group. The general recommendation is that social network analysis can be a powerful tool for managers to influence the choice of group composition, understanding the possible advantages and disadvantages which could derive from combining individuals with specific network structures.

7.4. Boundaries and Limitations of the Thesis

Each of the three papers of the thesis discusses its own specific empirical limitations and this concluding part of the thesis will not repeat all the issues already addressed in the discussion parts of the articles. Nevertheless, there are few boundary conditions and empirical limitations which are not specific to each paper and which still need to be discussed. This section of the chapter will briefly introduce these limitations and boundary conditions. In order to make the discussion succinct a summary illustration of those general limitations will be provided. A detailed description of each

issue and comprehensive illustrative tables are offered in the appendix at the end of the thesis.

The first limitation of the thesis is the use of different thresholds of intensity for the three papers. The network survey asked respondents to indicate the frequency of information exchanges with all contacts in the organization. Such frequencies ranged from 1 to 5 (1 = once a month or less; 2 = once a week; 3 = several times a week; 4 = once a day; 5 = several times a day). From the relational data collected, it is possible to consider different thresholds of intensity and construct networks with only ties entailing *at least* a specific frequency of interaction. Previous authors have argued that there is no universal agreement about the intensity of information exchange to consider when defining a *tie* between two nodes and researchers must each time select the threshold of intensity appropriate for the specific theory they want to test (Marsden & Campbell, 1984; Wasserman & Faust, 1994). In other words, in some contexts an information exchange can be considered a tie when individuals interact daily, while in other contexts an information exchange can be considered a tie when individuals interact once a month.

In each of the three papers that compose this thesis I considered different levels of tie intensity. I considered the specific level of intensity which yielded the strongest empirical results. There are theoretical and statistical reasons for which results are stronger with a specific intensity threshold. Network scholars must define the appropriate intensity level in which they assume that causal mechanisms are triggered. The use of different levels of tie intensity in the three papers does not represent a strictly empirical limitation but it can be seen as a boundary condition of the theorizations. I did not provide an explanation of the reasons why I chose a specific threshold within each paper because the discussion on tie intensity is perhaps tangential to the core theoretical development. This needs a rather detailed explanation and it could confuse the reader, weakening rather than strengthening the cohesiveness of the theorization.

The rationale behind the choice of intensity threshold for each specific paper is presented in detail in the appendix. Furthermore, the appendix reports and discusses regressions and findings using alternative thresholds of intensity. Paper 1 focuses on a level 2 threshold of intensity. A low threshold of intensity is ideally better to measure

the antecedents of networks. In fact, all relationships are initially assumed to be formed with low tie intensity and then become progressively reinforced over time. The lowest tie intensity threshold 1 was not used because it is associated with a series of conceptual and empirical problems. Paper 2 focuses on the highest intensity threshold. The justification for using this highest intensity threshold is related to the fact that in the prediction of network outcomes, differently from the case of network antecedents, strong ties could be more relevant. In the traditional sociometric approach, studies of the effects of networks generally focus on the few four or five strongest ties individuals have (Holland & Leinhardt, 1973; Marsden & Campbell, 1984; Wasserman & Faust, 1994). The strength of ties is likely to influence the magnitude through which the explanatory mechanisms linking networks to outcomes are triggered. For instance, the higher the tie strength the more information individuals can exchange or the more negotiations individuals can have to exchange tasks. Paper 3 focuses on an intermediate level of tie intensity. The reason why this paper focuses on the intermediate level is empirical. In fact, the variance conditions for testing the empirical hypotheses are better with an intermediate threshold of intensity. Higher thresholds would be more theoretically justified but, as shown in the appendix, they did not allow generate adequate variance conditions.

The second core limitation of the thesis is related to external validity. The concern for external validity is likely to be relevant in the case of Paper 2. In fact, evidence for Paper 2 is provided only from the data in the pharmaceutical organization, disregarding data from the videogame organization. As the videogame organization did not confirm the empirical hypotheses developed in the model, it is reasonable to raise some possible concerns about the external validity of the theory presented. In general, there are both statistical reasons and theoretical reasons which justify the possible lack of confirmation in the videogame organization. The most important reason is related to the fact that networks in the videogame organization tend to be highly dynamic and unstable. In the definition of network ties embraced in this thesis the condition of stability is fundamental to trigger the explanatory mechanisms which justify the association with the studied outcomes. The more networks are unstable, the more difficult it becomes to observe a significant relationship with outcomes. The appendix

discusses all the concerns for external validity reporting and explaining the results of regressions performed with the data from the videogame organization. The appendix also reports the results of analyses performed for each organizational sub-sample in Paper 1. The replication of findings across both organizations in Paper 1 suggests a good level of external validity. Nevertheless, there are some findings which could be contingent on or influenced by the type of organization considered. Analyses of the organizational sub-samples for Paper 3 are not reported because of the group-level focus of this paper: the number of groups in each organization is small and estimates for each organization may not be particularly meaningful.

A third concern that needs to be addressed is that of multicollinearity in the variables. Multicollinearity could be a factor that limits the empirical analyses because several of the variables studied exhibit substantially high levels of correlation. In order to address the problems of multicollinearity, tables in the appendix report the multicollinearity diagnostics for the regressions in Papers 1 and 2, along with an analysis of the findings. In general, the results show relatively low concerns for multicollinearity. In most cases, the variance inflation factors are below the thresholds generally considered to be indicative of multicollinearity concerns. Perhaps the only case worthy of notice is the moderate-high multicollinearity for the general structural hole variable in the prediction of job crafting in Paper 1. For this paper some tests were performed in order to assess the possible stability of findings with positive results. Paper 2 does not show substantial multicollinearity concerns. In Paper 3 multicollinearity concerns are not addressed because the HLM regressions estimate coefficients and standard errors in a different way and do not provide indications of variance inflation factors or tolerance.

Beside the three main limitations, there are also other conditions which need to be considered with respect to the thesis. The development of the job crafting scale could not follow the standard procedures for creating and validating a new scale. More specifically, I could not have the opportunity of adequately generating a large pool of potential items and selecting those with the best properties. I could also not assess the capacity of the construct to capture unique behaviors and the distinctiveness of the scale

with respect to similar scales. There are measurement issues also when it comes to performance. The use of different measures of performance in the two organizations may have validity reasons, but it entails the disadvantage of having different instruments to capture the same type of behaviors. There are also measurement considerations for the construct of satisfaction with the group. Although I provided reasons to justify the use of a single-item scale, it is relevant to acknowledge the reliability limitations of this approach. The measurement of communication networks, disregarding other types of ties, is a boundary condition of the study. If I could measure different types of ties the theory could have certainly been reinforced. The study of networks often generates endogeneity concerns. In the specific case of this theory, the use of different measures of job characteristics mitigates the possible endogeneity problems in paper 1. The use of lagged measures in paper 2 and in paper 3 also decreases, though does not eliminate, possible endogeneity concerns. The use of a richer longitudinal data and some statistical corrections could have further mitigated the concern of endogeneity, but the approaches followed already suggest good confidence in the interpretation of results.

7.5. Conclusion

The present thesis has elaborated theory about the social context of jobs. It merged the two new perspectives in job design research, proactive job design and social job design, and it blended them with network theory in order to develop a set of theoretical propositions which offer an overall appreciation of the interplay between networks and jobs. Three distinct papers were developed addressing the main question of the relationship between networks and jobs but elaborating this question in different ways in order to offer a specific set of concrete contributions which respond to the research gaps highlighted by previous scholars. The arguments developed in this thesis help explain the proactive nature of jobs, consider the social forces that underlie individual behaviors in shaping jobs, and examine the job attributes that shape individual network positions.

The findings of this thesis have importance for theory as well as for management. They suggest a different approach to job design which does not chain individuals to their jobs but facilitates their initiative to change jobs. The thesis suggests an approach to job design in which management does not design jobs using a top-down logic only, but it also designs jobs using a bottom-up logic. More specifically, the proactive initiatives of individuals could offer feedback information to better understand job requirements. The thesis also suggests the importance of designing jobs for social purposes and of empowering the development of social relations. The thesis offers suggestions concerning the possible practical implications of formal social network analyses in organizations. Social network analyses can improve the understanding of social dynamics and enable the assessment of the social outcomes of job design. As a whole, this thesis supports the importance of individuals' own initiative in organizations but does not diminish the role of management in guiding the organization. Top-down and bottom-up approaches are not conceived as mutually exclusive approaches but as synergistic approaches to be combined for increased effectiveness.

The insights concerning the interplay between jobs and networks can be extended to other research areas. This paper focuses on job design and networks but the same mechanisms identified in this thesis could be used to explore team design and organization design. The network approach to design in organizations does not only relate to the individual level but could also be expanded to other levels of analysis. The individual initiatives considered in job crafting behaviors exclusively pertain to the individual job but initiatives with larger breadth could be contemplated as well. For instance, individuals may have personal initiatives that concern the work in their unit. Individuals may also have initiatives concerning strategic ideas which have organizational implications. Following a perspective on the micro-foundations of strategy, scholars could study individuals' initiatives with a strategic role. All these initiatives may be interestingly associated with network relations, expanding the theoretical arguments developed in this thesis. Last, job crafting could be an individual activity as well as a group activity. Job crafting may be a group-level behavior (Leana et al., 2009), in which individuals collaboratively work to change tasks in the unit. The social dynamics explored in this thesis may have considerable influence on collaborative

job crafting. To conclude, the theoretical material presented in this thesis offers several potential sources of value and it will hopefully fuel new research endeavors while promoting the advancement of knowledge in the management field.

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APPENDIX: COMPLEMENTARY INFORMATION ON BOUNDARY CONDITIONS AND LIMITATIONS

Thresholds of Tie Intensity

In each of the three papers that compose this thesis I considered different levels of tie intensity. More specifically, I considered the specific level of intensity that yielded the strongest empirical results. There are theoretical and statistical reasons behind the choice of the intensity threshold for each paper. Given that the reasons are theoretically justified and given that in any case, network scholars must define the appropriate intensity level in which they assume that causal mechanisms are triggered, the use of different levels of tie intensity in the three papers does not represent a serious empirical limitation but it can be seen as a boundary condition of the theorizations. I did not provide an explanation of the reasons why I chose a specific threshold within each paper because the discussion on tie intensity is perhaps tangential to the core theoretical development. It needs a rather detailed explanation and it could confuse the reader, weakening rather than strengthening the cohesiveness of the theorization. However, in this appendix, I provide for the interested reader a detailed explanation of the reasons why I chose each specific threshold for the three papers as well as some discussion of the possible causes that made findings stronger for the selected thresholds of tie intensity.

Paper 1: In Paper 1, I chose a low threshold. More specifically I opted for the threshold level 2 considering ties with interaction frequency of *one week or more*. In Table XVI, we can see the empirical results of regression equations for Paper 1 using all five possible intensity thresholds. For simplicity, I report the results only for the regressions predicting structural holes because it is the prediction of structural holes that offers the logical explanation for the choice of the intensity threshold in Paper 1. Furthermore, extracting the sub-networks of structural holes for each degree of tie intensity is a computationally lengthy procedure, which may be unnecessary for the purposes of this discussion. As we can observe, the results tend to be stronger

TABLE XVI – Paper 1: Results of Regressions on Structural Holes with Different Thresholds of Tie Intensity

	Self-Report					Job Averaged				
	Intens.1	Intens.2	Intens.3	Intens.4	Intens.5	Intens.1	Intens.2	Intens.3	Intens.4	Intens.5
Organization	1.486	1.191	.477	-1.986**	.686**	1.243	1.090	.332	-2.130	.693
Gender	.566	.463	.150	.435	.185	.774	.724	.360	.631	.230
Age	.078	.056	.069	.069*	.037**	.067	.044	.059	.067	.035
Education	-.659	-.625	-.460	-.131	-.266	-.506	-.536	-.425	-.118	-.259
Tenure Org (Y)	.182	.198*	.109	.045	.023	.192*	.205	.116	.045	.023
Tenure Position (M)	-.017	-.017*	-.010	-.005	-.001	-.016	-.016	-.010	-.004	-.001
Autonomy	1.691**	1.171**	.642	.527	.249*	2.049**	1.422*	.870	.882	.339
Variety	.968	1.329**	1.001**	.378	.041	1.848**	2.129**	1.359**	.457**	.043*
Significance	.326	.034	.044	-.060	.196	.171	.151	.165	.045	.253
Identity	-1.060	-.950*	-.851**	-.575**	-.325**	-1.373*	-1.131*	-.890*	-.847**	-.394
Feedback	-1.083*	-.921	-.710	-.346	-.021	-1.937**	-1.882**	-1.394**	-.834*	-.052**
Adj. Δ R²	.06	.06	.05	.02	.04	.09	.09	.07	.05	.04
	Supervisor					Coded				
	Intens.1	Intens.2	Intens.3	Intens.4	Intens.5	Intens.1	Intens.2	Intens.3	Intens.4	Intens.5
Organization	-.538	-.811	-1.170	-2.974***	.182	-.974	-1.592	-1.849*	-3.652***	-.186
Gender	-.167	.149	.088	.110	.154	.047	.041	-.296	.171	.148
Age	-.020	-.003	.036	.045	.026	-.033	-.050	-.008	.019	.013
Education	-.865	-.814	-.606	-.356	-.282	-.657	-.579	-.492	-.110	-.191
Tenure Org (Y)	.126	.104	.059	.035	.025	.105	.110	.057	.029	.023
Tenure Position (M)	-.009	-.007	-.005	-.003	.000	-.004	-.004	-.003	-.003	.001
Autonomy	2.509****	1.983****	1.362***	1.177****	.578****	1.016**	.894**	.603*	.584**	.178*
Variety	1.038*	.962*	.452	.293	.085	1.174**	1.122***	.742**	.280	.080
Significance	-1.401	-.587	-.122	-.156	.112	1.263**	1.063**	.660*	.347	.271
Identity	-1.586***	-1.366***	-1.028**	-.852***	-.498***	-.569	-.687*	-.460	-.274	-.008
Feedback	-1.630**	-1.317**	-.971*	-.713*	-.120	-1.015**	-1.332***	-1.062***	-.606**	-.211*
Adj. Δ R²	.23	.23	.18	.16	.18	.32	.37	.29	.16	.14

 * p <. .1; ** p <. .05; *** p <. .01; **** p <. .001

considering the threshold 2, although it is important to acknowledge that they are partially replicated also using the other thresholds. In the self-report measures, the difference among thresholds is higher. In the job-averaged measures, the difference tends to be smaller, and threshold 1 offers slightly better results than threshold 2. In the supervisory measures, the difference among thresholds is also not particularly pronounced and the significance is well replicated across different thresholds. Last, in the coded measures we see again higher variation of results. In all cases, threshold 1 is the closest to threshold 2 and we can clearly observe how the more we increase the threshold of intensity, the lower the predictive validity of the model becomes. There is therefore a clear contingency effect of tie intensity on the relationship between job characteristics and structural hole positions.

There is a theoretical reason why the results are stronger for a low threshold of tie intensity and why it is appropriate to consider such a minimal threshold in the theory for Paper 1. Sociometric research in sociology has traditionally focused on the strongest intensity threshold to identify social ties among individuals and several works simply asked respondents to report the strongest four or five ties because stronger network ties are assumed to trigger their beneficial or deleterious advantages of social relationships (Holland & Leinhardt, 1973). Although Granovetter (1973) challenged the idea of focusing the theorization on strong network ties proposing the importance of weak ties, the focus on strong ties still represents a popular approach in sociometry. However, in paper 1 it may be more appropriate to consider a low threshold of intensity. The main theoretical reason that justifies this choice is related to the fact that the paper explores the antecedents and not the consequences of social networks. The formation of structure is a progressive process and we may assume that it is unlikely that individuals start communicating to each other with a regularity of several times per day. According to Nebus (2006) an individual first addresses a contact and if the information exchange is beneficial, the contact is addressed again and again, reiterating the information exchange episodes and progressively constructing a tie. According to the proposed theory, the structure of jobs exercises effects on network formation since the very beginning and explains why individuals may be addressed for the very first time. Every tie may start with low intensity and evolve to become a tie with high intensity and we could speculate

that only when ties reach a certain intensity may they trigger the mechanisms which transfer effects on outcomes. However, the factors that influence the formation of structure start exercising their effect since the early information exchanges between two parties. For this reason, considering the predictors of networks, it may be more methodologically appropriate and theoretically justified to consider all ties. It is important to acknowledge that in Paper 1, networks are also treated as antecedents of job crafting. However, the last hypotheses have a lesser role in the paper, whose core contribution is constructed around the prediction of networks. I wanted to avoid using different thresholds for different hypotheses in order to maintain a certain degree of consistency and therefore I preferred to focus on lower thresholds.

If it is theoretically pertinent to choose a low threshold of intensity when predicting network formation, why are results stronger using a threshold of intensity 2 and not using a threshold of intensity 1? Results generally tend to be replicated using those two thresholds and only in the case of coded measures can we observe a modest difference in findings. The reason why results are slightly better with level 2 is because level 1 may not represent an appropriate threshold to measure networks in the study's context. Level 1 refers to ties having a frequency of "*once a month or less*". This operationalization presents several problems. First, such an intensity level is a vague quantifier and individuals could identify ties having frequency of once a month as well as ties having frequency of once a year, leading to a distorted measurement of networks. Second, it could be argued that ties of such extremely low intensity should not even be considered network ties. In fact, for a relationship to be considered a network tie, information exchange must still occur with certain regularity, so that there is a sort of bond between the parties and the parties can exchange information differently compared to two complete strangers (Marsden & Campbell, 1984; Wasserman & Faust, 1994). If individuals ask for information to alters with whom they interact only once a month or even less we can assume that they will not derive substantially more information than the case in which they interact with a completely unknown employee. Third, ties with such low tie intensity are likely to be censored. The online questionnaire had 25 lines to include the names of the contacts. Most of the time, the space limitation did not create problems because individuals tended to report less than 25 contacts. However, in a

minority of cases which does not exceed 10%, respondents reached the space limit. In all cases respondents initially identify the most frequent contacts and the last contacts are generally those with intensity 1. The space limitation is most likely to censor contacts with frequency 1, resulting in a distorted measurement. Fourth, even if the individual does not reach the space limit (25 lines are indeed a lot), there could be many employees with whom a respondents talks once a month or more in the organization. Identifying contacts one by one requires time and expands the completion time for the questionnaire. It is therefore likely that respondents did not spend time to identify rare contacts one by one, reporting only the contacts with more regular communication exchanges. Fifth, ties with such low tie intensity could be harder to recall, given the very rare occasions of exchange, therefore leading to a measurement bias. In addition, respondents not only had to recall the contacts, but also to identify their first and last names. If a respondent exchanges information with someone only once every three months, it is less likely that he or she will recall the first and last name of such contact. The above-mentioned reasons may suggest why results are less strong for intensity threshold 1, which is related to more measurement errors and a less theoretically appropriate measure of a network tie. This intensity level was initially included in the questionnaire because, a priori, I could not know the average number of contacts, the distribution of contacts, and the characteristics of the sampled organizations. Furthermore the threshold was included in case I wanted to develop a construct of tie intensity or to allow the possibility of testing specific extreme cases.

Paper 2: Paper 2, differently from Paper 1, focuses on the highest tie intensity threshold. In Table XVII and Table XVIII it is possible to see the results of regressions using different tie intensity thresholds. Table XVII reports the results of the regression equations predicting job crafting. We can observe that the results are generally better with the highest intensity threshold. Nevertheless, while the five hypotheses on the relationship between network job characteristics and job crafting are more significant with the highest intensity threshold, the results for the two hypotheses on centrality tend to be stronger for low intensity thresholds. Table XVIII reports the results of the regression equations predicting performance. Even in this case we can observe rather different empirical results. The disordinal interactive effect between job crafting and

TABLE XVII – Paper 2: Results on Regressions Predicting Job Crafting with different thresholds of intensity

	Intens.1	Intens.2	Intens.3	Intens.4	Intens.5
Gender	.305*	.304*	.350*	.428**	.110
Age	-.009	-.009	-.004	.016	.015
Tenure Organization (Y)	.011	.013	.007	.013	.018
Education	-.042	-.136	-.213	-.033	-.103
Tenure Position (M)	-.001	.000	-.001	-.002	-.001
Specialization	-.094	-.098	-.039	-.157	-.286**
Autonomy	.296**	.260**	.239*	.263**	.297**
Variety	.037	.120	.102	.006	.204
Significance	.108	.089	.109	.108	.125
Identity	-.044	-.089	-.109	-.088	-.030
Feedback	-.330**	-.345***	-.415***	-.383**	-.393***
Identity ²	-.037	-.063	-.075	-.094	-.062
Betweeness	.136**	.142**	.077**	.062*	.069*
Eigenvector	-.023**	-.034***	-.040***	-.031***	-.020*
Network Autonomy	.643**	.494*	.570*	.175	.359**
Network Variety	.263	.338	.099	.007	-.078
Network Significance	.101	-.154	.125	-.261	-.543***
Network Identity	-.391	-.538*	-.559*	-.287	-.120
Network Identity ²	.162	.444	-.323	.388	.567**
Network Feedback	.375	.363	.586*	.204	.440***
Adj. Δ R²	.20	.22	.20	.10	.28

* p <. .1; ** p <. .05; *** p <. .01; **** p <. .001

TABLE XVIII – Paper 2: Results on Regressions Predicting Performance with different thresholds of intensity

	Intensity 1		Intensity 2		Intensity 3		Intensity 4		Intensity 5	
Gender	.18	.19	.15	.14	.23	.17	.21	.17	.21	.23
Age	-.05****	-.05***	-.04***	-.04***	-.05***	-.05***	-.04***	-.04**	-.04***	-.04*
Tenure Organization (Y)	.01	.01	.00	.00	.02	.01	.02	.02	.04**	.02
Education	-.10	.00	-.23	-.15	-.27	-.27	-.30	-.37	-.23	-.45
Tenure Position (M)	-.00	-.00	-.00	-.00	-.00**	-.00**	-.00*	-.00*	-.00**	-.00*
Network Autonomy	-.48	-.56	.11	.01	-.29	-.24	-.28	-.30	-.28	-.21
Network Variety	-.32	-.21	-.73	-.65	-.47	-.44	-.31	-.28	.07	-.06
Network Significance	.86	.85	1.87***	1.74***	1.18**	1.11**	.46	.33	.11	-.01
Network Identity	.43	.39	.83*	.67*	.57*	.45	.23	.19	.13	.32
Network Identity ²	-1.39	-1.39	-.18	-.15	.18	.39	-.03	.03	-.12	-.03
Network Feedback	-.60*	-.58*	-1.41**	-1.27**	-1.03**	-.95*	-.28	-.19	-.04	.17
Betweenness	.08	.09*	.04	.06	.05**	.06***	-.01	.04	-.10*	-.02
Eigenvector	-.04***	-.04***	-.03***	-.03***	-.02**	-.02**	-.01	-.02	-.00	-.02
Job Crafting	-.05	.07	-.08	.03	-.12	-.04	-.15	-.16	-.31	-.23
Job Crafting x Betweenn.	.00		.04		.00		.12		.36***	
Job Crafting x Eigenvector		-.02*		-.02		-.01		-.01		.01*
Adj. ∆ R²	.00	.03	.00	.00	.00	.00	.00	.00	.28	.07

* p <. .1; ** p <. .05; *** p <. .01; **** p <. .001

centrality measures is significant with the highest tie intensity threshold. At the lowest intensity level there is a marginally significant interaction with eigenvector centrality which, observing the differences in signs, could also suggest a disordinal pattern. However, the lower tie intensity thresholds support a significant relationship between the centrality measures and performance. More specifically, the findings tend to replicate the same divergent effects of betweenness and eigenvector centrality hypothesized for job crafting, suggesting that the mechanisms identified tend to be activated also with performance. The positive relationship linking betweenness centrality to performance has already been supported by previous authors (Mehra, Kilduff & Brass, 2001). However, the relationship between eigenvector centrality and performance has not been investigated, especially accounting for its unique effect which may emerge after controlling for betweenness. There are mixed and distinct results in the hypotheses using different thresholds. Pondering the advantages and disadvantages I preferred focusing on the highest tie intensity threshold because it is more theoretically justified although the lowest tie intensity thresholds have better statistical conditions for empirical testing.

The core reason why I chose the strongest tie intensity threshold is because Paper 2 explores the consequences of networks and the explored mechanisms are likely to be more strongly triggered by relationships with high tie intensity. As explained before, choosing high intensity thresholds is rather common in sociometric research, where authors generally build network maps only on the few strongest ties individuals have (Holland & Leinhardt, 1973). This core approach was challenged by Granovetter (1973), who developed an argument on the importance of weak ties. This argument was derived from evidence on clustering dynamics in triads (Davis, 1970) and specifies a causal association between tie strength and sparse networks. Let us consider the situation in which we have a triad where A is tied to B and to C but B is not tied to C. According to Granovetter (1973) this triad is unstable for strong ties while it is stable for weak ties. In other words, in case of strong ties A will feel compelled to introduce B to C while in weaker networks A will feel little obligation to introduce his or her unconnected contacts to each other. Weak ties are likely to generate sparse structures in which individuals can bridge structural holes. Hence weak ties anticipate the formation

of structural holes. The first problem with this theory is that the logic of clustering in triads seems to be appropriate for emotional ties and friendship ties in an open social environment but it is less applicable in other contexts, such as in the case of instrumental ties in organizations (Krackhardt, 1992). The second problem is that this theory explains the prediction of structure, not the effect of structure on outcomes. Structural hole positions depend on other factors as well, as shown in paper 1. It can be argued that weak ties influence the formation of structural holes, but, given a certain structure, the relationship between structure and outcomes may be amplified if ties are strong. Hansen (1999) argued that weak ties allow better search for information when they are associated with sparse network structures, but given the same network structure it is strong ties that allow more information exchange, more trust, and more advice, triggering many beneficial mechanisms associated with networks. Granovetter (1982) himself noted that weak ties are beneficial because they tend to be associated with a sparse structure, but, given the same structure, strong ties are more available, improve information exchanges and trigger therefore the beneficial advantages of social relations.

Specifically to the theorization of Paper 2, each of the intervening mechanisms introduced in the predictive role of networks on crafting are likely to be more strongly activated in the case of higher tie strength. The strongest mechanism likely to depend on the degree of tie intensity considered is information. Information is the first mechanism introduced in Paper 2 to justify the relationship between networks and crafting. I argued that networks provide information that facilitates crafting behaviors. Given the same structure, if ties are strong there is inevitable more information exchanged which can help crafting. First, the definition itself of tie strength entails the frequency of information exchanges and therefore it naturally encompasses the amount of information exchanged between two parties (Granovetter, 1973; Marsden & Campbell, 1984). Second, strong ties are better than weak ties for information exchanges that entail the transfer of complex and uncertain information (Hansen, 1999). It can be assumed that crafting behaviors, being associated with behavioral opportunities for a change in personal practices, are often surrounded by uncertainty and complex information exchanges (Berg, Grant & Johnson, 210). Third, strong ties are better for information

exchanges in change behaviors because individuals need to reassure each other that the change initiative is appropriate (Krackhardt, 1992). Fourth, information about behavioral opportunities is generally transferred to contacts with which someone shares a strong tie (Bian, 1997). As explained in Paper 2, the information mechanism of networks does not only explain why networks directly affect crating, but also why crafting and networks interact in the prediction of performance. High tie intensity thresholds may therefore be appropriate also for the exploration of the interaction hypotheses anticipated in the paper.

Tie intensity may also play a role for the other mechanisms introduced in Paper 2. The second mechanism illustrated is resistance. Strong ties are likely to exercise stronger resistance because they have a much stronger binding power than weaker ties, explaining opposition in case actors do not comply with their behavioral expectations (Hansen, Mors, & Løvås, 2005; Hansen, 1999). It can be speculated that resistance is activated more strongly in networks with high tie intensity. The third mechanism introduced is exchange. Strong ties are more likely to be reciprocated and generate knowledge about the others and expectations of behaviors, which can promote exchanges between parties (Hansen, 1999). Strong ties facilitate exchanges between two parties because they decrease the likelihood of opportunism and therefore foster negotiation behaviors (Coleman, 1990). Strong ties allow individuals to more easily exchange views, decrease dysfunctional conflict and allow understanding of how to collaborate and negotiate together (Nelson, 1989). The fourth mechanism that we introduced is motivation. It was argued that contacts can transfer enthusiasm and motivation to engage in crafting behaviors. According to Tottendell, Wall, Holman, Diamond and Epitropaki (2004), the more individuals interact for work purposes, the more they develop affective bonds in which they are likely to transfer feelings, emotions and attitudes towards certain behaviors. It can be expected that weak ties are emotionally "colder" and individuals are less likely to transfer through networks their enthusiasm and motivation to engage in crafting behaviors. For all the above-mentioned reasons, the highest intensity threshold may be more appropriate for operationalizing ties in the context of Paper 2.

However, as shown in the thesis chapter on the context, the highest intensity thresholds do create an empirical problem. More specifically, in the case of higher thresholds the variables of eigenvector and betweenness centrality have poorer variance conditions. The higher the tie intensity is, the lower the variance captured between individuals and the more skewed the distribution of observations is. This factor is probably the cause of the lower significance of the betweenness and eigenvector hypotheses for higher intensity thresholds as shown in Table XVII. This factor is also probably the cause of the lack of empirical evidence connecting centrality measures to performance in Table XVIII. Nevertheless, the problems of distribution only affect the structural variables of betweenness and eigenvector centrality, while they do not affect the network job characteristic variables. The network job characteristic variables are similarly and normally distributed for all thresholds of intensity. Given that it is theoretically more meaningful to use a higher tie intensity threshold when networks are predictors, I preferred focusing on the highest tie intensity. Using different thresholds of intensity for the distinct hypotheses would have distorted the consistency of the paper and I preferred keeping the same threshold for all the hypotheses.

Paper 3: Following the same premises as for Paper 2 and focusing as well on the consequences of networks, Paper 3 should also be focused on higher tie intensity. Some of the mechanisms that explain performance and behaviors, such as information exchanges, have already been explained before. High intensity thresholds are likely to explain the conflict and imbalance that stem from structural hole positions at the group level. In the argument concerning the strength of weak ties by Granovetter (1973), triads are supposed to cluster because strong ties generate tensions and awareness of each other's' social structure. In other words, Granovetter (1973) argues that in networks with weak ties, none is really aware of the ties of others or really cares much about the ties of others. Hence, individuals do not perceive pressures to behave in a certain manner. Strong ties generate expectations for behaviors and when individuals do not comply with those expectations, frictions may emerge (Coleman, 1990). It can be assumed that the tensions and frictions stemming from an unbalanced group structure with high variance are exacerbated in the case of stronger ties.

TABLE XIX – Paper 3: Results of HLM Models with different thresholds of intensity (controls are included in the HLM equations but the intercepts for the control variables are omitted for simplification purposes)

HLM analyses for JOB CRAFTING:

	Intensity 1		Intensity 2		Intensity 3		Intensity 4		Intensity 5	
	γ	p	γ	p	γ	p	γ	p	γ	p
Intercept β_0	3.29	<.001	3.22	<.001	3.20	<.001	2.88	<.001	2.85	<.001
Intercept for *Constraint* Individual	-0.45	0.12	-0.32	0.26	-0.29	0.21	-0.32	0.09	-0.23	0.21
Group-Level Mean *Constraint*	-0.01	0.98	0.34	0.60	0.84	0.19	0.78	0.06	0.43	0.34
Group-Level Variance *Constraint*	-0.10	0.95	-1.54	0.33	-3.82	<.001	-0.97	0.36	1.09	0.34

HLM analyses for SATISFACTION:

	Intensity 1		Intensity 2		Intensity 3		Intensity 4		Intensity 5	
	γ	p	γ	p	γ	p	γ	p	γ	p
Intercept β_0	4.71	<.001	3.78	<.001	3.65	<.001	3.82	<.001	3.59	<.001
Intercept for Individual *Constraint*	-0.07	0.83	-0.40	0.20	-0.42	0.31	0.21	0.12	-0.47	0.08
Group-Level Mean *Constraint*	-0.08	0.93	1.08	0.25	1.39	0.07	0.71	0.42	0.64	0.29
Group-Level Variance *Constraint*	0.19	0.94	-2.60	0.22	-4.05	0.04	-1.72	0.42	0.70	0.68

HLM analyses for PERFORMANCE:

	Intensity 1		Intensity 2		Intensity 3		Intensity 4		Intensity 5	
	γ	p	γ	p	γ	p	γ	p	γ	p
Intercept β_0	2.91	<.001	2.74	<.001	2.72	<.001	2.42	<.001	2.95	<.001
Intercept for *Constraint* Individual	-0.08	0.77	-0.14	0.59	-0.29	0.30	-0.10	0.63	0.09	0.65
Group-Level Mean *Constraint*	0.81	0.23	1.12	0.05	1.00	0.01	1.15	<.001	0.19	0.53
Group-Level Variance *Constraint*	-1.14	0.40	-1.69	0.16	-1.02	0.24	-0.07	0.94	0.09	0.91

However, in Paper 3, the chosen intensity threshold for the analysis is a medium threshold of intensity 3. It is possible to see in Table XIX the findings of regressions using the different thresholds of intensity. Results are substantially better adopting a medium intensity threshold. In general, results are stronger for higher levels of intensity than for lower levels of intensity, confirming the theoretical logic introduced before. However, the results are substantially stronger for the medium threshold as compared to the higher thresholds. It is interesting to see that, while job crafting for the selected threshold shows a significant relationship with group-level variance in structural holes but not with group-level mean in structural holes, the intensity level 4 gives modest confirmation to the significant relationship between group-level mean in structural holes and job crafting while it does not confirm the relationship with group-level variance.

The intensity level 4 is also interesting in the case of job crafting because structural holes are marginally significant also at the individual level. We can see therefore the flipping signs and the lack of isomorphism in the predictions at different levels of analysis. In other words, considering the intensity threshold 4, structural holes are beneficial for job crafting at the individual level but deleterious to job crafting at the group level. Combining the results of threshold 3 and threshold 4, it is possible to reach interesting insights into the predictive effect of networks on job crafting. Considering satisfaction, it is possible to detect a marginally significant relationship with individual structural holes for the strongest intensity threshold. Even in this case structural holes seem to be slightly beneficial to satisfaction. Results are not only replicated, but become stronger considering the threshold 4 in the relationship between group-level mean in structural holes and individual performance. There is also a marginal replication of this relationship considering intensity threshold 2.

If it is theoretically sound to use a high intensity threshold, why are results using threshold 3 stronger than results on the higher intensity thresholds? The reason may simply be statistical. Figure 28 shows the distribution of the individual level variables of structural holes, operationalized through the measure of constraint used in Paper 3. As in the case of betweenness centrality and eigenvector centrality, the distributions of observations are better for lower intensity thresholds as compared to higher intensity

FIGURE 28 – Distribution of Structural Hole Variables with Diverse Tie Intensity Thresholds

Intensity Threshold 1

Intensity Threshold 2


Intensity Threshold 3


Intensity Threshold 4

Intensity Threshold 5
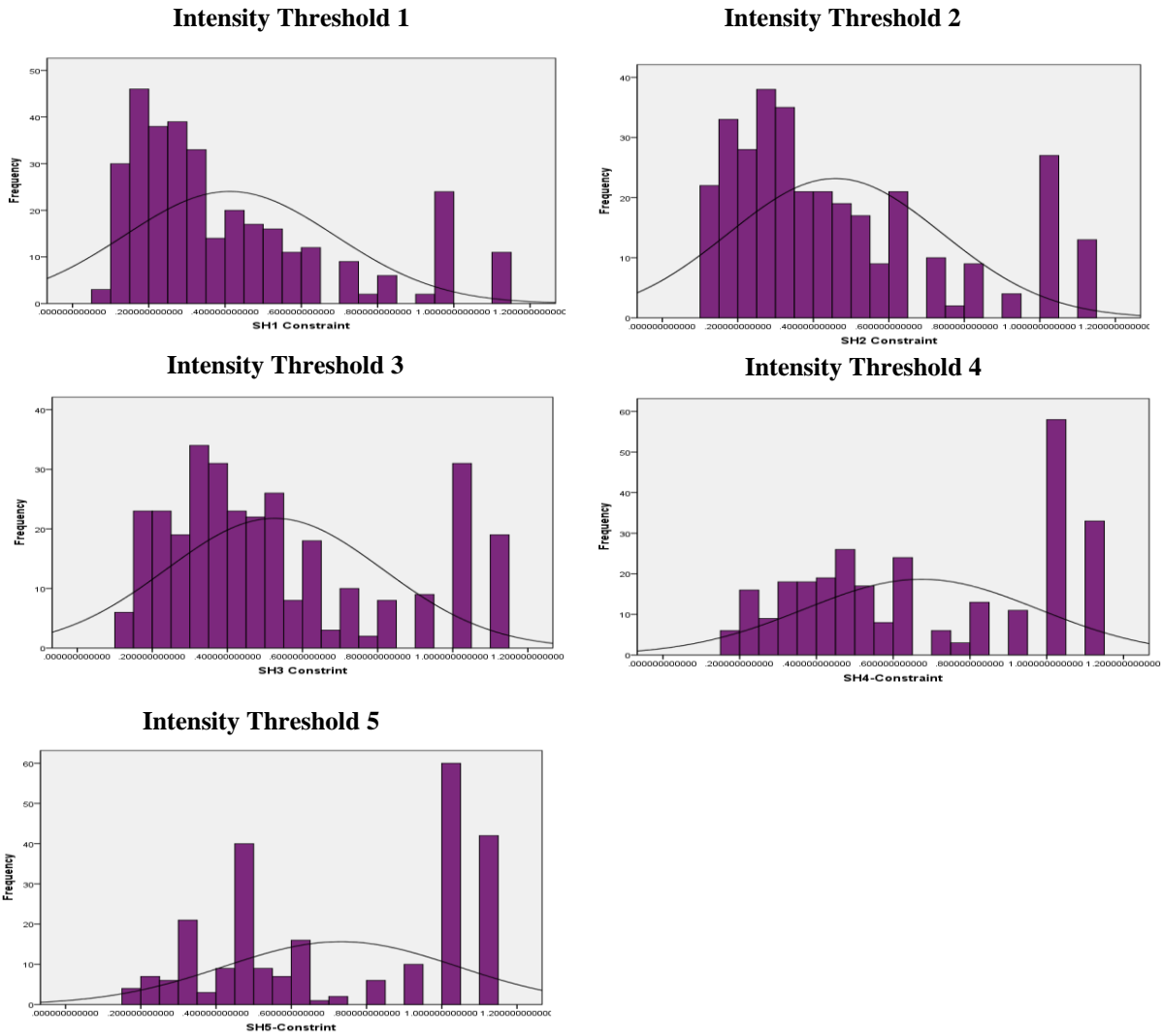
thresholds. There is not much difference between level 1, level 2 and level 3. However, in level 4 and in level 5 we can see that the variance conditions significantly worsen. The scores are less normally distributed. There is a substantial group of individuals who all have the highest level of constraint, meaning that all their contacts are overlapping. There are few individuals who have a constraint inferior to 0.5 and very few individuals who have a constraint lower than 0.3. In practical terms, this means that in the highest tie intensity thresholds there are not many individuals who bridge structural holes and this could explain the deleterious mechanisms hypothesized in the manuscript. Brokers can be better detected using lower tie intensity thresholds. The same empirical problems faced in Paper 2 for betweenness and eigenvector centrality emerge in Paper 3, considering structural holes. However, while in Paper 2 the centrality measures were only part of the theorization and were "sacrificed" for the better conditions to test network job characteristic variables, in Paper 3 structural holes are the only predictors. Given the nature of the model, it is theoretically more significant to consider higher tie intensity thresholds. Given the distribution of observations it is empirically more convenient to consider lower intensity thresholds. As the main empirical problems concern level 4 and level 5, while the first three levels show considerably fewer differences, the intermediate level 3 represents the option that more adequately combines good theoretical and empirical justifications.

External Validity

The concerns for external validity of the findings collected in the organizations are addressed in each of the papers. The idea of collecting data on two completely different organizations was developed in order to decrease possible problems of generalizability. However, there is a fundamental limitation which still remains to be addressed. The theory of Paper 2 is built only on evidence from the pharmaceutical company while the evidence does not confirm the model in the videogame company. Table XX reports the findings of regressions on job crafting and on performance, showing the scanty evidence in support of the predicted models for the videogame

TABLE XX– Paper 2: Regressions for Job Crafting and Performance on Organization 2

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Gender	-.207	-.197	-.191	-.001	-.016	-.083
Age	.013	.009	.004	.011	.008	.002
Tenure Organization (Y)	.037*	.034*	.027	.030	.032	.029
Education	.123	.135	.129	.091	.107	.150
Tenure Position (M)	-.006	-.006*	-.005	-.003	-.004	-.005
Specialization				.099	.105	.116
Autonomy				.162*	.134	.117
Variety				.117	.109	.067
Significance				.101	.080	.043
Identity				.031	.059	.005
Feedback				-.156*	-.154*	-.086
Identity ²				.000	.011	.019
Betweenness		.041*	.035		.036	.035
Eigenvector		-.001	-.001		-.001	.000
Network Autonomy			-.196			-.206*
Network Variety			.070			.091
Network Significance			.057			.043
Network Identity			-.095			-.116
Network Identity ²			-.587****			-.518***
Network Feedback			-.023			-.008
Adj. R²	.07	.08	.20	.16	.17	.24

	Model 1	Model 2	Model 3	Model 4	Model 5
Gender	-.068	-.025	2.992	-.009	-.010
Age	-.019	-.020	-.034	-.020	-.020
Tenure Organization (Y)	-.007	-.010	-.020	-.003	-.004
Education	.023	-.001	-.012	-.036	-.037
Tenure Position (M)	-.002	-.001	-.009	-.001	-.001
Network Autonomy	.097	.126	-.001	.141	.141
Network Variety	.061	.058	.131	.061	.061
Network Significance	.006	.000	.058	-.011	-.010
Network Identity	-.034	-.022	.010	.001	.001
Network Identity ²	.183	.280*	-.023*	.235	.240*
Network Feedback	-.088	-.087	.313	-.107	-.106
Betweeness	-.011	-.016	-.085	-.040	-.038
Eigenvector	-.002	-.002	-.005	-.014	-.014
Job Crafting		.165	-.001	.166	.167
Job Crafting x Betweeness			.174		-.004
Job Crafting x Eigenvector				.002**	.002**
Adj. R²	-.07	-.05	-.06	.00	.00

 * p <. .1; ** p <. .05; *** p <. .01; **** p <. .001

company. The only hypothesis which finds strong and consistent support is the one concerning the curvilinear effect of task identity on job crafting behaviors. There is a modestly significant relationship between betweenness centrality and job crafting when job characteristics are not included as control. I can also find a significant interaction between eigenvector centrality and job crafting in the prediction of performance. However, most hypotheses are not replicated in the videogame organization.

In fact, the main discrepancy concerns the hypotheses linking network job characteristics and job crafting. The aggregate dataset including all sub-samples finds empirical support for the hypotheses predicting the significant and divergent effect of betweenness and eigenvector centrality on job crafting. In the whole sample, after including the complete set of controls used in Paper 2, betweenness centrality has positive and significant predictive value (β = .052; p = .015), while eigenvector centrality has negative and significant predictive value (β = -.014; p = .003). The significant and divergent relationships are also confirmed with other intensity thresholds. With intensity threshold 3 and including all controls in the equation, betweenness is still positive (β = .058; p = .023), while eigenvector is negative (β = -.016; p = .018). With intensity threshold 2 results are still confirmed although significance is inferior (betweenness β = .07, p = .042; eigenvector β = -.014; p = .065). Results are also partially confirmed for the other thresholds with betweenness positive and significant (β = .08; p = .024) in threshold 1 and eigenvector negative and significant (β = -.013; p = .044) in threshold 4. Table XX shows that in the videogame subsample betweenness has a modestly significant and positive relationship while eigenvector centrality shows a negative sign, although the coefficient is not significant. The videogame company contributes to detecting the significant results concerning the predictive role of betweenness and eigenvector centrality on job crafting using the whole sample. Nevertheless, results are not replicated for the network job characteristics.

Although it is difficult to determine with certainty what lies behind the lack of replication, there are both theoretical reasons and statistical reasons that can help interpret why the theory is not replicated in the sample of the videogame organization. The most important reason that suggests a possible lack of replication is theoretical. This

reason is consistent with the argument offered before in relation to the choice of a high threshold of intensity for Paper 2. As illustrated, the mechanisms which are hypothesized to explain the relationships between network predictors and job crafting outcomes are likely to be stronger for ties with high intensity. The very same logic can be extended to argue that the explanatory mechanisms are likely to be stronger for more stable ties as compared to more dynamic ties. As explained, network theory is built on the assumption of stable ties, which create behavioral expectations in the two parties, making the exchange dynamics between tied individuals different from those for strangers (Adler & Kwon, 2002). If a tie is unstable it cannot give the same information or control advantages while it can create noise because individuals may be pulled in many different directions and do not have time and attention to dedicate to their stable ties (Levin, Walter, & Murnighan, 2011). If in a company ties continuously change, there can be lower behavioral expectations behind network ties and structural positions may be relatively unimportant because they are likely to change. As we can see from the figures and the arguments reported in the context chapter, the videogame company is an environment that is much more dynamic and in which there are fewer stable ties as compared to the pharmaceutical company. Not only does the videogame company have fewer stable ties but it also has many newly formed ties, reflecting a general level of instability and continuous dynamism. If individuals have fewer stable ties and many unstable ties the portion of stable ties over total ties is low. In such an environment, the mechanisms triggered by the network variables may be mitigated leading to a lower likelihood of finding significant relationships with network outcomes. Individuals may be requested to focus more on their interaction time in newly formed relationships, which do not activate the same mechanisms of stable ties, and focus less on exploiting the possible advantages of their stable network. Likewise, ego's contacts may be occupied by their newly formed relationships and be less concerned with constraining ego's behavior, so that the disadvantages of occupying a network position are less manifest. These arguments do not imply that the significant effects of network variables cannot *a priori* be found, but it acknowledges the greater difficulty of detecting significant consequences of networks in a dynamic environment where unstable relationships are prevalent.

There could also be statistical reasons that help explain the lack of replication in the videogame organization. One main reason could be that the videogame organization shows substantially higher lack of orthogonal conditions among the network job characteristics. Considering that the sample size for each organization is relatively small and considering that the model has many hypotheses, the lack of orthogonal conditions among the predictors may limit the possibility of finding significant relationships. Out of the 10 correlations involving network job characteristics, only in 2 cases does Organization 1 shows higher correlations as compared to Organization 2, while Organization 2 shows higher correlations 8 times. Most importantly, all 10 correlations in Organization 2 are significant, while only half of the correlations among network job characteristics in Organization 1 are significant. In the videogame organization, 5 correlations out of 10 have very high significance ($p < .001$), while only one correlation in the pharmaceutical organization has the same level of significance. Furthermore, the videogame organization, as explained in the chapter on the context of the thesis, has relatively lower variance conditions in job crafting behaviors, given that everyone tends to engage to some extent in these types of behaviors. The pharmaceutical company differently shows better variance conditions in the distribution of job crafting behaviors and it may therefore be more suitable for testing predictive hypotheses.

There are statistical reasons that help explain why the findings for Organization 2 on the prediction of performance are not strongly supported. The conditions of variance in individual performance for Organization 2 are much lower than the conditions of variance for Organization 1. As was discussed in the chapter on the context of the research and as shown in Figure 21 of this chapter, the variance captured by performance ratings in Organization 2 is substantially lower and 68.5 % of individuals obtained the same rating of 3 (average performance compare to others). Inevitably, when most individuals are rated the same and the variance captured is low, explaining variance becomes more difficult, though it is still possible. As explained in the methodology chapter and in the chapter on the context, the reason why there is less variance in the videogame company depends on the different operationalization and data collection for performance. In Organization 1, performance was measured through a supervisory questionnaire. Organization 2 unfortunately did not agree to let me collect

performance ratings through the same supervisory questionnaire. I collected secondary data on performance from the personnel records of formal performance assessment but given that those ratings are the base to justify compensation bonuses and promotion or lay-off decisions, supervisors tend to give ratings around the mean. These considerations offer possible speculative reasons why significant findings may not have been detected in the videogame organization. Paper 2 therefore has some limitations, but the significant evidence collected in the pharmaceutical organization still offers interesting insights and can provide an independent and substantial contribution to our understanding of networks and jobs. Network research has some core tenets which have been replicated in different samples but it is still quite common to find a lack of replication and a lack of cumulative evidence in core network questions (Fleming, Mingo & Chen, 2007; Kilduff & Brass, 2010).

Although examining the lack of supportive evidence for Paper 2 represents the most important issue to discuss under the heading of external validity, the replication of findings across samples can also be addressed for Paper 1. It is possible therefore to see whether the aggregate results reported in Paper 1 are replicated in both organizations or not. I did not perform those analyses for Paper 3, because the sample of units is too small to detect meaningful results considering a single organization. The sub-samples are still small for Paper 1, especially considering the high number of predictors included in the equations but it may be interesting to see whether the evidence is stable across the two different samples. Table XXI reports the results of the regression equations predicting structural holes in the separate organizations. It is interesting to see that, although relationships are only sometimes significant, the structure of the data tends to be similar in both organizations, suggesting the possible strength of the model elaborated in that paper. Using all four different measures and for both organizations the coefficients are always positive for task autonomy and task variety, while being always negative for task identity and feedback from the job. Only in the case of task significance do results tend to be less stable showing both positive and negative signs. In the pharmaceutical company, the supervisory measure of job characteristics gives all significant relationships, and in all cases but for task significance the evidence replicates the predictions of Paper 1. Task variety is significant and positive with three measures

TABLE XXI – Paper 1: Regressions Predicting Structural Holes on the different subsamples

	Model 1 Controls	Model 2 Self-Report	Model 3 Job	Model 4 Supervisor	Model 5 Coded
PHARMACEUTICAL ORGANIZATION					
Gender	1.80	1.67	1.76	.97	.18
Age	.03	-.02	-.01	-.04	-.10
Education	.29	-.12	-.29	-.59	-1.42
Tenure Org (Y)	.04	.07	.05	.07	-.05
Tenure Position (M)	-.00	-.00	-.00	-.00	.01
Autonomy		.66	1.04	4.55****	2.40****
Variety		1.95*	2.76	2.17*	1.11*
Significance		-1.18	-1.41	-2.34**	-.52
Identity		-.48	-.61	-4.58***	-.25
Feedback		-.86	-1.92	-1.59**	-2.85****
Adj. R²	.11***	.13***	.21***	.37****	.47****
VIDEOGAME ORGANIZATION					
Gender	.25	.89	1.23	-1.02	-.50
Age	.13	.14	.11	-.03	-.03
Education	-1.62	-1.48	-1.24	-.33	-.96
Tenure Org (Y)	.67****	.52***	.53***	.25	.28*
Tenure Position (M)	-.04	-.02	-.01	-.04	.00
Autonomy		1.12	1.37	1.34*	.59
Variety		1.03	1.74*	1.62**	1.36**
Significance		.44	.64	-1.07	1.57**
Identity		-.84	-.98	-.60	-1.03
Feedback		-.95	-1.73*	-1.74	-.45
Adj. R²	00	.00	.07	.26***	.44****

* p <. .1; ** p <. .05; *** p <. .01; **** p <. .001

TABLE XXII - Paper 1: Regressions Predicting Job Crafting on the different subsamples

	Model 2 Self-Report	Model 3 Job	Model 4 Supervisor	Model 5 Coded
PHARMACEUTICAL ORGANIZATION				
Gender	.49***	.46**	.53***	.12
Age	-.01	-.01	-.02	-.01
Education	-.06	-.16	-.04	-.19
Tenure Org (Y)	.02	.02	.04	.00
Tenure Position (M)	-.00**	-.00**	-.00**	-.00
Autonomy	.41***	.64****	.29	.08
Variety	.00	-.19	.16	.44****
Significance	-.05	-.34*	-.35*	-.06
Identity	-.00	.01	-.21	.02
Feedback	-.34**	-.15	-.16	-.07
Alters' Job Crafting	1.00**	.86	.74	.28
Structural Holes	-.01	.00	-.02	-.02
Structural Holes – High Crafting	-.00	-.02	-.03	-.00
Structural Holes – Low Crafting	.01	.00	.01	-.00
Adj. R²	.33***	.35****	.38****	.39****
VIDEOGAME ORGANIZATION				
Gender	.06	-.01	.13	-.01
Age	.00	.01	.01	.00
Education	-.03	.01	.08	.00
Tenure Org (Y)	.01	.01	.04*	.01
Tenure Position (M)	.00	.00	-.00	.00
Autonomy	.15**	.14	-.00	.03
Variety	.14**	.11	.03	.02
Significance	.07	-.02	.07	.05
Identity	.10*	.00	.00	.03
Feedback	-.05	-.06	.04	.05
Alters' Job Crafting	-.27	-.20	-.39	-.12
Structural Holes	-.07****	-.05***	-.05**	-.05***
Structural Holes – High Crafting	.07****	.08****	.08***	.08****
Structural Holes – Low Crafting	.02	-.00	-.02	-.01
Adj. R²	.37****	.29****	.29****	.26****

* p <. .1; ** p <. .05; *** p <. .01; **** p <. .001

over four and feedback from the job is significant and negative in two cases. The results for the videogame organization are generally less supportive, although the structure of the data is similar. Task autonomy is always positive and significant in the supervisory evaluations. Variety is always positive and significant in three cases over four. Task significance is mostly positive and significant in the coded measure. Task identity is always negative, though the coefficient never reaches significance. Feedback from the job is always negative and significant in the case of the job-averaged measure. The only variable which shows some instability is task significance.

Table XXII shows the results of the regression equations predicting job crafting. For simplicity, only the full models are represented, using the four cases with different job characteristic measures. In this case we can see that the evidence shows strong replication for the videogame sample, where the ambivalent effect of structural holes is well captured. Evidence in the pharmaceutical organization is not supportive and the coefficients are far from being significant, suggesting that the interpretation of their sign may not be meaningful. Bridging may therefore seem to be more relevant for crafting in dynamic organizations than it is for mechanistic organizations. The evidence collected in only two organizations cannot allow us to assert this claim with confidence, but it could be suggested that the type of organization influences the role of structural holes for crafting. In general, the evidence seems to show partial replication of the formulated hypotheses in both organizations, although some difference in the structure of data is observable. Nevertheless, it could also be that in the pharmaceutical organization, structural holes do not have significant effects on job crafting because job characteristics already explain a large portion of variance. As illustrated in Paper 1, without controlling for the job characteristics, results seem to support a significant role played by structural holes.

Multicollinearity

The third issue addressed in the section of limitations and boundary conditions is the concern for multicollinearity. Multicollinearity may be a relevant issue given the

high correlations between several pairs of variables in the dataset. More specifically, the job characteristics in Paper 1 are strongly correlated with one another. The correlation among job characteristics is a common problem which concerns all measurement instruments used to operationalize them. In the regressions predicting job crafting, the three dimensions of structural holes also show significant correlations. In Paper 2 the centrality dimensions are strongly correlated with each other as well as the network characteristic variables. Each network job characteristic variable is then correlated to the individual job characteristic used as control. In Paper 3, individual level structural holes are significantly correlated to group-level structural holes and the two group-level variables are significantly correlated as well. Last, the group of controls in the equation show very high correlations as well: for instance, the tenure indicators are correlated to each other and some demographics are significantly correlated to the organizational dummy, given the significant differences between the two organizations sampled. Furthermore, multicollinarity may arise because of the relatively small sample size, which makes estimates less precise and standard errors likely to be higher. As a whole, the significant correlations among the predictors in the regression equations suggest the possibility of multicollinearity problems.

In order to investigate the seriousness of possible multicollinearity problems, I report in Table XXIII and in Table XXIV the multicollinearity diagnostics of the regressions in Paper 1 and in Paper 2. The multicollinearity diagnostics in Paper 3 are not reported because HLM analyses, differently from OLS regressions, do not produce any multicollinearity statistics. The method through which associations are derived across levels of analysis estimating different intercepts and slopes for each group does not allow me to address multicollinearity concerns. The tables reported show that the structure of the data is adequate and that severe multicollinearity concerns are not present. The tables report the variance inflation factors for each of the variables in the regression analyses of the papers. Although there is no unique level suggested by scholars as indicative of high multicollinearity concerns, there are some rules of thumb, according to which a VIF equal to 5 indicates moderate multicollinearity concerns and a VIF equals to 10 or more indicates severe multicollinearity problems (Kutner, Nachtsheim, Neter, 2004). Results of regressions predicting structural holes in Paper 1

TABLE XXIII – Paper 1: Multicollinearity Diagnostics – Variance Inflation Factors in Regressions

	Controls	Self-Report	Job	Supervisor	Coded
Organization	2.044	2.230	2.394	2.964	3.533
Gender	1.080	1.145	1.141	1.372	1.174
Age	2.397	2.465	2.505	3.074	2.471
Education	1.046	1.071	1.073	1.179	1.102
Tenure Org (Y)	2.591	2.672	2.666	4.002	3.083
Tenure Position (M)	2.480	2.589	2.601	3.777	2.964
Autonomy		1.377	1.646	2.825	1.972
Variety		1.465	1.769	1.672	2.443
Significance		1.473	1.681	3.846	2.308
Identity		1.250	1.292	2.301	1.590
Feedback		1.552	1.754	3.314	2.186

	Self-Report			Jobs			Supervisor			Coded		
Organization	2.230	2.240	2.298	2.394	2.402	2.462	2.964	2.971	3.061	3.533	3.561	3.664
Gender	1.145	1.146	1.146	1.141	1.145	1.145	1.372	1.373	1.397	1.174	1.174	1.176
Age	2.465	2.474	2.525	2.505	2.510	2.550	3.074	3.074	3.080	2.471	2.482	2.494
Education	1.071	1.075	1.087	1.073	1.076	1.087	1.179	1.188	1.189	1.102	1.107	1.117
Tenure Org (Y)	2.672	2.726	2.747	2.666	2.726	2.745	4.002	4.032	4.095	3.083	3.113	3.133
Tenure Position (M)	2.589	2.627	2.683	2.601	2.635	2.689	3.777	3.788	3.841	2.964	2.968	3.014
Autonomy	1.377	1.405	1.425	1.646	1.674	1.696	2.825	3.216	3.399	1.972	2.031	2.035
Variety	1.465	1.505	1.519	1.769	1.828	1.837	1.672	1.728	1.762	2.443	2.542	2.599
Significance	1.473	1.473	1.528	1.681	1.681	1.775	3.846	3.866	3.894	2.308	2.370	2.394
Identity	1.250	1.273	1.358	1.292	1.313	1.389	2.301	2.459	2.473	1.590	1.617	1.624
Feedback	1.552	1.571	1.586	1.754	1.804	1.815	3.314	3.459	3.465	2.186	2.321	2.327
Structural Holes		1.148	6.371		1.189	6.120		1.492	6.193		1.724	6.059
Str. Holes High Craft			3.275			3.269			3.568			3.080
Str. Holes Low Craft			3.548			3.329			3.408			3.006

TABLE XXIV – Paper 2: Multicollinearity Diagnostics – Variance Inflation Factors in Regressions Predicting Job Crafting and Performance

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Gender	1.041	1.112	1.234	1.306	1.383	1.610
Age	1.509	1.522	1.804	1.923	1.964	2.564
Tenure Organization (Y)	3.162	3.164	3.748	2.971	3.002	4.160
Education	1.299	1.401	1.680	1.372	1.381	1.778
Tenure Position (M)	2.744	2.778	3.192	2.652	2.692	3.297
Specialization				1.577	1.611	1.998
Autonomy				2.016	2.118	2.412
Variety				1.974	2.017	2.251
Significance				2.018	2.125	2.335
Identity				2.257	2.657	3.314
Feedback				2.185	2.238	2.500
Identity ^{2}				1.956	2.034	2.196
Betweeness		1.414	1.606		1.770	1.982
Eigenvector		1.273	2.060		2.287	4.298
Network Autonomy			1.637			1.947
Network Variety			1.483			1.622
Network Significance			1.483			2.268
Network Identity			2.335			2.814
Network Identity ^{2}			1.275			1.378
Network Feedback			2.169			2.894

	Model 1	Model 2	Model 3	Model 4	Model 5
Gender	1.275	1.291	1.291	1.293	1.294
Age	1.664	1.664	1.682	1.666	1.683
Tenure Organization (Y)	3.114	3.123	3.957	3.439	3.966
Education	2.237	2.331	2.595	2.343	2.632
Tenure Position (M)	2.760	2.904	3.033	2.992	3.049
Network Autonomy	2.020	2.117	2.120	2.142	2.169
Network Variety	2.697	2.703	2.865	3.623	3.638
Network Significance	1.619	1.834	1.854	1.854	1.919
Network Identity	2.401	2.401	2.534	2.401	2.584
Network Identity ^{2}	2.371	2.500	2.764	2.516	2.793
Network Feedback	1.950	2.180	2.180	2.273	2.303
Betweeness	2.113	2.466	6.029	4.094	6.135
Eigenvector	1.827	2.226	2.241	3.397	4.067
Job Crafting		1.906	2.071	2.001	2.083
Job Crafting x Betweeness			4.378		6.083
Job Crafting x Eigenvector				4.790	6.657

show low VIF and lack of multicollinearity concerns. Despite the fact that job characteristic variables are correlated with each other in all four different methods used to measure them, there are no substantial problems. Among the four measures used to operationalize the job characteristics, the self-report measures show the best results while the supervisory evaluations are comparatively the worst. In the regressions predicting job crafting, the two structural hole variables constructed on alters' characteristics do not show particular problems, although the overall structural hole variable shows moderate-high variance inflation factors when the two other variables are included in the equation. Often the studies of interaction show multicollinearity concerns which can be alleviated through mean centering but this option makes no sense in the case of this study because the interaction between alters' crafting and individual structure was not computed through the multiplicative term.

The table with the regression results predicting job crafting in Paper 2 also shows VIF below the suggested threshold of acceptability. The network job characteristic show rather adequate values as well as the centrality indicators. Only in the last case of the full model in which all variables are simultaneously input into the equation, does eigenvector centrality show a VIF equals to 4.2, higher than the others but still below the level for being problematic. It is important to acknowledge that in Paper 2 I explain that the full model is not the best one to identify the possible effect of centrality indicators on job crafting. Table XXIV also shows the results of the regressions predicting individual performance. Even in this case, we can see that there are no substantial collinearity concerns. Each of the equations considering betweenness or eigenvector shows that the interaction term is adequate. Only in the case in which both interaction terms are simultaneously included in the equation does the VIF of these terms exceed 6. However, this finding is not particularly problematic. It was hypothesized in Paper 2 that centrality interacts with job crafting in the prediction of performance. It was then hypothesized that both betweenness and eigenvector would exercise a similar interactive effect and therefore that each of them would combine with job crafting to predict performance but *not* that each of them would exercise a unique and independent predictive role. The theory is that centrality interacts with job crafting in the prediction of performance and that this effect can be seen considering

betweenness or eigenvector but not necessarily considering them together. It is therefore not a particular problem if they interfere with each other when they are simultaneously considered in the equations. It is important however that each of them does not show multicollinearity when it is separately considered in the equations. As a whole therefore, it can be argued that multicollinearity does not represent a serious concerns for the analyses of the thesis. Only in the case of one hypothesis in the thesis is there a VIF level which exceeds the threshold for moderate concerns but not for severe concerns. Mehra et al. (2001: 135) note that multicollinearity among network variables is often a concern although they acknowledge that this "tends to inflate the standard errors of the regression coefficients, making it more difficult to obtain significant values, but the inflation of standard errors does not affect the validity of any significant results that are found". They cite Darlington (1990: 130) who recognizes that a significant value for a beta coefficient in a regression "is just as conclusive when collinearity is present as when it is absent".

QUESTIONNAIRE

First and Last Name:

_____

Please, list the first and last names of the persons in the company with whom you have been REGULARLY exchanging information about work related issues **FOR AT LEAST SIX MONTHS**, and indicate the frequency of interaction based on the following scale:

1 = once a month or less	2 = once a week	3 = several times a week	4 = once a day	5 = several times a day

First Name and Last Name	Frequency
	1 2 3 4 5
	1 2 3 4 5
	1 2 3 4 5
	1 2 3 4 5
	1 2 3 4 5
	1 2 3 4 5
	1 2 3 4 5
	1 2 3 4 5
	1 2 3 4 5
	1 2 3 4 5
	1 2 3 4 5
	1 2 3 4 5
	1 2 3 4 5
	1 2 3 4 5
	1 2 3 4 5

	1	2	3	4	5
	1	2	3	4	5
	1	2	3	4	5
	1	2	3	4	5
	1	2	3	4	5

Please, list now the first and last names of the other persons in the company, if any, with whom you have started to REGULARLY exchange information about work related topics **LESS THAN SIX MONTHS AGO**, and indicate the frequency of interaction based on the following scale:

1 = once a month or less	2 = once a week	3 = several times a week	4 = once a day	5 = several times a day

First Name and Last Name		**Frequency**			
	1	2	3	4	5
	1	2	3	4	5
	1	2	3	4	5
	1	2	3	4	5
	1	2	3	4	5
	1	2	3	4	5
	1	2	3	4	5
	1	2	3	4	5
	1	2	3	4	5
	1	2	3	4	5
	1	2	3	4	5
	1	2	3	4	5
	1	2	3	4	5
	1	2	3	4	5
	1	2	3	4	5

Please describe your job based on its PRESCRIBED FORMAL REQUIREMENTS:

Prescribed Formal requirements are your assigned duties, the responsibilities specified in your job description, what would be formally expected that anyone do in your position.

	1 = completely disagree	2 = somewhat disagree	3 = neither disagree nor agree	4 = somewhat agree	5 = completely agree
The job gives me the chance to use my personal initiative or judgment in carrying out the work	1	2	3	4	5
The job allows me to make a lot of decisions on my own	1	2	3	4	5
The job provides me with significant autonomy in making decisions	1	2	3	4	5
The job involves a great deal of task variety	1	2	3	4	5
The job involves doing a number of different things	1	2	3	4	5
The job involves performing a variety of tasks	1	2	3	4	5
The job requires the performance of a wide range of tasks	1	2	3	4	5
The results of my work are likely to significantly affect the lives of other people	1	2	3	4	5
The job itself is very significant and important in the broader scheme of things	1	2	3	4	5
The job has a large impact on people outside the organization	1	2	3	4	5
The work performed on the job has a significant impact on people outside the organization	1	2	3	4	5
The job involves completing a piece of work that has an obvious beginning and end	1	2	3	4	5
The job is arranged so that I can do an entire piece of work from beginning to end	1	2	3	4	5
The job provides me the chance to completely finish the pieces of work I begin	1	2	3	4	5
The job allows me to complete the job I start	1	2	3	4	5
The work activities themselves provide direct and clear information about the effectiveness (e.g. quality and quantity) of	1	2	3	4	5

my job performance					
The job itself provides feedback on my performance	1	2	3	4	5
The job itself provides me with information about my performance	1	2	3	4	5
The job is highly specialized in terms of purpose, tasks, or activities	1	2	3	4	5
The tools, procedures, materials, and so forth used in this job are highly specialized in terms of purpose	1	2	3	4	5
The job requires very specialized knowledge and skills	1	2	3	4	5
The job requires a depth of knowledge and expertise	1	2	3	4	5
On the job, I frequently communicate with people who do not work for the same organization as I do	1	2	3	4	5
Unless my job gets done, other jobs cannot be completed	1	2	3	4	5
My job cannot be done unless others do their work	1	2	3	4	5

Please, indicate the degree to which each of the statements below characterized your behavior OVER THE LAST SIX MONTHS:

1 = strongly disagree	2 = somewhat disagree	3 = neither agree nor disagree	4 = somewhat agree	5 = strongly agree

I introduced new approaches on my own to improve my work	1	2	3	4	5
I instituted on my own new tasks that are more effective	1	2	3	4	5
I chose on my own to do more tasks than prescribed in my formal job	1	2	3	4	5
I changed on my own how my job was executed to be more effective	1	2	3	4	5
I changed minor work tasks that I thought were not productive on my own	1	2	3	4	5
I chose on my own to do different tasks than prescribed in my formal job	1	2	3	4	5
On my own, I changed the way I do my job to make it easier to	1	2	3	4	5

myself

On my own, I eliminated redundant or unnecessary tasks	1	2	3	4	5
I chose on my own to do more simplified tasks than prescribed in my formal job	1	2	3	4	5

Please, indicate the degree to which you agree or disagree with the following statements: (*items only measured in Organization 1 – Not used in the thesis*):

	1 = strongly disagree	2 = somewhat disagree	3 = neither agree nor disagree	4 = somewhat agree	5 = strongly agree
There is a good fit between what my job offers me and what I am looking for in a job	1	2	3	4	5
The attributes that I look for in a job are fulfilled very well by my present job	1	2	3	4	5
The job that I currently hold gives me just about everything that I want from my job	1	2	3	4	5
The match is very good between the demands of my job and my personal skills	1	2	3	4	5
My abilities and training are a good fit with the requirements of the job	1	2	3	4	5
My personal abilities and education provide a good match with the demands that my job places on me	1	2	3	4	5

Please rate the characteristics of the subunit in which you are working.

By subunit we mean your group of employees working for the same supervisor

	1 = strongly disagree	2 = somewhat disagree	3 = neither agree nor disagree	4 = somewhat agree	5 = strongly agree
My subunit has significant autonomy in determining how to do the tasks	1	2	3	4	5
My subunit can decide on its own how to go about doing the work	1	2	3	4	5

My subunit has considerable opportunity to independence and freedom in how to do the tasks	1	2	3	4	5
My subunit knows exactly what is expected from it	1	2	3	4	5
My subunit knows which its responsibilities are	1	2	3	4	5
Explanations from outside the subunit are clear on what has to be done by the subunit	1	2	3	4	5

Please, indicate the degree to which each of the statements below characterized the behavior of ALL THE MEMBERS of the subunit together OVER THE LAST SIX MONTHS:

(items only measured in Organization 1, not used in the thesis):

1 = strongly disagree	2 =somewhat disagree	3 = neither agree nor disagree	4 = somewhat agree	5 = strongly agree

The members together introduced new approaches to improve the work of the subunit	1	2	3	4	5
The members together instituted new tasks that are more effective	1	2	3	4	5
The members together chose to do more tasks than expected in the subunit's formal mandate	1	2	3	4	5
The members together changed how tasks were executed to be more effective	1	2	3	4	5
The members together changed minor work tasks that they thought were not productive	1	2	3	4	5
The members together chose to do different tasks than expected in the subunit's formal mandate	1	2	3	4	5
The members together changed the way they do their tasks to make them easier	1	2	3	4	5
The members together eliminated redundant of unnecessary tasks	1	2	3	4	5
The members together chose to do more simplified tasks than expected in the subunit's formal mandate	1	2	3	4	5

Please rate the performance of your subunit in the last six months:

We remind you that performance evaluations will remain strictly confidential

	1 = not at all	2 = not much	3 = averagely	4 = very much	5 = exceptionally					
How well do you think your subunit performs?						1	2	3	4	5
How effective is your subunit?						1	2	3	4	5
How effective is your subunit at getting things done quickly?						1	2	3	4	5
How efficient is your subunit?						1	2	3	4	5

Please, indicate the degree to which you agree or disagree with the following statements:

	1 = strongly disagree	2 = somewhat disagree	3 = neither agree nor disagree	4 = somewhat agree	5 = strongly agree					
Members of my subunit have great confidence that the team can perform effectively						1	2	3	4	5
My subunit can take on nearly any task and complete it						1	2	3	4	5
My subunit has a lot of team spirit						1	2	3	4	5
I am very satisfied to work in my subunit						1	2	3	4	5
I am very happy to work in my subunit *(items measured only in organization 1)*						1	2	3	4	5

Concluding Questions:

Job Title: _____

Age: ____

Number of Years of Tenure in this Company: ____

Number of Months in Current Position: ____

Number of Months Working with the Current Team ____

School Degree:_____

Degree's Field of Specialization:_____

THANK YOU FOR YOUR COOPERATION