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Behavioural operations in healthcare. A knowledge sharing perspective

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Behavioural Operations in Healthcare. A Knowledge Sharing Perspective

1. Introduction

Knowledge sharing among employees is receiving increased attention in Operations Management (OM) studies (Siemsen et al., 2008, 2009; Letmathe et al., 2012; Li et al., 2014) since it has been shown to trigger innovation in the operations and to enable superior organizational performances (He and Wong,2004; Fugate et al.,2009; Silva et al., 2014). These positive effects are more evident–and thus more critical–in knowledge-intensive service work environments, where employees are required to systematically adapt and change their current work practices to satisfy the "always different" needs of each customer (Den Hertog, 2000). Front-line service workers–such as call-centre operators, repair technicians, airline crews, fire fighters, police officers, teachers, and healthcare professionals–face day-by-day the challenge of delivering value for the customers in a context characterized by time pressure, unpredictability of the workload, front-line contact with customers, and reliance on others for information and supplies (Tucker and Edmondson,2003). In such work settings, employees' knowledge represents the major driver for improving current practices (Den Hertog, 2000).

Although operations managers realize the importance of knowledge sharing for innovation, initiatives formulated to promote knowledge sharing often fail due to employees' indifference or aversion (Shah and Ward,2003; Siemsen et al., 2008). Accordingly, studies have diffusedly employed psychological and behavioural models to understand when and why employees engage in knowledge sharing behaviours (Bock et al., 2005; Siemsen et al., 2009).

While these studies significantly strengthened the theory and practice of behavioural operations, two issues still limit our understanding of the antecedents of knowledge sharing and its consequences on the innovation of current operations. First, knowledge sharing should not be considered as an indistinct behaviour, since it differs according to the "type" of knowledge to be shared. Huy et al.(2010) posited that sharing best practices, sharing mistakes and searching for feedbacks represent three distinct knowledge sharing

behaviours which greatly differ in terms of individual-level triggers (antecedents) and outcomes (consequents). More research is needed to develop this argument further in the context of behavioural operations; particularly to understand whether these three knowledge sharing behaviours play a different role in affecting innovation and/or are triggered by distinct factors. Second, the role of knowledge assets in eliciting knowledge sharing and individual innovation remains unclear. Knowledge assets represent the knowledge, skills and abilities that are available to the individual via codified procedures, databases and evidence-bases (*organizational capital*) and via the tacit knowledge accessed through social interactions with coworkers, or clients (*social capital*) (Nahapiet and Ghoshal, 1998; Bontis, 2001). Empirical evidence is needed to understand whether and how these knowledge assets increase employees' engagement in knowledge sharing behaviours and in the innovation of current operations. Clarifying the mechanisms linking knowledge assets to knowledge sharing behaviours and individual innovation can help operations managers to better engage employees in innovating daily operations.

Against this background, our study develops an empirical model to test whether different knowledge sharing behaviours– i.e. sharing best practices, sharing mistakes and seeking feedbacks–(1) differently affect employees' innovative work behaviours, and (2) are promoted and enabled by different types of knowledge assets.

The locus of this work is the specific context of Hospice and Palliative Care Organizations (H&PCOs), which deliver compassionate, multi-speciality and high-quality care to dying cancer patients. H&PCO operations have peculiar complexities, since patients' care cannot be fully standardized, and healthcare professionals must be ready to adjust, adapt and even radically change the operations to meet patients' needs. H&PCO managers are then pressed to implement initiatives that attract, integrate and exploit valuable expert knowledge dispersed in the organization. To this end, H&PCOs' executives and healthcare professionals have great need for insights from OM scholars, concerning effective strategies for improving current work practices and thus performance (Boyer and Pronovost, 2010).

Within this research setting, we conducted a survey of three H&PCOs and tested our theoretical model using Structural Equation Modelling analysis.

Our results offer two advancements in behavioural operations management. First, we

specify different mechanisms through which knowledge assets affect knowledge sharing and innovative work behaviours. In particular, we highlight the mediation role played by psychological safety, i.e. employees' perception that the immediate social environment is safe for interpersonal risk-taking (Edmondson, 1999).

Second, three different dimensions of knowledge sharing–sharing best practices, sharing mistakes and seeking feedbacks–have differentiated effects on employees' propensity to generate, promote and implement innovations in the operations. While sharing best practices influences all three innovative behaviours, seeking feedbacks exclusively affects idea promotion, and sharing mistakes specifically influences idea implementation.

Our results are relevant to practice as they encourage healthcare operations managers to foster the creation of numerous, high quality interpersonal relationships among employees, based on rich and cohesive network ties, as they represent significant antecedents of all knowledge sharing behaviours (sharing mistakes, seeking feedback, idea promotion).

2. Research Framework and Hypotheses

Our research framework consists of three building blocks: employees' innovative work behaviour, knowledge sharing, and knowledge assets. This section details each block and proposes hypotheses that link employees' knowledge sharing to their innovative work behaviour, and knowledge assets to employees' knowledge sharing behaviours, with the mediation of psychological safety (Figure1).

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Figure1

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2.1 Innovative Work Behaviour (IWB)

IWB represents the "intentional creation, introduction and application of new ideas within a work role, group or organization, in order to benefit role performance, the group or the organization" (Janssen, 2000, p.288). IWB is the combination of three behaviours:

(1) *idea generation*, i.e. the development of novel ideas to solve problems or exploit opportunities; (2) *idea promotion*, i.e. the search for potential allies to support the innovative idea; and (3) *idea implementation*, i.e. the application of the innovative idea in the real-life context of the organization (Scott and Bruce, 1994; Janssen,2000; de Jong and den Hartog, 2010). Accordingly, employees engaged in the generation, promotion *and* implementation of new solutions for scheduling, purchasing or service operations are characterized by high degrees of IWB.

Past research has already focused on factors associated with employees' *willingness* to innovate–e.g. intrinsic motivation and self-efficacy; and with the *opportunities* provided by in-job tasks–e.g. job demands, autonomy and workload (Scott and Bruce, 1994; Janssen, 2000; Carmeli et al.,2005). While significant, these factors do not comprehensively explain why some individuals are more innovative than others. Motivated employees may still struggle to exploit the opportunity of their work and display innovative behaviours.

In this research, we suggest that two factors should be added: (1) individuals' involvement in knowledge sharing activities, and (2) individuals' exploitation of organizational knowledge assets.

On one hand, the generation, promotion and implementation of new ideas involve the alternation, use and incorporation of knowledge in processes and products (Nonaka and Takeuchi, 1995). Individuals' propensity to share knowledge thus is a relevant step for building higher capacity to intervene in the innovation process. Notably, despite a diffused recognition that the possession and sharing of knowledge is relevant for innovation purposes at firm level (Nahapiet and Ghoshal, 1998; Crossan and Apaydin,2010), only few contributions have substantiated this claim at the individual level (Radaelli et al., 2011, 2014).

On the other hand, the ability of an organization to innovate is strictly related to its ability to store and use its knowledge assets (Nonaka and Takeuchi, 1995; Kang et al., 2007). While studies have shown that organizations' capacity to absorb new knowledge is closely associated to its knowledge stocks (Cohen and Levinthal, 1990; Helfat, 1997), the link between knowledge assets and innovation at the employee level of analysis still needs to be explored.

Building on this premise, we now detail how employees' knowledge sharing affects their propensity to generate, promote and implement new ideas; and how three knowledge assets–i.e. *organizational capital*, *structural social capital* and *relational social capital*– influence knowledge sharing behaviours with the mediation of psychological safety.

2.2 Knowledge Sharing and IWB

The capacity to store, recombine and mobilize knowledge represents an important condition for the generation, promotion and implementation of new ideas, at any level of analysis (Kogut and Zander, 1992; Rodan and Galunic, 2004; Lopez-Cabrales et al., 2009). At the individual level, employees face multiple occasions in which they manage knowledge and may come up with stimuli to innovation. One key occasion is knowledge sharing, i.e. the communication of task-relevant ideas, information, and suggestions with colleagues within their organization (Srivastava et al., 2006). Here we claim that individuals who are more actively involved in knowledge sharing efforts display stronger innovative work behaviours in their job.

Two reasons substantiate this claim. First, when sharing knowledge, individuals mobilize, interpret and re-elaborate and re-interpret their ideas, information and suggestions to fit recipients' interests and understanding. These activities can be instrumental to discover new ways to use existing knowledge (Radaelli et al., 2014). Particularly, employees *generate new ideas* in their workplace by recombining three tokens of knowledge: evidence of best practices; experiences of and lessons from past mistakes; and situation-specific feedbacks gained when interacting with co-workers or clients (Grol and Grimshaw, 2003; Cannon and Edmondson, 2005). Thus, sharing best practices, sharing mistakes and seeking feedbacks represent distinct occasions for idea generation–i.e. the re-thinking and recombination of these pieces of information might suggest new uses (Huy et al., 2010).

Second, knowledge sharing efforts also represent occasions for individuals to engage in social exchanges with their colleagues. Drawing from the Social Exchange Theory, several authors highlighted the role played by the "norm of reciprocity" in knowledge sharing, i.e. individuals engage in this social exchange with an expectation that knowledge recipients would reciprocate their effort in the future (Dirks and Ferrin, 2001;

Chiu et al., 2006). By stimulating recipients' sense of indebtedness, knowledge sharers can then be expected (i) to receive more unique and valuable knowledge, which contributes to the *generation* of new ideas; (ii) to find more potential allies that would provide practical support to *idea promotion* and *implementation.* While best practices, mistakes and feedbacks are forms of knowledge particularly valuable for innovation, earlier research suggests that best practices are particularly valued by recipients and hence most likely to engender norms of reciprocity (Smith et al., 2005; Watson and Hewett, 2006). Mistakes are instead more controversial pieces of information, since recipients may fail to appreciate their utility, use them opportunistically, or underestimate the value of the sharer (Cannon and Edmondson, 2001; 2005). Likewise, seeking feedbacks might trigger less reciprocity from recipient. This behaviour already incorporates short-term social exchanges with recipients, so it might be less effective to engender any further reciprocity (Ashford et al., 2003).

Based on these arguments, we suggest that all three forms of knowledge sharing have positive impacts on each form of IWB–possibly with different strength. So, we hypothesise:

H1 Employee's knowledge sharing positively affects their innovative work behaviour.

2.3 Psychological Safety, Knowledge Sharing and IWB

IWBs expose employees to important organizational and interpersonal risks because they challenge established practices and operations, which might have consolidated into taken-for-granted routines, and be protected by interested cadres of organizational actors (McNulty and Ferlie, 2004; Currie et al., 2012). Employees seeking to modify practices and operations might thus face negative reactions from the organization, via open resistance, ridicule or indifference (Sonenshein, 2010). In such cases, employees' organizational status, prestige and career prospects might be disadvantaged. Consequently, employees need to carefully assess whether the risks and rewards from their engagement. The theory of approach-avoidance behaviours suggests that employees are guided by an 'approach system', which attracts them toward behaviours that might reward them, but are also guided by mechanisms of heightened vigilance towards threats and punishments (i.e. an avoidance system) (Smith and Bargh, 2008). One mechanism of

vigilance relates to psychological safety, i.e. individuals' belief that their immediate social environment is safe for interpersonal risk taking (Edmondson, 1999). Individuals that perceive low levels of psychological safety in their social context are likely to disengage from behaviours that might attract opportunistic or foul behaviours from colleagues (May et al., 2004). Idea promotion and implementation can be high-risk behaviours, since employees connect with co-workers and managers to explain and apply their ideas–and thus they openly expose their challenging of the status quo, and directly negative reactions from the organization (Katz and Allen, 2007). To avoid this risk, employees might thus decide to remain wedded to the status quo, and replicate current operations (McNulty and Ferlie, 2004; Currie et al.,2012). Accordingly, it can be argued that employees are more likely to promote and implement new ideas when they become more confident that high psychological safety is in place.

Similar considerations extend to idea generation. Ideas can be generated in 'isolation' or within the social contexts of inter-professional collaborations, brainstorming groups or project teams (Girotra et al., 2010). The former may be immune to social influences if employees avoid interactions with others; most often, however, employees innovate in collaboration with others and constantly assess psychological safety, up to the point of disengaging from idea generation to minimize interpersonal risks (Wang and Noe, 2010). Following these arguments, we hypothesise:

H2 Employees' perception of psychological safety positively affects their innovative work behaviour

Similar observations can be extended to knowledge sharing. Knowledge sharing is also a risk-taking behaviour, which is embedded in social interactions, and from which employees often disengage when they anticipate recipients' opportunistic behaviours (Siemsen et al., 2009; Yam and Chan, 2015). With regard to the sharing of best practices, previous research noted that recipients might perceive this behaviour as an attempt to 'intrude' in their decision-making, and thus could dismiss the shared knowledge through claims of inappropriateness, "reinventing the wheel" or "not invented here" (Currie et al., 2008; Oborn and Dawson,2008). So, potential knowledge sharers need to carefully assess the psychological safety of their environment before committing to this behaviour

Similarly, sharing mistakes and seeking feedbacks are risk-taking behaviours because they could expose 'weaknesses' and problems of the sharer (Huy et al., 2010). By sharing their own mistakes, individuals may expose themselves to "who's to blame?" criticisms, ridicule, stigma and scepticism – and, ultimately, to negative consequences in their daily work (Cannon and Edmondson, 2001; 2005). Similarly, the search for feedbacks may expose the individual to unexpected criticism and doubts about his/her competence; and the request may annoy the recipient. As such, all forms of knowledge sharing require vigilance from employees, who can be expected to share best practices, mistakes and feedbacks only when psychological safety is high. So, we hypothesise:

H3 Employees' perception of psychological safety positively affects their knowledge sharing behaviour

2.4 Knowledge Assets, Knowledge Sharing and Psychological Safety

Past research investigated how knowledge assets might contribute to innovation by supporting knowledge management activities and the establishment of a positive climate in the social context (Davenport and Prusak, 2000). Two forms of knowledge assets have in particular attracted research attention, i.e. organizational capital and social capital.

Organizational capital refers to the codification and systematization of knowledge through databases, patents, manuals and the like (Youndt et al., 2004). Social capital refers instead to the knowledge assets made available through social relationships that span boundaries, and through which the individual can draw upon and benefit (Payne et al., 2011). Altogether, they represent two aspects that managers and employees can control: the codification of knowledge and the network of acquaintances in which social interactions occur.

Regarding organisational capital, scholarly attention sought to understand whether or not the codification and systematization of knowledge through databases, patents, manuals etc. really facilitates knowledge sharing (Wang and Noe, 2010). Past research provides a few theoretical arguments in support of a positive link, highlighting the fact that codified knowledge makes knowledge sharing easier to perform because it eliminates the 'stickiness' that tacit knowledge always carries with itself (von Hippel, 1994). At the same time, it has been questioned to which extent codified knowledge can play a

significant role in the sharing of complex knowledge, where the tacit component is dominant and often irreducible to codification (Sternberg and Horvath, 1999). Although evidence on these aspects is not definitive, past research suggests that organizational capital supports the exchange of knowledge by rendering the "objects" of such exchange (i.e. ideas, information, etc.) more amenable to be accessed and shared with others (Ancori et al., 2000; Anand et al., 2010).

In order to disentangle the role of organizational capital on the three different knowledge sharing behaviours, we will test the following hypothesis:

H4 Employees' perception of organisational capital positively affects their knowledge sharing behaviour

Regarding social capital, past research distinguishes between *structural social capital* (i.e., the "impersonal configuration of linkages between people or units, Nahapiet and Ghoshal, 1998, p.244) and *relational social capital* (i.e., the dyadic nature of interaction between individuals, in terms of interpersonal trust and mutual identification, Li et al., 2014). Altogether, they represent the width and strength of the ties that connect individuals in a social network, and carry valuable tacit knowledge.

In relation to structural social capital, past research suggests that, as the personal network of social acquaintances expands, individuals become less likely to enact threats and perform opportunistic behaviours (Trevino et al., 2006). In larger cohesive networks, employees' behaviours become visible to more people, and thus (i) opportunistic behaviours are more likely to be identified, reported and sanctioned; and (ii) socially relevant behaviours are more likely to be recognized and rewarded (Burt, 2001). Consequently, large cohesive social networks tend to develop a "generalized trust" based on norms of reciprocity and shared psychological safety. Individuals embedded in such social environments tend to be tolerant of mistakes and to perform socially principled behaviours as they share fears of sanction and prospects of rewards, (Kale et al., 2000; Bock et al., 2005).

It follows that employees might be more likely to perceive greater psychological safety when part of larger networks of social interactions. We thus hypothesise:

H5 Employees' perception of structural social capital positively affects their perception

of psychological safety

Differently, relational social capital represents affective ties in which the connected individuals share mutual identification and interpersonal trust (Makela and Brewster, 2009). Close affective relationships are valuable for all parties involved, because each actor is more willing to dedicate time and effort to sustain the relationship and to accept norms of reciprocity (Moran, 2005; Jha and Welch, 2010). Close relationships also make aggressive and opportunistic behaviours easier to be identified, since relational closeness allows employees to have more time and more 'in-depth' observations of others' action (Ferris et al., 2003; Carmeli, 2005). It follows that employees embedded in relationships with greater relational social capital tend to feel more 'protected', since the chance that other parties would be willing to perform opportunistic behaviours is inferior. This leads us to the following hypothesis:

H6 Employees' perception of relational social capital positively affects their perception of psychological safety

Structural social capital has also a distinguishable contribution on fostering knowledge sharing behaviours. Previous research argued that the structural social capital is valuable for individuals since it makes more resources accessible and available to attain their goals (Oh et al., 2004; Kang et al.,2007). Cohesive and redundant ties are helpful in the transmission of tacit knowledge for three reasons. First, in larger cohesive network, individuals have more potential knowledge recipients, and thus they are more likely to find somebody relevant, for, and interested in, their knowledge sharing (Hansen, 1999). Second, greater visibility of employees' action within the organization fosters reputational mechanisms, i.e. it becomes more relevant for employees to perform socially relevant behaviours that could gain them more prestige and status (Burt,2001). Third, the greater visibility of employees implies that negative behaviours such as knowledge hoarding are more likely to be identified, and sanctioned, and then less likely to be performed (Hansen, 1999).

Taken together these considerations, we suggest that employees in broader cohesive networks are more likely to find and pursue short-term and long-term rewards through

knowledge sharing; and to find and avoid interpersonal risks linked to knowledge sharing. Accordingly, we posit the following hypothesis

H7. Employees' perception of structural social capital positively affects their knowledge sharing behaviour.

Relational social capital is characterized by three properties–trust, personal obligations, and mutual identification (Nahapiet and Ghoshal, 1998)–that support the emergence of strong norms of reciprocity between individuals (Hite, 2005; Jha and Welch,2010). These properties discourage the occurrence of opportunistic or deviant behaviours that may break a strong tie, as well as encourage altruistic behaviours that can empower it. So, individuals tend to attribute value to occasions for sharing knowledge with trusted individuals, than to those for sharing with less trusted individuals (Moran, 2005; Nahapiet and Ghoshal, 1998). In addition, the time and opportunity that each party spends on the relationship makes knowledge sharing both easier and more advantageous. For these reasons, strong ties appear supportive of any typology of knowledge sharing, and are particularly adept to foster risk-taking behaviours such as sharing mistakes and seeking feedbacks since risk sources are neutralized by the three aforementioned property of the relationship. Accordingly, we hypothesise:

H8. Employees' perception of relational social capital positively affects their knowledge sharing behaviour.

Overall, Figure 2 provides a comprehensive view of the proposed hypotheses.

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Figure2

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3. Methods

We collected data through a survey on three Italian hospice and palliative care organisations (H&PCOs). We chose palliative care as research setting because of the

multidisciplinary approach needed to take care of this kind of patients. Selected H&PCOs are largely recognised by peers as high quality providers. They are all located in the North-western regions of Italy and they are comparable in terms of size (number of beds and healthcare professionals), organisational structure, type service delivered, and management practices. All three H&PCOs are not-for-profit organisations and provide home-based and hospice-based care. These organizations are characterized by lower degrees of hierarchy than traditional hospitals. The need to offer compassionate care to dying cancer patients (and their families) whose life expectancy is lower than two weeks creates an organisational context in which formal authority leaves the floor to humanity and creativity. Professionals, regardless of their specialisation, work as equal peers with the main goal of identifying the operations that fit better with each patient and her relational environment. Since there are not predefined or dominating solutions, teams discuss openly different strategies regardless of who is the proponent. Health professionals rotate frequently between the two types of services to promote knowledge and best practices sharing. Within all three of the H&PCOs, meeting among professionals are arranged–on average–twice a week. These meetings among different professionals are used to review performance, set targets, share relevant information on patients and in-work experience of caregivers.

Since the unit of analysis were individual professionals, all data came from primary sources. Control variables were also collected from respondents, and double-checked using secondary sources of information. The survey was conducted from March to April 2011. Professionals involved in the research included physicians, psychologists, physiotherapists, nurses and other healthcare operators. Administrative staff was not included in our survey since they do not participate in H&PCO core activities. We delivered questionnaires to a total of 226 professionals. 201 questionnaires were returned, but 6 were considered unusable and thus discarded, resulting in an effective 86.2% response rate. Table1 reports sample characteristics.

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Table1

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3.1 Measures

All constructs were measured using multiple-item scales, adapted from previous studies. All scale items are provided in Appendix.

Structural social capital (composite reliability = .852) was measured by four items adapted from Tsai and Ghoshal (1998) and Subramaniam and Youndt (2005). These items measured the multiple connections among employees within the same organization and, possibly, with other organizations. *Relational social capital* (composite reliability = .886) was measured by a four-item scale adapted from Kale et al. (2000) and Wasko and Faraj (2005). This scale captures close interpersonal interactions, trust, and friendship among employees.

Organizational capital (composite reliability = .935) was measured by a four-item scale adapted from Subramaniam and Youndt (2005). The scale gauges the degree to which individuals perceive that their organisation appropriates and stores knowledge in physical organisation-level repositories such as databases, manuals and protocols.

The three constructs constituting the knowledge sharing block–sharing best practices (composite reliability = .866), sharing mistakes (composite reliability = .835) and seeking feedbacks (composite reliability = .882)–were measured by a four-item scale each drawn from Huy et al. (2010). They represent the extent to which individuals share their best practices or mistakes with co-workers, or seek feedbacks from others.

Finally, three separate constructs–idea generation, idea promotion and idea implementation (composite reliabilities: .881, .802 and .843 respectively)–were considered to capture the dimensions of innovative work behaviour. Items for these constructs were drawn from de Jong and den Hartog (2010) and indicate the extent to which individuals are creative and develop new ideas, promote them with and seek endorsement from co-workers, and seek to implement them within their organisation's routines.

To enhance our understanding of the context in which the constructs were investigated and, subsequently, to refine the wording of our questions, we conducted face-to-face interviews with personnel from one of the organisations involved. Next, the scales were pre-tested on faculty members of two universities, who reviewed the questionnaire and

commented on the length and clarity of each scale item. A final version of the questionnaire was then pilot-tested using a group of 48 individuals from one of the organizations involved in the study. These individuals were chosen because they were considered representative of the target population of our survey in terms of professional role and expertise. This pilot study dataset was used to calibrate and refine our measures, and was not included in subsequent empirical analyses. The final questionnaire included 10 scales, for a total of 40 items measured on a 7-point Likert scale. We included several *control variables*, namely: age, gender, professional experience, professional experience in the H&PCO (measured as the natural logarithm of the number of years), professional role and organization (both measured as dummies).

3.2 Analytical Procedures

We first conducted a number of diagnostic tests, taking appropriate corrective measures where needed.

Common Method Variance. Because data were collected from individual respondents in a cross-sectional study, the potential for common method variance (CMV) is a concern (Spector, 2006;). Note, however, that CMV is unlikely to have any substantial impact on our results. Following Podsakoff et al. (2003), we took procedural measures to minimize the impact of CMV by randomizing the sequence of items in the survey, guaranteeing anonymity and confidentiality to respondents, emphasizing that there were no correct or incorrect answers, asking respondents to provide independent and honest answers.

In addition to evaluating the extent to which CMV might influence our empirical findings, we carried out various post hoc tests on the data. First, a Harman's single-factor test was conducted on the ten variables of our theoretical model. The outcome of this test showed that there are ten factors, and that the highest variance accounted for by one factor is 25.3%, indicating minimal evidence of method bias (Harman, 1967). Second, an analysis using a single-method-factor approach advocated by Podsakoff et al. (2003) and by Liang et al. (2007) likewise showed that CMV was not problematic. This approach consists in ascertaining that, after controlling for the effects of an unmeasured latent

method factor in our PLS model; all path loadings of the hypothesized indicators with their respective constructs remain statistically significant[1].

Data Screening. The collected data were screened, and 6 questionnaires discarded as unusable due to incompleteness. This reduced the number of usable questionnaires to 195. In addition, the collected data were screened for univariate and multivariate normality. The results indicate a moderate level of skewness (largest observed skewness: -1.925) and kurtosis (largest observed kurtosis: 6.406). Moreover, the assumption of multivariate normality was not met ($p<0.001$).

Model Estimation Procedures. To test our hypotheses, we estimate the nomological network for which we employed Structural Equation Modelling (SEM) analysis.

SEM techniques are generally divided into two main approaches: covariance-based SEM (Joreskog,1970), and the variance-based SEM approach based on partial least squares (PLS) developed by Wold (1985). Both are second generation data analysis techniques for modelling the relationships between observed indicators and latent variables, and the causal paths between latent constructs. While the use of PLS is relatively less widespread, in recent years there has been increasing interest in its use in numerous OM studies (e.g., Jeffers, 2009;Peng and Lai, 2012; Silva et al., 2014). We also adopted the PLS approach for several reasons. First, PLS does not require assumptions of multivariate normality for the collected data. Also, PLS has been shown to provide higher statistical power than covariance-based SEM when dealing with samples of small or moderate size (Reinartz et al., 2009). The sample size requirement for PLS corresponds to at least ten times the number of indicators for the scale with the largest number of formative (causal) indicators, *or* ten times the largest number of structural paths leading to an endogenous construct in the structural model (Barclay et al.,1995). In this study, the sample size of 195 was sufficiently high for PLS, since there are no formative indicators and the largest number of structural paths leading to an endogenous construct is three. Finally, PLS is

[1] Results available from the corresponding author.

considered to be particularly well-suited for explaining complex relationships (Fornell et al., 1990).

We employed SmartPLS software version 2.0 (Ringle et al., 2005). Since PLS does not require any assumptions about the distribution of the observed variables, to assess the statistical significance of the path coefficients, which are standardized betas, a bootstrap re-sampling procedure (500 sub-samples were randomly generated) was performed (Chin, 1998).

Following Hulland (1999) and Barclay et al. (1995) we analysed our model in two steps. First, we assessed the measurement model and evaluated the convergent validity, discriminant validity and reliability of the model constructs. Second, we evaluated the structural model by examining the size and significance of the path coefficients and the R^2 values of the dependent variables.

4. Results

4.1 Measurement model

The reliability and validity of the measurement model were assessed using PLS procedures. Composite reliabilities and the average variance extracted (AVE) were calculated to assess the reliability and convergent validity of our scales. The results in Table2 showed that the composite reliabilities and Cronbach's alpha coefficients of all scales were above the 0.70 recommended threshold (with one alpha coefficient approaching the acceptability level). Also, the average variances extracted by our measures were all above the 0.50 acceptability level, while all factor loadings were above 0.70 threshold, providing support for convergent validity. Table3 shows, instead, results relevant for discriminant validity. The square root of the average variance extracted for each construct (on the diagonal) was greater than each inter-construct correlation, which provides supports for discriminant validity (Hair et al, 2010). These results suggest that our measures exhibit good psychometric properties.

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Table2

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Table3

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4.2 Structural model

Results from our statistical analysis are reported in Table4. Significant coefficients are displayed in Figure3. Control variables used in this study do not show significant relations, and are therefore not reported[2]. To assess the statistical significance of the path coefficients a bootstrap analysis with 500 repetitions (Chin, 1998) was performed.

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Table4

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Figure3

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Our first set of research hypotheses entails the relationship between knowledge sharing and innovative work behaviour. Our results suggest that idea generation is significantly and positively affected by sharing best practices (β=0.279, $p<0.01$) but not by sharing mistakes or seeking feedbacks. Idea promotion is positively and significantly affected by

[2] The only control variable that shows significant relationships is the professional experience within the H&PCO, is positively related to idea promotion (β=0.266, $p<0.01$) and idea implementation (β=0.211, $p<0.05$). Results suggest that employees with higher professional experience within the organization positively contribute to promote and implement innovations. Additionally, to further explore differences among employees belonging to the three organizations, we employed analysis of variance (ANOVA). These results (available upon request) show that there were not significant differences among employees belonging to the three different organizations. Taken together our results show that our findings are not biased by an organizational-level effect.

sharing best practices (β=0.237, p<0.01) and positively but marginally influenced by seeking feedbacks (β=0.183, p<0.10), whilst no effect was found for the sharing of mistakes. Idea implementation is positively and significantly affected by sharing best practices (β=0.431, p<0.001), and sharing mistakes (β=0.220, p<0.05); while no effect was found for the seeking of feedbacks. Taken together, these results provide partial support to Hypothesis 1.

Hypothesis 2 suggested a positive impact of psychological safety on innovative work behaviour. Our results, however, do not support this claim, thus we conclude that Hypothesis2 cannot be accepted.

Regarding the mediating role played by psychological safety in the social capital–knowledge sharing dimension, our results suggest that psychological safety positively affects seeking feedbacks (β=0.282, p<0.01) and sharing mistakes (β=0.379, p<0.001), but not the sharing of best practices, thus partially supporting Hypothesis 3. Also, both relational social capital and structural social capital significantly affect psychological safety (β=0.566, p< 0.001 and β=0.193, p<0.05, respectively), providing support to our Hypotheses 5 and 6. Taken together, Hypotheses 3, 5 and 6 suggest that psychological safety mediates the relationship between an employee's perception of an organization's social capital and her knowledge sharing behaviour.

The link between an employee's perceptions of organisational capital and her knowledge sharing behaviour was described by Hypothesis 4. Results suggest that organisational capital positively and significantly affects only the seeking feedbacks dimension of our knowledge sharing construct (β=0.217, p<0.05), thus providing partial support for Hypothesis 4. Similarly, Hypotheses 7 and 8 claimed that social capital would exert a positive influence on knowledge sharing behaviour. The only significant relationship was found between the structural dimension of social capital and the sharing of best practices (β=0.201, p<0.05), thus partially supporting Hypothesis7 and rejecting Hypothesis8.

Taken together, our empirical evidence indicates that the relationship between social capital and knowledge sharing is non-mediated for what concerns the sharing of best practices, but fully mediated by psychological safety for what concerns the sharing of mistakes and the seeking of feedbacks.

5. Discussion

The quality of operations often depends on employees' involvement in innovative behaviours, such as generating and proposing changes and participating in their implementation at work. Such involvement is especially salient in professionalized delivery systems where frontline employees have substantive autonomy in decision-making and control of operations. Building upon this premise, this study explored whether the access to knowledge assets is related to higher degrees of IWB, and which role do knowledge sharing and psychological safety play within this relationship.

Our results have three major theoretical implications as they propose: (1) new evidence on the role of knowledge sharing, psychological safety and knowledge assets as antecedents of IWB in operational context; (2) more detailed understanding of knowledge sharing and IWB as multidimensional behaviours; (3) sharper distinction of the mechanisms through which different knowledge assets affect knowledge sharing and IWBs.

First, we find general support to the hypotheses that knowledge assets promote IWB through the mediation of knowledge sharing and psychological safety. Our evidence shows that individuals with higher degrees of knowledge sharing also display greater propensity to innovate their operations. This result adds to existing findings in the field of operations management, according to which knowledge sharing produces favourable conditions *for knowledge recipients* to innovate operations (Modi and Mabert, 2007; Lawson and Potter, 2012). Moving from a different perspective, we suggest that employees might directly benefit from their engagement with knowledge sharing. Our results convey two messages: (1) knowledge sharing can be a convenient strategy of knowledge mobilization for employees' IWB because it embodies social exchanges that make others more willing to reciprocate through new knowledge or other forms of support; (2) knowledge sharing is itself a knowledge recombination mechanism, and stimulates greater capacity to identify, recombine and apply new ideas (Radaelli et al., 2014).

Moving upstream in our model, knowledge sharing appears triggered by knowledge assets and psychological safety. This results connects with existing arguments that actors with greater social and organizational capital are more likely to innovate (Crossan and

Apaydin, 2009). Additionally, we can more specifically suggest that employees' exposure to higher degrees of social and organizational capital (1) increases their propensity to mobilize knowledge assets through knowledge sharing, which creates favourable conditions for IWBs; (2) engenders greater confidence in the psychological safety of the surrounding social context, which creates favourable conditions for knowledge sharing.

The existence of a positive link between social capital and knowledge sharing behaviours is particularly noticeable in professionalized settings. Traditionally, studies in such contexts have indicated that professionals preserve their autonomy and control of operations by limiting their social network, since the exposure to more contacts might allow others to intrude in their decision-making (Currie et al., 2008; Oborn and Dawson, 2010). Our findings are more positive, showing that individuals with greater social capital are indeed more likely to perceive high psychological safety, and be confident to share knowledge. It might then be argued that, even in professionalized contexts where boundaries are highly guarded, broader and more affective social ties increase employees' visibility and introduce more sanctions against opportunistic behaviours, as well as rewards for socially relevant ones.

Second, our findings support the opportunity to break down IWB and knowledge sharing into three dimensions. Regarding IWB, the distinction between idea generation, promotion and implementation is already frequent (de Jong and Den Hartog, 2010). Our findings support the notion that these three behaviours represent separate innovation stages, each involving distinct motivations, capabilities and conditions.

Differently, the distinction of knowledge sharing is relatively new in the literature (Huy et al., 2010). We show that this distinction is indeed important at least to recognize how different IWBs are differently supported by distinct forms of knowledge sharing. Noticeably, previous research has often focused on the sharing of best practice, and struggled to link the sharing of mistakes and the seeking for feedbacks with innovation (Cannon and Edmondson, 2005). While we confirm the importance of sharing best practices (which is indeed the only behaviour related to all IWB dimensions), we also highlight how: (i) sharing mistakes is related to higher idea promotion - which suggests that recognizing and sharing mistakes possibly activates employees' motivation to look

for changes that could prevent them; (ii) seeking feedbacks is related to higher idea implementation, which suggests that the exchange of feedbacks embodies social exchanges used by employees to test the practical utility and use of new ideas.

The results also emphasize that the three forms of knowledge sharing are affected by distinct antecedents. Sharing mistakes and seeking feedbacks, in particular, emerge as high-risks behaviours characterized by heightened vigilance by employees who are affected by psychological safety (which reveals an attention to assess the existence of interpersonal risks) and relational social capital (which embodies interpersonal trust and personal obligations in dyadic interactions). Sharing best practices, on the other hand, is unaffected by psychological safety and relational social capital. This is consistent with the notion that, while sharing mistakes and seeking feedbacks expose flaws or limitations in employees' operations, sharing best practice can be instrumental to affirm employees' status as knowledgeable actors, and to attract rewards from the organization – and thus involve less vigilance to risks.

Finally, combining these local insights, we can clarify the mechanisms through which knowledge assets are related to individual innovation. Structural social capital bears an indirect positive impact on all IWBs, increasing employees' predisposition toward sharing best practices and their perceived psychological safety. This suggests that broadening employees' personal social network can produce greater generalized trust as well as more practical opportunities for employees to find relevant knowledge recipients and allies during the innovation process. Relational social capital appears instead particularly connected to the promotion and implementation of new ideas. This suggests that, during the later stages of innovation, employees with closest and more affective ties are more likely to engage (and succeed) because it is easier for them to find allies and support. The lack of effects on idea generation, on the other hand, appears consistent with the notion that close ties engender conformity and cognitive lock-in effects – and thus employees do not rely on the most affective ties to stimulate their idea generation (Burt, 2001). Finally, access to organizational capital plays a softer role in IWB. In contexts such as H&PCOs, highly complex knowledge cannot be fully reduced to codified texts and expressions; and individuals' embodied experience and expertise are crucial. The importance of tacit knowledge suggests that employees might give less significance to

formal instruments such as databases, manuals and rely more on the mobilization of experiential and practical knowledge embedded in their social interactions. This is suggested, for instance, by literature on 'mindlines' (Gabbay and Le May, 2004), according to which professionalized workers rely primarily "on collectively reinforced, internalised, tacit guidelines [informed] by their own and their colleagues' experience, and their interactions with each other" (p.1013).

6. Managerial Implications

Important innovation at work might come from the "bottom", especially in those processes where employees have most direct control of the operations and possess expert knowledge inaccessible to others. Interventions that foster employees' innovativeness are thus relevant opportunities for managers to trigger continuous improvement of operations.

Our study adds new suggestions on what can be done to foster innovation.

The starting point is the recognition that innovativeness is not exclusively an intrinsic property of the individual–but rather a capability/propensity that can be nurtured. Being innovation a matter of knowledge creation and consolidation, employees' involvement with knowledge sharing is one key behaviour that managers should foster and monitor–not only because the circulation of knowledge creates opportunities for knowledge accumulation and recombination, but also because it is an act of knowledge recombination that fosters creativity and implementation skills and because it creates social obligations that might come in handy for innovation purposes. Fostering and monitoring knowledge brings along sizable issues, though, since it is as difficult to control and mandate as IWB is. Our findings point out to social capital as one relevant lever that can be handled to stimulate knowledge sharing and IWB among employees. Resulting from social construction, wide networks of strong ties cannot be mandated and controlled from the top-managers cannot in fact have full control of the interpersonal relationships among individuals in a given social context.

Some initiatives can be taken into account. Two interventions stood out during close observations of the H&PCOs–both in terms of effectiveness and parsimony. First, the

introduction of systematic *meetings*–within and across teams–had significant success among employees. Meant to discuss relevant cases and have weekly updates on team operations (within-team meetings) or meant to discuss key issues in H&PCO management and coordinate the work of different teams (plenary meetings), meetings represented also key occasions for employees to get to know each other and exchange information, and develop the social network in both cohesiveness and strength. Second, simple approaches of job/team rotation proved effective in having employees to develop connections with different colleagues in the organization. In particular, physicians–and this can be generalized to any central figure in social networks–were moved frequently in different teams to develop stronger ties with more peripheral actors (e.g. new doctors, nurses, physiotherapists).

Overall, our observations suggest that managers can foster knowledge sharing and IWB without adopting costly or time-consuming interventions–as interventions linked with organizational capital might be. Rather, managers can be effective enablers of social capital if they endorse a role of boundary spanners that actively use their privileged position to link together individuals, arrange moments of collaboration and establish task interdependencies that could bridge individuals' interests.

7. Conclusions

This study provides empirical support to (1) the positive impact of knowledge assets on knowledge sharing behaviours and IWBs among professional employees; (2) the mediating role played by psychological safety and knowledge sharing; (3) the appropriateness in studying knowledge sharing and innovative work behaviour as separate activities. Accordingly, we argue that initiatives that successfully increase employees' social capital, motivation to share knowledge and psychological safety can increase their propensity to innovate the current operations. Furthermore, along with systems that enable the sharing of best practices, we emphasize the importance of sharing mistakes and seeking feedbacks for individual innovation.

Some limitations emerge in this study, and suggest possible avenues for further research. First, the sample in this study is limited and causes some concerns over the generalizability of our results. Second, the cross-sectional nature of the data collected in

this study allowed us to test the proposed model, however, further studies could employ longitudinal datasets in order to further explore the causal links prosed in our research. Third, the research locus is limited to three H&PCOs, which can be regarded as peculiar in terms of their management style. Although we believe that the findings of this study can be generalized to other professionalized organisations, future research should test our hypotheses in other contexts, especially if relationships among professionals might be affected by hierarchy. Last, future studies can also improve the explanatory power of the model proposed by adding further variables that could more comprehensively explain the mediating mechanisms through which knowledge assets are translated into knowledge sharing and innovative work behaviour. Similarly, while we focused on micro-level variables, future research might investigate how our model translates at macro-level. The constructs of knowledge assets, knowledge sharing and innovation can indeed find immediate correspondence at organizational level. However, the transposition of this model introduces new issues–e.g. which construct of 'safety' grasps at macro-level the vigilance toward inter-organizational risks? What are the risks related to sharing mistakes, best practices and feedbacks between organizations connected in commercial relationships? Does the exposure to larger and tighter contacts engender effects of social visibility and self-visibility also in supply-relationships disengaged from mechanisms of organizational hierarchy?

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Appendix: Survey questionnaire

Structural Social Capital	
SSC1	There is a frequent interaction between personnel of my organizational unit to improve patient care
SSC2	In my organizational unit the interpersonal relationships between professionals are very frequent
SSC3	Coworkers in my organizational unit exchange ideas with many colleagues
SSC4	In my organizational unit employees exchange ideas with numerous professionals from other units
Relational Social Capital	
RSC1	My colleagues are always willing to help if I need it
RSC2	When I need help, I can always turn to my colleagues
RSC3	I have trouble to trust many of my colleagues because they are opportunists (R)
RSC4	With my colleagues I can talk freely about my problems
Organizational Capital	
OC1	The knowledge on day-to-day practice is codified in protocols and manuals
OC2	Protocols and manuals collect knowledge that help me significantly during my work
OC3	New employees can find in manuals and protocols the relevant knowledge to perform their activities during practice
OC4	Manuals and protocols makes our activities much easier
Psychological Safety	
PS1	I never worry that my mistakes would be criticized unfairly by my colleagues
PS2	I am sure that no colleague would voluntarily act against me
PS3	In my organization, I can discuss my work-related problems with no difficulty
PS4	In my organization, I face many problems when asking for help (R)
Idea Generation	
IG1	I usually have new ideas in my daily work practice
IG2	Frequently, I suggest small innovations that improve patient care
IG3	I can be very creative at work
IG4	I have often resolved difficult situations that had caused problems to my colleagues
Idea Promotion	
IP1	When I have an innovative idea I always try to get the support of my colleagues
IP2	When I have an innovative idea I often seek the approval of my colleagues
IP3	I was rarely able to make my colleagues enthusiastic about one of my innovative ideas (R)
IP4	When I have an innovative idea I always try to convince my colleagues to support it
Idea Implementation	
IIM1	I systematically apply innovative ideas to my daily practice
IIM2	I often have problems in translating innovative ideas into practice (R)
IIM3	When I have the opportunity, I always con