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FRONTLINE EMPLOYEE NETWORKS FOR SERVICE INNOVATION

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Abstract

Organizational Frontlines research has recognised the customer-facing interactions and interfaces as crucial for service innovation. Yet, organisations still find it difficult to innovate from the frontlines. This dissertation examines the role of frontline employee networks in relation to service innovation. Intra-organizational networks with customer-facing and internal-facing employees can generate new service idea networks and spontaneous decision-making networks for alignment of tasks and resources. These emergent service employee networks could form a sustainable and powerful innovation foundation. Thus, this dissertation conceptualises a taxonomy of network *domains* - in which frontline employees interact with *customers* and *internal-facing employees*- and network *flows* – as *new knowledge* and *self-governance* activities. Further, this taxonomy is advanced by theorising service employee *network structures (density and diversity)* as sources and *network flows (knowledge exchange and self-governance flows)* as mechanisms to generate service innovation.

Data to test service employee network structures and mediating effects of network flows for service innovativeness are collected through a social network survey in a premier hotel in Australia. The hotel employs 371 service employees where 50% of them are frontlines. The results suggest that network diversity and density have distinct effects through different types of network flows. Further, the effects on innovativeness differ in frontline and internal-facing employee networks. Together, key findings provide nuanced and intriguing insights into the influence of service employee networks in promoting innovation in service organizations. Theoretical and managerial implications are discussed.

Declaration

This is to certify that:

- i. the thesis comprises only my original work towards the degree of Doctor of Philosophy except where indicated in the preface;
- ii. due acknowledgement has been made in the text to all other materials used; and
- iii. the thesis is fewer than 100,000 words in length, exclusive of tables, maps, bibliographies and appendices.

Date: __26 March 2020__

Signature: _____O.O._____

.....Ozlem Ozkok.....

Preface

The dissertation comprises two papers. The first paper, entitled ‘Frontline knowledge networks in open collaboration (OC) models for service innovations’, was published at the Academy of Marketing Science (AMS) Review in 2019.

The published version of the first paper is presented in this dissertation; however, it should be noted that small changes were made to refine the paper for this thesis. The paper is co-authored with my three supervisors; however, the substantive contribution to this paper is my own. An earlier version of this paper was awarded the winner of Academy of Marketing Science Review/Sheth Foundation Doctoral Competition for Conceptual Articles Award in 2017. The first paper’s ideas were presented at the AMS Review conference in Florida, USA in May 2017. Valuable feedback from the AMS Review Doctoral competition panel contributed to further development of the proposed taxonomy in the second paper. The publication details are as follows:

Ozkok, O., Bell, S.J., Singh, J. & Lim, K. (2019). Frontline knowledge networks in open collaboration models for service innovations. *AMS Review*, 9(3), 268–288.
<https://doi.org/10.1007/s13162-018-00133-5>.

Building on the first paper’s conceptual taxonomy, a book chapter was published. The first draft of the book chapter was developed by me and supervisors through meetings. The book chapter is not included in the thesis. However, writing the book chapter improved my understanding of marketing and social network theories and helped me to develop the second paper for which the publication details are as follows:

Ozkok, O., Singh, J., Bell, S. J. & Lim, K. (2019). Service innovation from the frontlines in customer-centric organisations. In R. W. Palmatier, C. Moorman & J.-Y.

Lee (Eds.), *Handbook on Customer Centricity Strategies for Building a Customer-Centric Organisation* (pp. 79–107). Cheltenham, UK: Edward Elgar.

The second paper in the dissertation is entitled ‘Service Employee Network Structures, Network Flows and Service Innovation’ and is currently in preparation for publication in a journal within the services marketing domain. The paper is an empirical study focused on frontline employee (actor/ego) networks and their role in service innovation. Again, the substantive contribution in this paper was my own; however, I acknowledge the valuable contributions of my supervisors in refining this paper. At the time at which this dissertation was submitted, this paper has not been published or accepted for publication; however, earlier versions of the paper were presented to university interview panels at the 2019 American Marketing Association (AMA) Summer Educators’ Conference and at the Organizational Frontlines Research (OFR) Symposium at the 2020 AMA Winter Educators’ Conference. I am indebted to a number of helpful scholars who provided me with feedback at these conference presentations that led to meaningful revisions to the paper.

List of Papers

This thesis comprises two papers. Both papers investigate frontline employee networks and their effect on service innovation. Throughout the thesis, each paper will be referred to by their assigned Roman numerals, which are listed below with the paper titles:

- I Frontline knowledge networks in open collaboration models for service innovations
- II Service employee network structures, network flows and service innovation

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Finally, I acknowledge Capstone Editing's assistance for copyediting and proofreading services, according to the guidelines laid out in the university-endorsed national 'Guidelines for Editing Research Theses'.

Table of Contents

Abstract.....	ii
Declaration.....	iii
Preface.....	iv
List of Papers.....	vi
Acknowledgements	vii
Table of Contents	ix
List of Figures.....	xi
List of Tables	xii
1: Introduction	1
1.1 Theoretical Background for Social Networks and Frontline Employees.....	7
1.2 The Intersection of Three Domains: Services Marketing, Social Networks and Open Innovation Studies.....	10
2: Paper I—Frontline Knowledge Networks in Open Collaboration Models for Service Innovations	14
2.1 Abstract	14
2.2 Introduction	14
2.3 Literature Review.....	19
2.3.1 Frontline employees and service innovation.	19
2.3.2 An open collaboration approach to innovation.....	32
2.3.3 A social network theory approach to innovation.....	33
2.3.4 Gaps in frontline employee-service innovation research.	34
2.3.5 Towards a taxonomy of frontline network domains and flows.	37
2.4 Taxonomy of Frontline Networks	38
2.5 Taxonomy-based Theory Building Directions.....	39
2.5.1 Frontline employee–customer networks and knowledge exchange.	42
2.5.2 Frontline employee–internal-facing employee networks and knowledge exchange.	46
2.5.3 Frontline employee–customer networks and self-governance.	47
2.5.4 Frontline employee–internal-facing employee networks and self-governance.....	47
2.5.5 Theorising a dark side.....	52
2.6 Discussion	53
2.6.1 Frontline knowledge networks and open collaboration research.	53
2.6.2 Frontline knowledge networks and social networks research.	55
2.6.3 Frontline knowledge networks and organisational frontline research.....	56
2.6.4 Frontline knowledge networks and service practice.....	59
2.7 Conclusion.....	60
3: Paper II: Service Employee Network Structures, Network Flows and Service Innovation.....	61
3.1 Introduction	61
3.2 Literature Review.....	66
3.3 Conceptual Framework and Hypotheses.....	69
3.3.1 Density and diversity as core network constructs.	70

3.3.2 Mediating mechanisms of network flows.....	72
3.3.3 Network flows of knowledge exchange and its mediating mechanism.....	73
3.3.4 Network flows of self-governance and its mediating mechanism.....	78
3.4 Research Method.....	80
3.4.1 Network samples and network boundaries.....	81
3.4.1 Data collection.....	84
3.4.2 Measurements.....	86
3.5 Results	97
3.6 Discussion	102
3.7 Limitations	106
3.8 Conclusion.....	106
4: General Discussion and Conclusion.....	108
4.1 Implications for Services Marketing.....	109
4.2 Implications for Open Innovation Research.....	110
4.3 Implications for Social Capital and Social Networks Research.....	111
4.4 Managerial Implications.....	113
4.5 Conclusion— #OrganisationalFrontlinesAreCrucialforInnovation	116
References.....	117

List of Figures

Figure 1. Development of papers and conceptual model for testing in three steps	13
Figure 2. Figurative representation of the broad research streams relevant to this study.....	21
Figure 3. The hypothesised mediation model for actor networks and service innovation.	70
Figure 4. Service employee network structures that can be detrimental (Network 1) or beneficial (Network 2) to service innovation.....	104

List of Tables

Table 1 <i>Literature Review</i>	22
Table 2 <i>Frontline Employee Roles, Service Innovation and Potential Tensions</i>	35
Table 3 <i>Taxonomy of Frontline Networks</i>	41
Table 4 <i>Theory Building Directions for Taxonomy of Frontline Networks</i>	44
Table 5 <i>Taxonomy of Open Collaborative Networks and Network-Level Mechanisms in Practice</i>	50
Table 6 <i>Sample Characteristics</i>	83
Table 7 <i>Operationalisation of Constructs with Single-Item Survey Questions</i>	89
Table 8 <i>Operationalisation of Constructs with Multi-Item Survey Questions</i>	91
Table 9 <i>Confirmatory Factor Analysis Estimates and P-values for Service Innovation (Actor Innovativeness) and Customer Connectedness</i>	95
Table 10 <i>Descriptive Statistics for Frontline Employee and Internal-Facing Employee Networks</i>	100
Table 11 <i>Estimated Coefficients from the Frontline Employee and Internal-Facing Employee Ego Network Mediation Analysis</i>	101

1: Introduction

Organisational frontlines are where today's most complex and diverse organisation-customer interactions occur, with some designating them as 'the frontier of innovation' (Singh, Brady, Arnold & Brown, 2017, p. 1). Organisational frontlines are defined as the *interactions* and *interfaces* at a firm's boundaries that facilitate service exchange and value creation activities. Frontline interfaces are a combination of technology agents and servicescape artefacts that connect customers to a firm. A particularly important contributor to frontline interactions is frontline employees (FLEs). These customer-facing employees are responsible for enabling interactions with customers and the creation, communication and delivery of service processes and solutions. FLEs' work is made more complex by the need to coordinate interactions with frontline interfaces and the organisation's *backline* (i.e., the back-of-house employees and resources). Thus, it is not surprising that FLEs, as the agents occupying the nexus between the firm and the customer, have been the focus of several academic and practitioner studies, particularly in the area of service innovation (Burkus, 2015a and b; Lages & Piercy, 2012; Melton & Hartline, 2013; Ordanini & Parasuraman, 2011; Tjan, 2012).

The focus of this research is the role of FLEs in driving service innovation, which is defined as a new or improved service offering for the organization. New service ideas and offerings often emerge from frontline insights gleaned from customer interactions. For example, Amazon's 'Prime Now' was an employee-led innovation program that enabled employees to work backwards from the service launch to the implementation and the initial

design processes.¹ Amazon's new delivery service 'Prime Now' was born when one Amazon employee wrote a new service delivery method whereby a press-release initiative was required as a first step at Amazon when an employee has a new idea for services (Satell, 2018). The 'Prime Now' is a service that currently offers less than one-hour delivery for a fee and free delivery within two hours for members. Service innovation might equally emerge from FLEs engaging with customers. Zappos, an online retailer with a reputation for service innovation, views FLEs as the custodians of the customer relationship and the wellspring for creativity and service innovations. The company recognises that that outstanding customer service and subsequent innovation begins with service employees' conversations with customers. Similarly, since its inception, Southwest Airlines has held similar views on the importance of frontline-driven innovations. For example, a cabin crew member decided to inject some humour into the mundane safety announcements that Airlines are obliged to make to passengers before departure. Specifically, Martha 'Marty' Cobbs, a flight attendant at Southwest Airlines, enhanced this brief interaction with customers by saying: 'Put the oxygen mask on yourself first and then place it on your child. If you're traveling with more than one child, start with the one with the greatest earning potential' (Sideways, 2020, para. 28). Footage of Cobbs soon hit social media and the fun cabin message became a trending new story with more than 22 million views (Sampson, 2019). As a result of this employee-led innovation, Southwest Airlines relaxed its approach to delivering safety announcements, allowing cabin crew to adapt safety briefings across all flights. In fact, following the announcement, an insights research team at the company analysed customer survey data and

¹ Amazon's employee-led innovation process starts with an employee drafting a six-page press-release for a new initiative, a 'Frequently Asked Questions' section and a customer experience illustration regarding the new offering (Dyer & Gregersen, 2017).

estimated that if they could double the customers who heard the announcement, the uptick in loyalty from satisfied and engaged customers would generate \$140 million revenue per year via customer loyalty (Heath & Heath, 2017; WARC, 2018).

Furthermore, as big data, artificial intelligence (AI), and technological advances are increasingly incorporated into services for customers, an FLE's role has become essential in engaging with the customers at a more sophisticated level where self-service or AI can fall short. For example, AI nowadays mostly utilise mechanical and analytical intelligence which are implemented for standardised and rule-based tasks e.g., chatbots, self-service technologies, in-car intelligence services (Huang & Rust, 2018). The more sophisticated interactions with FLEs involve intuitive and empathetical intelligence for complex and highly interactive tasks e.g., customer assistance and problem solving where FLE can be more advanced in learning from customer service encounter dynamics (Huang & Rust, 2018). In fact, FLEs roles as boundary spanners can be enhanced by employing more real-time data mining tools and AI services to assist the customers. Organizations will need FLEs to be able to train, engage, as well as support their customer service technologies and vice versa. As the service context becomes more high-touch and more prone to high-personalisation for customer journeys (e.g., as in retail, consulting, hospitality industries) FLEs and their roles in recombination of resources for customer benefits become more pivotal. In short, businesses are realising that supported and engaged FLEs create valuable customer interactions and are a sustainable source of service innovation and revenue growth.

Academic research is also adding weight to the anecdotal claims about the advantages of engaged frontlines. In recognising service innovation as a knowledge-intensive activity, earlier studies underscored the importance of frontline interactions for new service design. These studies used role theories (Walker, Churchill & Ford, 1975), service-dominant (S-D) logic (Vargo & Lusch, 2004) organisational theories (e.g., resource-dependence, institutional

theory) (Pfeffer & Salancik, 1978), motivation and learning theories (Bandura, 1977) to examine innovation at both the individual and organisational level. The application of multiples theoretical lenses to frontline-service innovation has generated a range of important insights from the recruitment of FLEs (e.g., selecting employees with high customer-readability skills) to the role of manager/supervisor support, the implementation of organisational structures that are conducive to frontline innovation and the creation of supportive organisational climates (Marinova et al., 2008; Melton & Hartline, 2013; Morhart et al., 2009; Santos-Vijande et al., 2014; Schepers, Nijssen & van der Heijden, 2016). An important theme inspiring a body of research has been the intersection between individual level FLE factors and service innovation. Some personality traits can affect idea diffusion, such as high creativity and good organisational citizenship behaviours (Bettencourt, Gwinner & Meuter, 2001; Woisetschläger; Hanning & Backhaus, 2016). Further, some motivational factors, such as desire for job mobility and job and customer satisfaction, can drive new idea generation from the frontlines (Maria Stock, Jong & Zacharias, 2016). Some studies have shown that role ambiguity and conflict have negative effects on boundary spanner creativity (Coelho, Augusto & Lages, 2011; Di Mascio, 2010). Conversely, other studies have shown that role conflict is positively linked with idea generation and service performance and arises from FLEs learning on the job and dealing with diverse and numerous sets of customer issues (George & Zhou, 2007; Lages & Piercy, 2012; Schepers et al., 2016).

Service innovation can be seeded by frontline interactions with customers or can be an outcome of intra-organisational collaborations. Previous studies have suggested that frontline-customer interactions improve the number of innovations whereas frontline involvement in new service designs improve both the radicalness and volume of innovations in organisations (Ordanini & Parasuraman, 2011). Conversely, other studies have suggested that FLEs' contributions are largely confined to the launch of services and have no effect on

new service idea generation (Melton & Hartline, 2010). Thus, the findings are mixed in relation to frontline involvement in service innovations and the literature is fragmented on the individual role of service employees and their collaborative involvement on service innovation.

As frontlines are often at the centre of service innovation studies, some studies have gone beyond looking into dyadic interactions (customer-frontline) and individual characteristics (frontline creativity) to examine organisational contextual factors. Frontline learning orientation and an organisation's climate and job complexity are enablers of FLEs innovativeness and thus facilitators of cross-level effects on organisational innovativeness (Bell, Menguc & Widing, 2010; Schepers et al., 2016). Thus, findings on the individual characteristics of FLEs, co-creation activities with customers and the contextual factors that enhance service innovation have motivated some successful interventions, such as digital employee suggestion boxes, customer collaboration platforms and innovation hackathons.

However, previous research has been subject to some key limitations, including that this research has focused on 1) the limited cognitive and resource generation capabilities of FLEs (as individuals); and 2) the complex and tacit nature of frontline learning (Ye, Marinova & Singh, 2012). New service design activities are often crowded with many external and internal knowledge sources (i.e., customers and service employees) and stifled by hierarchical and bureaucratic governance structures. Thus, inherent limitations and barriers to service innovation requires further research to model more systemic and natural ways to achieve continuous innovation from the frontlines. Specifically, more research is required to better understand the diverse nature of FLE-relationship interactions and their role with service innovation.

Similarly, service innovation research in the trade literature tends to celebrate the frontline *individual*—the 'lone genius'—and their contributions to organisation-wide service

innovations. The preceding examples of employees at Amazon Prime and Southwest Airlines demonstrate that individuals are the innovators but neglect the perspective that these individuals were also embedded in customer and employee networks during their service tasks. The connections and relations that individuals have with others may be an influence on and could perhaps even be the source of new ideas that are ultimately developed into something more concrete.

To summarise, key insights for service employee's innovativeness from social networks and open innovation studies have been underutilised in services marketing literature. To address this gap, this study adopted a new way of looking at employee-service innovation as a *distributed process*. Specifically, an open innovation framework was conceived that enables the involvement of multiple distributed actors (e.g., customers, employees and suppliers) to achieve a unified goal of producing a new product or service (Chesbrough & Bogers, 2014). This conceptual lens allows for 1) actors to be coupled with multiple others; and 2) the possibility that actors self-manage their tasks and resources. Thus, this framework embraces the potential of employees to find and cultivate ideas within the forum of their workplace relationships while also adopting a self-driven approach to seeing innovation to fruition. These two elements are central to the 'open innovation' thesis that informs this research (Chesbrough & Bogers, 2014). However, it should be noted that the open innovation literature has focused largely on product and user-led innovations (e.g., customer idea platforms for new products, open source software design or wiki-like knowledge platforms) (O'Mahony & Bechky, 2006). The focus has been on *external* knowledge flows as drivers of innovation. Further, boundary spanners in the extant open innovation literature has privileged engineers or research and development (R&D) employees as the micro-level shapers of macro-level innovations (Subramanian, Lim & Soh, 2013). Open service innovation with the FLE as the focal boundary spanning employee is less

common. However, some researchers have begun to embrace this perspective (e.g., Mina, Bascavusoglu-Moreau & Hughes, 2014) and I have taken this emerging literature as a lead.

Notably, open service innovation can generate valuable insights by investigating frontlines. In fact, FLEs as unique boundary spanners operate in particularly dynamic and fragile customer environments as they go about generating customer and market knowledge. Customer interactions are often fleeting—they have often been described as ‘*moments of truth*’—while customer churn limits relationship durability. Thus, FLEs have a particularly important role in both maintaining customer relationships through professional service delivery and acting as knowledge brokers for firms hoping to utilise customer insights and knowledge. As knowledge and resource integrators, FLEs also have to self-direct their tasks within organisations. Rarely will firms articulate how newly acquired customer knowledge from the frontline is tested and exploited. Thus, FLE roles (especially as they relate to service innovation) are subject to the influence of a range of working *relationships* and *activities* within and across organisations. Consequently, the nature of FLEs social networks will be paramount in determining the relationship between knowledge sourced from customer relationships and service innovation. Indeed, this is the central purpose of this thesis: to propose an open service innovation framework, within which social networks (comprising relationships between a diverse set of frontline and backline actors) help facilitate the application of new knowledge towards service innovation.

1.1 Theoretical Background for Social Networks and Frontline Employees

Social networks are defined as networks of actors/nodes connected by purposive ties (e.g., friendship, power and coordination). These networks may have different structures and tie content enabling a range of personal or organisational outcomes. In the past decade, organisational and social science researchers have adopted a social network lens that is often rooted in social capital and network theories to better understand network relations by

analysing network structures and actor positions (Borgatti & Halgin, 2011). Network theory predicts how and why certain network constructs (e.g., centrality, closeness, structural holes and density) generate several mechanisms (e.g., knowledge integration, reputability, legitimacy and collaborative governance) and certain organisational outcomes that are most commonly studied as performance and learning (Provan, Fish & Sydow, 2007). An important underlying assumption of network theory is that information (and other resources) flow through network ties and that actor connectivity affects the nature of these flows (Granovetter, 2005). Thus, *model-based theorising* about network structures and types of relations can be helpful in simultaneously conceptualising network constructs and mapping real-world network phenomena (Borgatti & Halgin, 2011; Lave & March, 1975).

Social network studies that examine innovation have extensively researched the effects of network and tie structures. For example, ‘strength of weak ties’ theory suggests that highly connected circles overlap and tend to generate fewer novel ideas (Granovetter, 1973). It will assist readers if this is stated. A corollary of this is that an individual’s social capital is improved with the emergence of ‘structural holes’ in their networks. An ego (an actor) whose ties span a structural hole (i.e., who has ties to groups of disconnected nodes) is better able to access non-redundant information (Burt, 1992). An actor’s centrality and connectedness are also important to job performance, information diffusion and idea sharing (Perry-Smith, 2006; Wasserman & Faust, 1994). In addition to structural characteristics and positions, network flows (i.e., the content of ties) have been studied in relation to their implications for individual and organisational innovativeness. For example, flows of knowledge and collaboration, especially across heterogeneous relationships, in employee networks have been found to predict learning and innovation (Borgatti & Cross, 2003; Capaldo, 2007; Rodan & Galunic, 2004; Sosa, 2011).

The links between network characteristics and innovation are compelling; however, considerable equivocality remains in the findings. For example, there is an ongoing debate between those advocating for open and disconnected network ties as a source of innovation (Burt, 1992; 2004) versus those who demonstrate the advantages of closed and dense network structures (Granovetter, 2005). Open and disconnected social structures can derive unique information flows that help innovations while closed structures can also be advantageous due to the highly collaborative nature of network linkages (Ahuja, 2000; Shan, Walker & Kogut, 1994). Conversely, embedded and dense relationships appear to foster trust and improve coordination and innovativeness (Gulati & Gargiulo, 1999; Obstfeld, 2005). However, it should be noted that as networks become more cohesive and denser, strong social norms can lead to groupthink, making actors less likely to share their creative ideas (Soda & Usai, 1999; Sosa, 2011).

Boundary spanning employees form the micro-foundations of bridging network ties, even among inter-organisational networks (Capaldo, 2007). Transferring knowledge within and between units occurs through knowledge flows between boundary spanners and the people with whom they are connected. (Tortoriello, Reagans & McEvily, 2012). These flows tend to increase under conditions of ‘ambiguity arising from organisational change’ (Srivastava, 2015; p. 1367) (e.g., market events or the launch of a new initiative). Boundary spanners are knowledge brokers for external flows; however, they are also pivotal to the development of knowledge within organisations. For example, salespeople are connected with both customers and internal sources of knowledge and support (Bolander et al., 2015); their positional and relational centrality within these networks helps improve their sales performance (Bolander et al., 2015). With the exception of Bolander et al.’s study, little research has been conducted on how networks affect service employees and the innovativeness of such employees. To address this issue, this research also used a social

networks lens to study FLEs' behaviours and to understand how various network structures and flows affect FLEs' innovativeness.

1.2 The Intersection of Three Domains: Services Marketing, Social Networks and Open Innovation Studies

As interest continues to grow in the role of 1) distributed knowledge, 2) open and co-creative contexts and 3) service innovation, a decision was made to locate this research at the intersection of three domains of literature: services marketing, open innovation and social networks. This research focused on service employees in each of these domains. Open innovation realises *permeable boundaries*—a phenomenon with which service employees are familiar, as they naturally find themselves crossing multiple boundaries within their organisations as they discharge their customer service responsibilities. Further, *social network* theorising enabled the servicescape to be conceptualised in terms of the nuanced informal structures that inevitably exist on the frontline. To do so, a taxonomy was first built that recognises FLE network connectedness *domains* and network *flows* to enable service innovation in an organisation. Next, an ego network study was conducted that considered how the different types of *network connectedness (density or diversity)* and types of *network flows (knowledge exchange and resource flows)* of actors can lead to innovativeness among service employees.

To summarise, this research investigated FLEs' networks to better understand how FLEs innovate in relation to service work by including relevant actors in their internal organisations as internal-facing employees (IFE). The frontlines and IFEs' connectedness provide insights into interactions in which new service ideas are exchanged and how decisions are made through mutual task and resource negotiations.

This research contributes to the literature in a number of ways. First, it contributes to the services marketing literature by extending understandings of the roles of frontlines and

their contribution to innovation beyond the more typical individual-level and dyad-level of analysis. A network-level approach was adopted to capture the effects of both a broader range of actors and the resources that flow between them on FLE innovativeness. Further, by distinguishing between different service employee roles, this research suggests that customer-facing and internal-facing service employees are affected differently by variations in network flows and structures.

Second, this research contributes to the field of open innovation by extending its conceptualisation of boundary spanning roles to include the unique role of FLEs. Unlike R&D and technical employees (who are the usual foci of open innovation research), FLEs maintain a distinctive relationship with customers (e.g., that requires higher levels of social content) and are often more broadly connected to back-of-house employees. Taken together, these differences are likely to have significant implications for the ways in which service innovations are identified and implemented within a firm.

Finally, the dissertation contributes to social networks and social capital research by extending understandings of network flows beyond the more traditional forms (e.g., knowledge, advice and friendship) to include self-governance (i.e., mutual agreed decision-making activities for managing tasks and resources between actors). It also explores the distinction between FLEs and IFEs as sub-networks within a firm. It should be noted that while exploring the effects of networks-within-networks is not new, this particular distinction has not yet been made, despite being foundational to services marketing logic.

This dissertation consists of three parts. In the first part, a paper entitled ‘Frontline knowledge networks in open collaboration (OC) models for service innovations’ proposes a taxonomy of *network domains* and *network flows* (Figure 1 demonstrates the evolution of two papers in three steps). Under this taxonomy, FLE-customer and FLE-IFE connectedness are conceptualised as *network domains*, knowledge exchange (i.e., new service idea exchange)

and self-governance (i.e., mutual decision-making activities to manage tasks and resources) flows are conceptualised as *network flows* (See Figure 1 step called Paper I Taxonomy development for service innovation). In the second part, a second paper entitled ‘Service employee network structures, network flows and service innovation’ builds on the taxonomy in the first paper (See Figure 1 step called Paper II Empirical testing). Motivated by the mixed results in the social capital and social networks for innovation literature, it was theorised that different network structures matter for employee-level service innovation. Dense networks and diversity (i.e., heterogeneity) in networks are distinctly important to the innovativeness of service employees. Additionally, what flows in these networks mediates the effects of network structures depicting different types of connectedness (See Figure 1 step called Paper II Conceptual model for testing). Ego-level network data is collected from a premier hotel in Australia to empirically analyse the model. In the third part of this thesis (see ‘General Discussion and Conclusion’), the broader implications of the findings are explored in relation to the literature on services marketing, social networks and innovation. In this final section, an agenda for future research is also outlined.

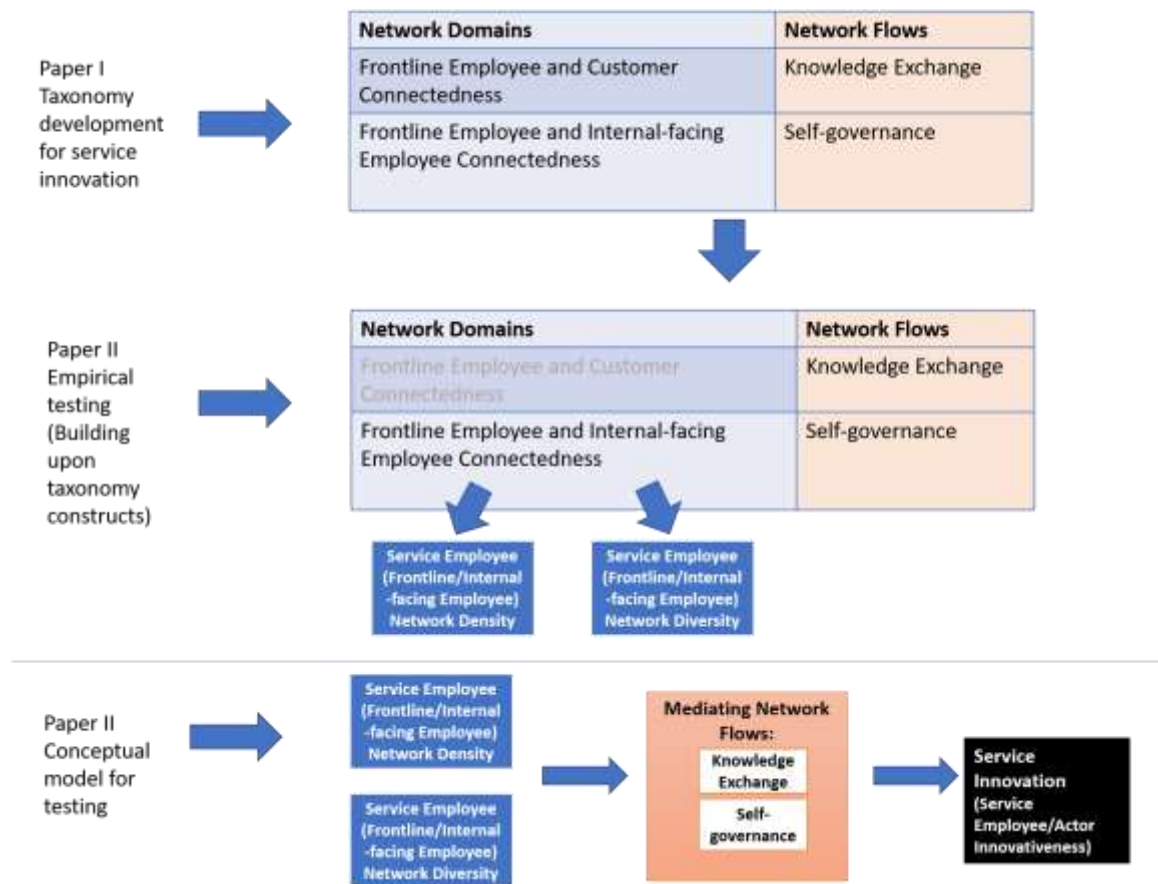


Figure 1. Development of papers and conceptual model for testing in three steps

2: Paper I—Frontline Knowledge Networks in Open Collaboration Models for Service Innovations

2.1 Abstract

Service organisations often view customer-facing employees or FLEs as valuable sources of inimitable knowledge and innovation. This is due to the experiential nature of service and the subtle qualities required for engaging in customer interactions. However, organisations face significant challenges in leveraging the knowledge of their FLEs to develop service innovations. Drawing upon the open innovation and social network literature, this paper develops a theory about the role of FLE networks and the degree to which these networks enable the flow of distinct content to realise effective service innovation. Specifically, a taxonomy of network *domains* (which connects customer-facing employees and IFEs) and network *flows*, as new knowledge and self-governance activities, is conceptualised to provide a framework for the roles of FLEs in knowledge networks in relation to service innovation. This taxonomy expands opportunities for theorising about the mechanisms of frontline knowledge networks in service innovation and identifies a ‘dark side’ that could undermine potential innovation gains if left unchecked. Future directions and implications for theory and practice are also discussed.

2.2 Introduction

Both the academic and practitioner literature emphasises two central themes in service innovations: (a) service is a knowledge-based activity and superior knowledge is key to innovative ideas (Galunic & Rodan, 1998; Grant, 1996; Hargadon & Sutton, 1997); and (b) service innovation emerges from collaboration or co-creation with customers (Magnusson, Matthing & Kristensson, 2003; Stock & Zacharias, 2011). In co-creation,

research shows that FLEs are critical nodes in knowledge networks that permit organisations to open boundaries to collaborate with customers. FLEs are also reliable filters and enablers of new knowledge creation that motivates service innovation (Allen, 1977; Lages & Piercy, 2012; Melton & Hartline, 2010). A 2015 Accenture survey found that 91% of enterprises identified customers as ‘valuable’ sources of innovation ideas (Alon, Elron & Jackson, 2016), while a recent Boston Consulting Group survey of senior executives revealed that customer insight teams are crucial for innovation (Barton, Koslow, Dhar, Chadwick & Reeves, 2016) and most likely to drive business growth (Barton, 2018). The crucial role of customers in generating new knowledge for service innovations has elevated the significance of customer-facing FLEs. Thus, this study aimed to a) review the relevant organisational frontlines and open innovation literature; b) conceptualise a taxonomy of network *domains* and resource *flows* to provide a framework for the role of FLEs in service innovation; and c) identify taxonomy-based theory building directions for future research in the study of service innovation from the frontlines.

Leveraging customer-facing resources and customer interactions for effective service innovation is neither trivial nor spontaneous. The field of Organisational Frontlines² research has shown that customer interfaces in service organisations are inherently paradoxical as they require juxtaposing openness and complexity to generate competitive advantage (Singh et al., 2017). Studies on FLEs as conduits of customer knowledge for service innovation and organisational performance have both improved our understanding while also revealing several anomalies (Chen, Li & Arnold, 2013; Hult, Mena, Ferrell & Ferrell, 2011). For example, Ordanini and Parasuraman (2011) demonstrate that FLEs are fundamental in

² Organisational Frontlines research in marketing has been defined as ‘the study of interactions and interfaces at the point of contact between an organization and its customers that promote, facilitate, or enable value creation and exchange’ (Singh et al., 2017, p. 2). FLEs feature prominently in the frontline activities of service organisations.

shaping the volume and radicalness of service innovation. Conversely, other researchers narrow FLEs role to ‘services marketability’ and to *delivering* service innovations rather than *developing* new knowledge for meaningful service innovation (Karlsson & Skålén, 2015; Melton & Hartline, 2013, p. 77). Further, Melton and Hartline (2013) note that cross-functional teams could be more effective than FLEs in launching new services and sales performance. These anomalies do not necessarily diminish the role of FLEs in so far as they suggest that an exclusive focus by scholars on customer-facing employees may yield incomplete or inaccurate insights. A broader perspective is needed to examine how FLEs embrace collaborative relationships with external customers and how they network internally with other employees (both customer-facing employees and IFEs) to provide a deeper understanding of their potential contributions to service innovation.

A defining feature of the open innovation literature is its focus on how external and internal participants improve/hinder organisational performance. Open innovation is defined as ‘a distributed innovation process based on purposively managed knowledge flows across organisational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organisation’s business model’ (Chesbrough & Bogers, 2014, p.17). To date, relatively few studies have examined open innovation in a service context (for an exception see Mina et al. 2014); however, it offers a useful perspective due to its focus on the interaction between a firm and its customers as a source of innovation and for analysing external and internal knowledge flows (Chesbrough & Bogers, 2014; West & Bogers, 2017). The internal-external nexus was used as a starting point for understanding the role of human, rather than firm-level, mechanisms in knowledge flows. Specifically, this study focused on FLEs’ interactions with customers and internal employees. Social network theory was drawn upon to understand how service innovation results from relationships among a) customers; b) FLEs as customer-facing employees; and (c) IFEs.

A taxonomy of network *domains* (i.e., networks defined by distinct members or agents) and resource *flows* (i.e., the content of exchange among network members) is proposed to provide a foundation for subsequent theorising about FLE-centred service innovation. In terms of network domains, the following networks were considered: 1) FLE-IFE networks (i.e., networks comprising FLEs and IFEs with limited customer contact); and 2) FLE-customer networks (i.e., networks comprising FLEs connected to varying degrees with both other FLEs and customers). The former is a cross-pollination network which enables mutual learning via non-redundant information exchange. The latter network is a source of new service ideas facilitated by active idea sharing during service delivery and troubleshooting processes. In terms of network flows, the following flows were considered: 1) knowledge exchange (i.e., the sharing of new ideas about service delivery among organisational employees); and 2) self-governance activities (i.e., the mutually negotiated distribution of self-organising responsibilities among network members). Knowledge flows enable novel service ideas to be shared, sorted and sieved for effective development and deployment. Conversely, governance activity flows ensure that action can be taken based on new insights.

Three aspects of this study are noteworthy. First, it advances understandings of organisational frontlines research by exploring the contribution FLEs make to service innovations and the specific mechanisms through which frontline knowledge has an effect on such innovations. This is achieved by locating them within networks of both customers and IFEs. Thus, this research extends the findings of dyadic studies on FLE-customer or FLE-manager relationships and their contribution to learning and innovating (Bell & Menguc, 2002; Homburg, Wieseke & Bornemann, 2009; Liao & Chuang, 2004; Selnes & Salis, 2003). By exploring the broader intra-organisational networks, this study provides a more nuanced

account of the mechanisms and pathways through which new knowledge motivates service innovation within the firm and the key role played by FLEs in the proposed mechanisms.

Second, this research extends findings on open innovation to the service context. Open product innovation research offers many lessons for a service context; however, some unique aspects of the services context have implications for the advancement of open innovation theory. Further, this paper considers the specific case of FLEs as a dominant vector that enables the processing of market knowledge to achieve innovation outcomes. The potential contribution of FLEs in open innovation has gone largely unnoticed, as researchers have focused on engineers and developers and on open communities of similar experts. Key features of FLE-customer interactions (e.g., continuity of contact, real-time interactions and solution generation) are not apparent in these more frequently studied boundary spanning roles.

Third, this paper extends social network theory by advancing the view that internal-external network interactions involving FLEs have the potential to contribute significantly to firm performance. Social networks research involving FLEs is relatively scarce (Provan, Fish & Sydow, 2007). Indeed, extant work has largely focused on the outcomes of a given network configuration (e.g., Balkundi, Barsness & Michael, 2009; Mehra, Dixon, Brass & Robertson, 2006). The proposed theory accommodates intra-organisational interactions between networks where the peculiarities of one network structure might undermine (or enhance) the performance of another. This paper also extends social network theory by proposing the idea of self-governance as a flow within a network. Knowledge flows within networks have been explored in previous research; however, the exchange of a mutually negotiated understanding about how individuals within a network might act on, or respond to, new knowledge represents an extension.

The remainder of this paper is organised as follows. The next section reviews earlier literature on organisational frontlines and service/open innovation literatures. Next, a taxonomy of network *domains* and resource *flows* is conceptualised to provide a framework for the roles of FLEs in service innovation. Finally, new directions for theoretical and empirical research in the study of service innovation from the frontlines are discussed.

2.3 Literature Review

Service innovation is generally defined as the creation of new or improved service offerings (Menor, Tatikonda & Sampson, 2002). Services are usually knowledge- and skill-intensive, such that service innovation often involves the continuous generation of new knowledge and its use in improving service offerings (Ordanini & Parasuraman, 2011). The role of FLEs—boundary spanners located at an organisation’s external interface with customers—in generating new knowledge for service innovation is well recognised. For example, Sørensen, Sundbo and Mattsson (2013) grant a unique status to ‘innovation that develops from ideas, knowledge, or practices derived ... from frontline-service employees’ meetings with users in the service delivery process’. Similarly, Bell (1981) notes that service encounters represent the single greatest opportunity for potential innovations.

This literature review centres on the FLE role in service innovation. However, to sharpen its focus, previous studies that approach the FLE role from open innovation and social network perspectives are focused upon. Below, the distinctive features of the FLE role that make it well suited for service innovation are first discussed. Next, insights are drawn from the relevant literature to guide our theoretical contribution.

2.3.1 Frontline employees and service innovation.

Direct interactions with customers privilege FLEs with a distinct perspective on what might contribute to service innovation. Customer interactions provide insights into and early signals of changing needs, motivations and preferences. For most service organisations,

insights and early signals from customer interactions are a critical and potent source of new knowledge that can help generate innovative solutions and reconfigure existing ones (Alam, 2002; Grönroos, 2007). FLEs provide a key and sometimes the *only*, contact with this source (Woisetschlager, Hanning & Backhaus, 2016; Zeithaml, Bitner. & Gremler, 2008). Further, as boundary spanners, FLEs are connected to both a heterogeneous network of customers and internal employees and other stakeholders who may not have customer-facing roles but are involved in service production, delivery and support. Thus, the boundary function of FLEs endows them with access to diverse and divergent sources of knowledge that can drive service innovation if effectively mobilised.

Open innovation literature has examined the effectiveness of knowledge *flows* (both inward and outward) that yield innovation opportunities at points of contact between an organisation and external sources (Chesbrough, 2011). Relatedly, social network studies examine the structural properties of the formal and informal networks that make for effective connections between an actor and other actors and resources both internal and external to the organisation (Borgatti & Halgin, 2011). Often, the effectiveness implications of network properties to seed and serve innovations are examined at the level of the individual actor (e.g., the FLE) and/or the level of an entity such as a business unit (Bell et al., 2010; Schepers et al., 2016; Santos-Vijande et al., 2016). The open innovation and social network streams of research are complementary—*networks* enable and lubricate *flows*—and weaving them together provides a more realistic and holistic understanding of the focal phenomenon.

To facilitate this weaving, Table 1 summarises a review of the literature on open innovation and social network studies with a focus on FLEs, while Figure 2 displays the overlaps in these literatures that are subsequently developed in detail. The literature review sought to circumscribe the overlaps in the open innovation and social network literatures that both emphasise FLE and service innovation. Thus, the FLE perspective is shown in Figure 2

as a common criterion for selecting articles from both literatures for inclusion in our review. Table 1 summarises the key theoretical and empirical contributions of each article, as well as the key gaps identified in each study. Next, the key insights from the overlaps identified are discussed and a framework for examining the role of FLEs in service innovation is developed as a starting point for our theorising.

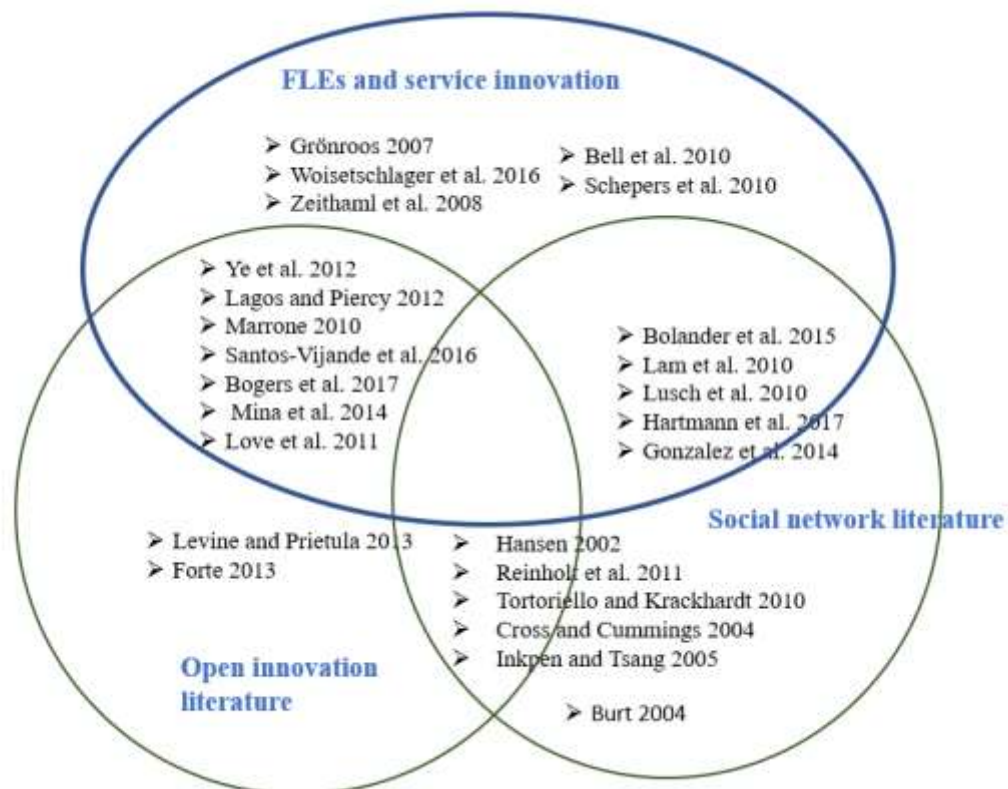


Figure 2. Figurative representation of the broad research streams relevant to this study.

Table 1

Literature Review

Author(s)	Broad Research Stream	Key Theoretical Contribution	Key Empirical Contributions	Key Gaps Identified
Hansen, 2002	Social (Knowledge) Networks	Theorises a knowledge network model to explain how the nature (connectedness) and degree (related/unrelated knowledge) of lateral inter-unit relations affect effective knowledge sharing and project completion.	Shorter network connections to units with related knowledge (joint effects) increase knowledge acquisition (.37/.06, $p < .01$). The net effect of outdegree and non-codified knowledge has a negative effect on project completion time.	More inclusive knowledge network models that go beyond lateral relationships are needed to understand how network connectedness and knowledge flows (codified/uncodified) interact to effect knowledge and project outcomes.
Burt, 2004	Social Networks	Conceptualises structural holes (information holes between densely connected groups) as an antecedent to generating new ideas and employee job performance and promotions.	Brokerage (0.939, $p < .001$) and idea length (.0013, $p < .05$) have a significant effect on idea discussion. Further, managers with networks who do not span structural holes had low idea value (.694, $p < .001$, high dismissal of ideas (.972; $p < .001$) and have fewer ideas (2.356, $p < .001$).	Ideas were generated as different social groups were integrated but the idea spread was an issue, as whole networks stayed disparate in organisations. The need to investigate how whole networks (i.e., small worlds) work to diffuse ideas for innovations remains a fertile research area.

Author(s)	Broad Research Stream	Key Theoretical Contribution	Key Empirical Contributions	Key Gaps Identified
Cross and Cummings, 2004	Social Networks	Theorises that individuals spanning social boundaries will observe higher performance ratings in knowledge-intensive work due to access to diverse knowledge and knowledge absorption in solving complex problems.	Consultants with ties to IFEs outside and inside the organisation ($p < .01$), high betweenness centrality (awareness of network position) ($p < .05$) and high flow betweenness (information of network position) ($p < .05$) had high performance ratings.	Network characteristics and boundary spanning ties and positions are relevant factors in knowledge-intensive networks. The need to adopt a whole-network perspective to study organisational innovativeness requires further attention.
Inkpen and Tsang, 2005	Social Networks	Theorises a network typology of horizontal and vertical networks that span from a structured to unstructured dimension. Inter-organisational networks are conceptualised as having structural, cognitive and relational dimensions that facilitate knowledge transfer.	N/A	Inter-organisational network types that permit knowledge spill overs and transfers may be affected by different conditions and mechanisms, such as shared goals in an intra-corporate network v. goal clarity in a strategic alliance.
Lam, Kraus and Ahearne, 2010	Social Networks	Theorises top-down frontline learning by positing that individual-level market orientation (IMO) diffuses to the frontline-level through formal channels (mid-	Sales directors' IMO has a positive effect on sales managers' IMO (.16, $p = .01$) and expert peers' IMO (.11, $p < .05$). In turn, expert peers' and	Formal top-down learning in organisations has been extensively researched; however, informal market-driven learning from expert peers to FLEs requires

Author(s)	Broad Research Stream	Key Theoretical Contribution	Key Empirical Contributions	Key Gaps Identified
		managers) and informal channels (social learning through expert peers). Additionally, sales district network size could hinder IMO diffusion from top-level managers and experts to frontlines.	managers' IMO have a positive effect on sales representatives' IMO respectively (35. $p < .01$; .17, $p < .01$). When the size of a sales network district is larger, the effect of expert peers' IMO on sales representatives' IMO diminishes ($-.05$, $p < .01$).	further attention. Social learning within groups are key for frontline learning. Dynamic and informal networks and their characteristics can complicate theorising about FLE networks.
Lusch, Vargo and Tanniru, 2010	Social Networks (S-D Logic view and Value Networks Perspective)	Theorises that supply chains are service ecosystems that employ value networks. These networks are tied through information technology and business relations. Thus, value is co-created by customers in networks via knowledge exchange (KE) and governance of supply chain (service) activities, which improve learning to serve in a value network.	N/A	Market and hierarchical governance have been researched extensively; however, little is known about the governance of networks. It will assist readers if this is stated. governance approach to better understand how social norms, network positions and characteristics predict learning requires further investigation.
Marrone, 2010	Open Innovation	Theorises about 1) team boundary spanning a) antecedents, including leadership, team	N/A	Conceptual and empirical research is scarce in relation to a) the mediating mechanisms of (whole)

Author(s)	Broad Research Stream	Key Theoretical Contribution	Key Empirical Contributions	Key Gaps Identified
		characteristics and structure, b) contextual antecedents, such as environmental certainty and team resources, c) outcomes, including team innovativeness; and 2) network-level boundary spanning, which is defined by having inter-team and external unit boundary spanning activities that could help innovation and performance outcomes triggered by leadership influence.		network-level boundary spanning activities; and the innovation area; b) team-level boundary spanning activities and the moderating variables.
Tortoriello and Krackhardt, 2010	Social Networks	Boundary spanners' bridging ties are conceptualised as having different micro-structures that generate individual innovativeness. Specifically, Simmelian ties are embedded in cliques and improve innovativeness via agreement creating forces, stability and increased cooperation.	Individual innovativeness is negatively associated with a high number of Simmelian ties due to accessing redundant information which impedes creativity. However, bridging Simmelian ties increases innovativeness ($p < .01$). Strong or weak bridging ties have positive but non-significant associations with innovativeness.	Mixed findings in strong and weak ties research calls for further examination of networks' structural characteristics which may have a confounding effect on network structure and the innovation relationship.

Author(s)	Broad Research Stream	Key Theoretical Contribution	Key Empirical Contributions	Key Gaps Identified
Reinholt et al., 2011	Social (Knowledge) Networks	Theorises a motivation-opportunity-ability framework to explain why open (ego-centric) networks may overcome the limitations of diffused trust and dispersed reciprocity to enhance knowledge sharing and acquisition.	Significant effects of three-way interaction among between autonomous motivation, network centrality and knowledge sharing ability on knowledge acquisition (.1, $p < .001$). Further, motivation to share knowledge positively moderates the association between knowledge acquisition and network centrality (0.9, $p < .05$).	Individual difference variables explain the variation in the degree to which knowledge is shared and transferred; however, issues of the quality of knowledge shared and the learning it entails have yet to be examined.
Lages and Piercy 2012	Open Innovation	Theorises about the drivers of employee generation of ideas for service improvement (GISI). The key antecedents that directly influence GISI include employee perceived organisational support, the reading of customer needs, job satisfaction and employee affective organisation commitment.	Reading customer needs (.54, $p < .01$), affective organisational commitment (.16, $p < .05$) and job satisfaction (.26, $p < .01$) facilitate idea generation for FLEs.	As FLEs are embedded in customer networks, it is important to know what amplifies and impedes knowledge flows, Customers and FLEs as domains of knowledge flows represent rich opportunities for future research.
Ye, Marinova and Singh, 2012	Open Innovation	Frontline knowledge is key to organisation learning because	Frontline knowledge articulation fully mediates	Harnessing frontline knowledge for

Author(s)	Broad Research Stream	Key Theoretical Contribution	Key Empirical Contributions	Key Gaps Identified
		it is developed from or created during customer interactions and is rich with insights for navigating productivity-quality trade-offs but remains untapped. Theorises a frontline knowledge mechanism for extracting value to improve service efficiency and customer satisfaction.	the relationship between knowledge generation and knowledge updating. When the frontline knowledge mechanism is a function, it significantly increases service efficiency (.13), customer satisfaction (.12) and revenue (.03) (all $p < .01$).	organisational outcomes requires the mobilisation of frontline networks for effective articulation.
Forte & Lampe, 2013	Open Innovation (Open Collaboration [OC])	Theorises about OC characteristics: 1) Participants work towards a goal; 2) Self-organising communities, such as Open Source Software projects or peer production platforms, represent good examples of OC; and 3) Social relations are persistent and permit the negotiation of social norms.	Findings from varied literature are present, but a key and common finding is that diverse motivations and social mechanisms exist for voluntary knowledge flows.	Different domains of human activity are present for OC. The need to discover dynamic social mechanisms that lead to the production of new knowledge requires further investigation.
Levine and Prietula, 2013	Open Innovation	Theorises the nature of OC organisation as: a) goal-focused (create value); b) open access (contribute/consume); c)	Simulations of a random population with a) 13% co-operators, b) 63% reciprocators, c) 20% free riders and d) 4%	Reciprocity and diversity are key mechanisms that require further development in open collaboration networks.

Author(s)	Broad Research Stream	Key Theoretical Contribution	Key Empirical Contributions	Key Gaps Identified
		networked (interaction/exchange); and d) loosely coupled (coordination/control). Also theorises about the performance benefits of OC organisations.	inconsistent participants showed that OC improves performance, but this improvement occurs at a decreasing rate with increasing 'co-operators'.	
Love, Roper and Bryson, 2011	Open Innovation	Theorises about the three phases of the innovation value chain: knowledge sourcing, transforming and exploiting. Further, the linkages throughout the value chain are formed by exploratory, encoding and exploitative linkages to external knowledge sources.	As for exploratory linkages, firms use of customers (27.935, $p < .01$) and internal networks with multi-functional teams (.223, $p < .01$) affects firms' knowledge sourcing activities. As for encoding linkages, public and private research organisations facilitate knowledge transformation from external sources (29.287, $p < .01$).	Firm external environments and knowledge activities play a key role in translating resources into business value; however, more longitudinal research is needed to understand causal linkages of knowledge processes in open collaborative networks.
Gonzalez et al., 2014	Social Networks	Theorises about how the formal and informal networks of Relationship Managers (RMs) affect RMs' performance. Social capital	Density of formal and informal networks have positive effects on performance (.24, $p < .05$; .37, $p < .01$). Moderating	Social capital derived from intertwined networks can be crucial for frontline performance. Studies that test whole-network-level

Author(s)	Broad Research Stream	Key Theoretical Contribution	Key Empirical Contributions	Key Gaps Identified
		sources (structures and relations) are posited to improve social capital benefits, including information access and cooperation. Cross-level networks (informal and formal) can enhance RM's performance, which is defined as 'cross-level' network synergy.	effects were found for the brokerage of 1) informal networks and density of formal networks (.24, $p < .05$), 2) formal network overlap (.38, $p < .05$) and 3) informal network density and network overlap (.56, $p < .01$)	effects, specifically different networks, such as advice or mentorship networks in which different knowledge flows may affect FLEs, require further attention.
Mina et al., 2014	Open Innovation	Theorises that there are differentiating features of service and manufacturing firms in open service innovation. Service firms are posited to rely heavily on external knowledge and non-R&D sources. They also co-create with customers more frequently. Drivers of open innovation in business service firms often include informal governance choices, such as mutual trust, relationships and/or less contractual solutions.	In relation to manufacturing and service firms, firm size (.008, $p < .1$) and R&D expenditure (.02, $p < .01$) were related to engagement with open innovation activities. Service firms utilise informal knowledge-exchange activities more than formal (.2, $p < .01$), as they engage with open innovation activities.	Open services innovation has been neglected by the open innovation research stream. An in-depth understanding of open innovation behaviours of service firms provides insight into how open innovation enables organisation outcomes and performance.

Author(s)	Broad Research Stream	Key Theoretical Contribution	Key Empirical Contributions	Key Gaps Identified
Bolander, Saturnino. Hughes and Ferris, 2015	Social Networks	Theorises that network positions of sales employees lead to knowledge flows. In fact, network centrality differs when a salesperson possesses power through reputational resources derived from access to powerful others versus informational resources derived from access to unique information.	Salesperson network characteristics (i.e., relational centrality and positional centrality) improves salesperson performance (.262, $p = .000$; .209, $p = .000$, respectively).	Political skills may drive relational centrality; however, it is not quite clear what drives positional centrality in networks. Further investigation of the antecedents of network characteristics that affect flows would be useful.
Bogers, Foss and Lyngsie, 2018	Open Innovation	Theorises about the micro-foundations of open innovation (e.g., that employee roles and characteristics play an important role in how and to what extent firms utilise external knowledge).	Innovative leadership of employees was associated with firm-level openness (.05, $p < .001$). Educational Diversity of employees positively affected firm-level openness (.19, $p < .05$). A positive interaction effect of educational diversity and work history exists on firm openness to external knowledge (.18, $p < .05$).	This study examined two types of employee diversity (as the micro-foundations of open innovation) to understand how knowledge heterogeneity employs firm openness to external knowledge use; however, the mechanisms and performance of open innovation were not examined.
Hartmann, Wieland and Vargo, 2017	Social Networks (Service Ecosystem Perspective)	Theorises about salespeople in a service ecosystem and defines selling actors as	N/A	The authors suggest that a social network lens be adopted as a research

Author(s)	Broad Research Stream	Key Theoretical Contribution	Key Empirical Contributions	Key Gaps Identified
		people who dynamically interact and exchange resources through service-for-service exchanges. Actors in the ecosystem form ties and relationships that facilitate the flow of information. As a result, they co-create value through institutional arrangements, crossing points and service ecosystem interactions. Often systematic interactions adopt and change collectively for institutionalised innovations.		priority to understand what service ecosystem tasks for emergent decision activities and what technologies will evolve and develop as the number of crossing points for multiple actors increase.
Santos-Vijande, Lopez-Sanchez and Rudd, 2016	Open Innovation	FLE co-creation involves collaboration with internal R&D teams to launch and market new service developments (NSDs). FLE co-creation enhances NSD market performance through FLE and customer outcomes as well as NSD speed and quality.	Some key findings for FLEs and customers: FLE co-creation directly affects FLE outcomes (2.074, $p < .05$) but does not significantly affect customer outcomes. FLE outcomes improve customer outcomes (4.355, $p < .01$), which in turn positively affects NSD market performance (2.297, $p < .05$).	Co-creation, which involves purposeful knowledge flows from internal and external facing employees, has complex and inherent challenges. Research in this area is scarce and further research is needed.

2.3.2 An open collaboration approach to innovation.

The concept of OC is considered pivotal in ‘distributed innovation models’ in which ‘knowledge flows purposefully cross organisational boundaries’ (Chesbrough & Bogers, 2014). OC is defined as ‘a system of innovation or production that relies on goal-oriented yet loosely coordinated participants who interact to create value and make [knowledge] available to contributors and non-contributors alike’ (Levine & Prietula, 2013). Thus, in an OC model, FLEs a) create or co-create value in customer interactions; and b) interact across different departments/units to successfully innovate customer services. For example, Chez Panisse, a Californian restaurant that started sustainable local food innovation, has an open kitchen concept where staff connectedness and customer collaboration are encouraged (Chesbrough Kim & Agogino, 2014). The Chez Panisse cooks create a new dish almost every day inspired by the fresh food markets and enhance their menu by listening to customers.

In OC settings, participants may be either firm employees or individual contributors who are motivated by mechanisms other than formal rewards, such as the desire to be recognised as an expert or active contributor and/or a sense of achievement. Social norms, reciprocity and diversity are important enablers of OC (Forte & Lampe, 2013; Levine & Prietula, 2013; Reinholt, Pedersen & Foss, 2011). These collaborative actions generate new knowledge that could potentially be shared and/or consumed widely. The service context and the role of FLEs share a number of similarities with this more general OC idea. For example, high-quality service innovations can emerge from the insights that FLEs gather during customer interactions (e.g., knowledge gained during customer problem solving/feedback) and the testing of these insights with peers, managers and/or IFEs (as internal knowledge flows). Customer knowledge is often tacit, and its value is only realised by conscious attempts to interrogate its relevance and effect. Interactions with other firm employees that encourage the exchange of knowledge (e.g., seeking help or advice from a colleague about

how to resolve a customer issue) help filter and refine the new knowledge through multiple lenses. Thus, newly generated (tacit) knowledge from customer interactions often needs to be filtered and refined and subsequently combined and recombined with current knowledge to develop opportunities for new service offerings (Santos-Vijande et al., 2016).

2.3.3 A social network theory approach to innovation.

Social network studies predict that the connectedness of network actors enhances innovation and that different actors have unequal effects on knowledge flows (Subramanian et al., 2013). Exploring frontline contributions to innovations along with their connections to customers and IFEs fits well with a social network perspective. Previous research on frontline innovation often focuses on employee (i.e., individual), dyadic (employee-customer) or team/organisational phenomena, which obscures potential insights from taking a whole-network perspective. Research has demonstrated that knowledge capture, circulation and codification play a crucial role in enhancing market intelligence and co-creation (Ballantyne, 2000, 2003). Notably, knowledge exchanged within internal networks legitimises FLE tacit knowledge, enables its translation into explicit knowledge and improves its value-in-use (Ballantyne, 2003, 2006). This paper sought to extend this literature by exploring the role of bottom-up employee-management networks (including FLE-IFE networks), which have been the focus of much of the literature, while also focusing on horizontal networks (i.e., FLE-IFE and customer networks) where significant market insight can be fruitfully cultivated.

Circumscribing the overlaps between open innovation and social network literatures reveals several gaps that guide how these bodies of related literature can be woven together (see the right-most column of Table 2) and permits an understanding of the nuances of roles of FLEs in service innovation. At a broad level, these gaps include the need to account for knowledge flows, adopt a whole-network perspective and account for the effects of hierarchy and self-governance and network characteristics, especially across boundaries.

2.3.4 Gaps in frontline employee-service innovation research.

Table 2 distils the implications of the roles of FLEs from open innovation and social network studies, which in turn formed the building blocks for our theorising. The insights (as organised in Table 2) are based on two distinct features of FLE roles: 1) customer interaction, which focuses on dealing with customers to serve their needs; and 2) service innovation, which focuses on the generation of new ideas by employees within an organisation. Both features are intertwined yet distinct and thus provide a motivation for integrating open innovation and social network perspectives. There are overlapping aspects of social networks and open innovation studies; however, as Figure 2 shows, each research stream has variously examined network characteristics (social networks), external and internal knowledge flows (open innovation) and service employees for knowledge-intensive work. The present study intersects these three research streams and advances theorising of frontline roles in service innovation.

Service innovations are effective when new knowledge stems from FLEs performing their work at the frontline and gleaning insights into non-obvious market preferences. This customer network is essential to enhance FLEs' knowledge about how services can be improved or modified to fit changing customer demands. Consequently, FLEs are key enablers of new service development or service innovation (Ordanini & Parasuraman, 2011). Similarly, this study also identified several drivers of creativity and speed that are essential for service innovations, including *live* customer interactions, *fast* decision-making requirements as per customer conversations, *continuous* internal coordination for problem solving, *frequent* exposure to unveiling roots of customer service problems and *prompt* customer feedback about service performances (see Table 2).

Table 2

Frontline Employee Roles, Service Innovation and Potential Tensions

Frontline Employee-Customer-Facing Roles	Representative Studies	Frontline Employee Roles and their Inherent Relations to Service Innovation	Tensions Identified due to Interplay between Frontline Employee Roles and Service Innovation
Co-creation with customers, as customer interactions are often <i>frequent</i> , fragile, dynamic and intimate.	Ordanini and Parasuraman, 2011; Vargo and Lusch, 2004, 2008; Ye et al., 2012	Accessing diverse and non-obvious knowledge about a) customer preferences and priorities; and b) dynamic market conditions and demands.	Complex organisational frontline interface that intertwines with diverse and distinct networks for KE. Tacit FLE knowledge is difficult to articulate, may not be in an easily useable or stored form for organisations.
<i>Real-time</i> problem solving for heterogeneous customer problems.	Bowen and Lawler, 2006; Singh et al., 2017; van der Heijden, Schepers, Nijssen and Ordanini, 2013.	Inherently helping to develop creative service solutions (e.g., with fast decision making and continuous internal coordination processes).	Improvised solutions may not be mobilised as effective solutions for a whole organisation. Cross-level and multi-level knowledge and task flows affect the nature of good-quality service innovations.
<i>On-the-job</i> learning from a diverse array of customer needs, wants and responses.	Bell et al, 2010; Choudhury, 2017; Schepers et al., 2016; Ye et al., 2012.	Learning the underlying causes of customer problems contributes to organisation learning and innovativeness.	Knowledge acquired may not be relayed easily to organisation entities or forms (e.g., may not be stored in a database, repository and library or relayed to another employee/manager).

Frontline Employee-Customer-Facing Roles	Representative Studies	Frontline Employee Roles and their Inherent Relations to Service Innovation	Tensions Identified due to Interplay between Frontline Employee Roles and Service Innovation
		Receiving prompt customer feedback as learning occurs facilitates the development of new ideas.	Service as a knowledge-intensive and intangible activity requires FLE creativity and skill development to advance innovation quality.
Acting as <i>change agents</i> for new services (i.e., promoting and delivering new services to customers).	Melton and Hartline, 2010, 2013.	Improving how new services are implemented and mobilised in a service ecosystem.	Innovation implementation from top to bottom often requires FLE buy-in. Top-down and bottom-up governance are not sufficient; the self-governance of social networks plays an important role when emergent customer service is inherently and frequently present in knowledge- and skill-intensive service innovation work.

In addition to customer interactions and service innovation roles, four sources of tension were also identified as a consequence of the interplay of these two roles (see Table 2, ‘Tensions’ column). As Fahey and Prusak (1998, p. 267) suggest, knowledge is meaningful when a ‘knower’ knows it and is affected by external social interactions and the knower’s own needs. Further, when personalised (tacit/unobservable) knowledge is not shared through communication, it is harder to utilise (Alavi & Leidner, 2001). This generates our first type of tension: a lack of social mechanisms in intra- and inter-organisational networks to extract FLE tacit knowledge could harm FLE idea generation processes for an organisation. Second, as problem solvers, FLEs may inherently develop creative ideas at work, but continuous effort in resolving conflicts and troubleshooting may impede FLEs’ innovation by imposing a heavy burden on their cognitive resources and available time. Third, as FLEs examine and resolve the underlying roots of service problems for a particular customer, the improvised solution deployed for that specific customer may remain as a solution at the dyadic level but fail to generalise into an innovation for the organisation as a whole. Finally, when acting as change agents, FLEs may experience difficulties in promoting top-down enforced service solutions; thus, organisations could see failures or diminished gains in the new service deployment and commercialisation phases of a project.

2.3.5 Towards a taxonomy of frontline network domains and flows.

A taxonomy facilitates theory building by developing a classification schema that provides a mutually exclusive and collectively exhaustive description of the phenomenon (Hunt 1991). Conversely, a classification schema facilitates theory building by directing attention to different configurations or combinations represented in the schema that are differentially effective for a given outcome, such that ‘ideal types’ may be theoretically conceptualised and empirically tested (Cornelissen, 2017). For example, in the strategy field, Miles, Snow, Meyer and Coleman (1978) identified three ‘ideal’ organisational forms (i.e.,

prospector, analyser and defender) that relate differentially to firm outcomes. Classifying organisational strategies into mutually exclusive and collective exhaustive categories permits theorising about the mechanisms that explain how different organisational forms foster and cultivate different pathways to innovation and performance (Doty, Glick & Huber, 1993).

2.4 Taxonomy of Frontline Networks

A meaningful taxonomy requires well-defined and clearly demarcated constructs as its building blocks. Consistent with our objective of linking frontline networks and the OC literature, frontline network *domains* and *flows* were conceptualised as distinct constructs. *Domains* indicate the distinct and substantively meaningful category of agents or stakeholders that are connected to FLEs. In the present study, two disparate domains were proposed: a) customers; and b) IFEs (within the same organisation). In other organisations, other domains could be considered such as suppliers or outside-employees, but I leave these domains for future work, as they are less proximal to the service innovation process. Unlike domains, *flows* indicate the distinct content that network connections carry. In the present study, two disparate forms of content were proposed: a) knowledge; and b) (self-) governance activities (see Table 3).

First, employees (i.e., FLEs and IFEs) and customers were identified and focused on as domains of interest. Knowledge and self-governance as flows of interest were also considered in our initial taxonomical development. Both were identified in the literature review of the roles of FLEs in service innovations (see Tables 1 and 2), which highlights the gaps and tensions in FLEs' connectedness to customer and intra-organisational networks and their innovation-related flows. Other flows are feasible including influence (power) and social (belongingness); however, these flows are left for future extensions, as the initial focus of the present study was on the two primary content types.

2.5 Taxonomy-based Theory Building Directions

Our taxonomy-based theory was developed in three steps: 1) the characteristics of domains and flows were explained; 2) flow-domain networks were intersected to predict each quadrant's distinct effect on service innovations; 3) network-level mechanisms for each domain-flow network were explicated in relation to their characteristics and functions. Here, we turn our attention to examining the dark side of frontline networks. Specifically, it considers which countervailing knowledge and self-governance mechanisms may diminish service innovations.

To define the domain and flow networks' characteristics, in Table 4, a deeper level of detail is used to characterise the taxonomy outlined in Table 3. Table 3 (shaded areas) substantiates and specifies our choice of domains and flows by including for each case a definition, its dimension and key attributes. Domain networks involve FLE-customer or FLE-IFE interactions. The frequency and extent of interactions may be spontaneous/uncertain or planned/predictable or both. Further, the attributes of the domain networks are the *closeness* and *number* of connections (i.e., ties) at each node, which are collectively referred to as 'connectedness'. For network flows, which are defined as the knowledge or governance activity content carried over networks, the relevant dimension is the *level* of content that passes through the network. For knowledge exchange network flow, the flow attributes are expertise-related and are reflected in the provision of guidance, help and advice to others, while for self-governance networks, the flow attributes are task-related and reflected in negotiated responsibility for assigning and executing tasks. The attributes of network flow differ depending on whether the content of ties are knowledge or self-governance activities.

Intersecting frontline network domains and network flows yields different combinations that reflect distinct ways of characterising innovation in service organisations. Specifically, a range of 'ideal' or prototypical combinations may be conceptualised using the

domains and flows that constitute the proposed taxonomy. Some combinations are especially noteworthy. For example, ‘more is better’ combinations intuitively characterise service organisations that are ‘high’ on all or most features, including customer and inside-facing connectedness and knowledge and self-governance activity flows. Other combinations may characterise service organisations that optimise by selectively combining features *across* (rather than *within*) domains and flows. For example, a ‘customer-connected knowledge network’ (see Table 3) combination may refer to a service organisation that selectively optimises frontline networks by emphasising customer connectedness and knowledge flows, while paying less attention to inside-facing connectedness and governance activity flows. Conversely, an ‘internally-connected governance network’ (see Table 3) combination may optimise selectively by giving priority to inside-facing connectedness and flows of governance activities. Finally, some service organisations may optimise FLE networks by combining features *within* domain or *within* network flow; however, this causes them to miss the gains that can be derived by optimising *across* domains and flows. For example, a connectedness combination may emphasise connectedness in both customer and inside-facing networks but pay less attention to the flows enabled in these networks. Similarly, a flow combination may give priority to flows of knowledge and governance activities but may pay less attention to the connectedness in FLE networks.

Our key argument is that the proposed domain and flow features of the taxonomy permit a comprehensive representation of a wide diversity of service innovations; these may differ substantially in terms of the frontline networks that an organisation fosters and supports. More importantly, the proposed taxonomy identifies major features that distinguish these service organisations and guides theory building by directing researchers to hypothesise about the effects of the distinguishing feature(s) on service innovation.

Table 3

Taxonomy of Frontline Networks

	NETWORK FLOWS	
	Knowledge exchange in network Definition Sharing, acquiring or seeking customer service knowledge between (frontline and internal-facing) employees and customers form this network flow.	Self-governance activities in network Definition Employee self-organisation activities (i.e., evaluate, decide, select and assign tasks) regarding customer services form this S-G network flow.
DOMAIN NETWORKS		
FLE-customer networks Definition FLEs' connectedness in the customer idea sharing processes form this network.	Customer-connected knowledge networks (Quadrant 1)	Customer-connected governance networks (Quadrant 3)
FLE-IFE networks Definition FLEs' connectedness in other employees' (IFEs') work-related communications form this network.	Internally-connected knowledge networks (Quadrant 2)	Internally-connected governance networks (Quadrant 4)

Note: FLE: Frontline employee, IFE: Internal-facing employee

This taxonomy provides the building blocks to better understand service innovation. Each network domain and flow component reveal a portion of the overall picture of a firm's capacity to innovate. It is beyond the scope of this study to explicate a grand theory of FLE-led service innovation that integrates all the components of our taxonomy; however, there is value in demonstrating the mechanisms that contribute to service innovation outcomes. Thus, in the following section, the implications of the four combinations of network domain and flow (see Table 3 and 4) are explored in relation to two of the most commonly studied aspects of innovation: 1) creativity; and 2) speed to market. Creativity in the context of service innovation affects the extent to which the service differs from competing alternatives in a way that is meaningful to customers (Dewar & Dutton, 1986), while speed to market refers to the time elapsed between the initial idea stage of the service innovation process and its actual implementation (Fang, 2008). As each quadrant in Table 4 is explored, elements of our taxonomy in practice are illustrated. We explicate the general network-level mechanisms for each domain-flow network and show these mechanisms at work within an exemplar company (see the summary in Table 5).

2.5.1 Frontline employee–customer networks and knowledge exchange.

Turning to the intersection between FLE-customer networks and knowledge exchange (Quadrant 1 in Table 4), a high level of connectedness is likely to have a positive effect on service innovation creativity. High connectedness increases the velocity of knowledge shared (e.g., due to higher frequency conversations and shorter pathways between customers and FLEs and fellow FLEs), which enables the real-time search for and testing of new ideas for service modifications and improvements. Social resources such as trust and cooperation, forged within close ties, are positively related to new knowledge creation (Collins & Smith, 2006). A lack of connectedness, by contrast, suggests infrequent contact between FLEs and customers, meaning that ideas and new approaches invented at the frontline are not easily

‘road tested’ with customers and other frontline colleagues. Further, higher connectedness and the trust between FLEs and customers that this creates, allows for the suggestion and trial of more radical and risky ideas. For example, customers demonstrate greater patience with service providers with whom they have strong relationships (Lengnick-Hall, Claycomb & Inks, 2000; Tax, Brown & Chandrashekar, 1998).

Table 4

Theory Building Directions for Taxonomy of Frontline Networks

	NETWORK FLOWS	
DOMAIN NETWORKS	Knowledge Exchange (KE) in network Definition Sharing, acquiring or seeking customer service knowledge between (frontline and internal-facing) employees and customers form this network flow. Dimension: KE for customer services. Attributes Flow: Expertise, guidance, help and advice around customer services. Actions: Seek, exchange, acquire and/or integrate knowledge.	Self-Governance (SG) activities in network Definition Employee self-organisation activities (i.e., evaluate, decide, select, assign tasks) regarding customer services form this network flow. Dimension: SG activities for customer services. Attributes Flow: Emergent tasks or alternatives for customer services. Actions: Assign, evaluate and/or execute emergent tasks or alternative courses of actions.
Customer-FLE Networks Definition FLEs' connectedness in customer idea sharing processes form this network. Dimension: FLE-customer interactions (Definition: the extent to FLEs and customers conversations) Attributes Closeness to customers (distance) and Number of connections.	Quadrant 1 Definition of network activities: FLEs and customers interact to seek help regarding customer services and exchange service solution knowledge. Functions of networks: Uncovers root causes of customer service problems; improves FLE knowledge by customer feedback; helps extract testable new service ideas. Expected effects on service innovation: Generates and improves <i>creative</i> knowledge shared between organisations and customers, enables <i>real-time</i> search for and testing of newly conceptualised ideas for service modifications and improvements.	Quadrant 3 Definition of network activities: FLEs and customers interact in decision-making activities regarding emergent customer service processes. Functions of networks: Self-organises for efficient service idea implementation; allocates and executes emergent customer service tasks; evaluates alternative customer service solutions. Expected effects on service innovation: Facilitates <i>rapid filtering of best-quality</i> ideas as candidates for organisation knowledge.

	NETWORK FLOWS	
DOMAIN NETWORKS	Knowledge Exchange (KE) in network Definition Sharing, acquiring or seeking customer service knowledge between (frontline and internal-facing) employees and customers form this network flow. Dimension: KE for customer services. Attributes Flow: Expertise, guidance, help and advice around customer services. Actions: Seek, exchange, acquire and/or integrate knowledge.	Self-Governance (SG) activities in network Definition Employee self-organisation activities (i.e., evaluate, decide, select, assign tasks) regarding customer services form this network flow. Dimension: SG activities for customer services. Attributes Flow: Emergent tasks or alternatives for customer services. Actions: Assign, evaluate and/or execute emergent tasks or alternative courses of actions.
FLE-IFE Networks Definition FLEs' connectedness in other employees' (IFE) work-related communications form this network. Dimension: FLE and other employee interactions. (Definition: FLE-non FLE networks are identified by their extent of cross-sectional FLE employee communications) Attributes: Closeness among employees (e.g., with proximity and departmental functions), Number of connections (e.g., meetings, conversations and serendipitous collisions)	Quadrant 2 Definition of network activities: KE and integration activities among internal networks. Functions of networks: Establishes creative communication for customer services across departments. Expected effects on service innovation: Engenders informal knowledge <i>validation</i> regarding <i>feasibility</i> of new customer service ideas; creates synergies through cross-sectional employee conversations.	Quadrant 4 Definition of network activities: Decision-making activities among internal networks. Functions of networks: Establishes fast idea validation through peers; inherently develops FLE organisational awareness and active bottom-up sense-making for better decisions. Expected effects on SI: Enables <i>timely</i> and <i>effective</i> execution of emergent customer service tasks.

As an example, consider the approach to service innovation at online retailer Zappos, where customer relationships are built not 'through the website', but as 'a result of how

people are treated' in frontline interactions (Solomon, 2017, p. 1). At Zappos, customer interactions are not measured by the number of customer calls, but the average duration of the call—the longer the call the better. Having 'in-depth' conversations with customers generate intriguing stories with exciting and often highly improvised customer service solutions. The firm's encouragement of FLEs to pursue deeper, more meaningful, interactions with customers unearths novel and varied ways of serving customers.

2.5.2 Frontline employee–internal-facing employee networks and knowledge exchange.

As FLE-IFE knowledge exchange networks (Quadrant 2 in Table 4) increase in connectedness, we are likely to observe increases in service innovation creativity as new ideas are interrogated by a wider range of employees from different backgrounds and with different skill sets. Increased connectedness across departments allows informal knowledge validation which helps refine organisation-wide thinking about new service processes. Cross-unit knowledge exchange in organisations is prone to synergies (Hansen, 1999, 2002; Szulanski, 1996), which enable the creation of new knowledge (Tsai & Goshel, 1998). Further, the effect on service innovation increases as emergent ideas flow and are considered practical and realisable within the firm. Internet firm Google, for example, actively tries to span department boundaries where possible to bring the full weight of the organisation's competencies to the innovation process. Google's COO describes the firm's efforts to 'have as many channels for expression as we can... different people and different ideas, will percolate up in different ways' (He, 2013). Thus, a cross-connected service organisation network is a positive lever for service innovation creativity. Finally, Fujitsu, which is well known for open innovation activities, prioritises the support of employee initiative both within and outside the firm (see Table 5 for details) (Edmondson & Harvey, 2016).

2.5.3 Frontline employee–customer networks and self-governance.

Turning to FLE-Customer self-governance networks (Quadrant 3, Table 4), we anticipate that a high level of connectedness will be associated with more efficient implementation of new ideas. FLEs with a strong sense of autonomy are likely to be more proactive in filtering and discarding ideas that are unlikely to be candidates for implementation when shared widely within the organisation. The FLE-Customer self-governance network, thus, performs a ‘triage’ function to ensure that only the better ideas for implementation are considered by other departments and senior management. Consider, for example, the autonomous nature of self-organised networks at Netflix. Their company culture references employee judgement as one of their important values. They empower and encourage employees to pursue and implement new ideas within minimal consultation or process constraints (Netflix Jobs, n.d.). Software developer Adobe takes a similar decentralised approach, funding creativity and testing upfront, by providing employees with a prepaid credit card to spend developing and testing ideas. This allows fast and relatively inexpensive, testing of an idea in its early stages without time consuming cycles of formal approvals (Burkus, 2015a). In the fashion industry, Zara exhibits customer-connected governance networks (see Table 5). Customers interact with ‘Regional Commercials’ (FLEs responsible for understanding dynamic customer demand). Further, ‘commercials’ are autonomous and can execute innovative ideas. For example, they can change clothing designs or manufacturing orders to match local demand (Doiron, 2015; Ringel, Taylor & Zablit, 2016).

2.5.4 Frontline employee–internal-facing employee networks and self-governance.

A high level of connectedness in the FLE-IFE self-governance network (see Quadrant 4, Table 4) leads to greater speed to market for emergent ideas but for different reasons than the FLE-customer network. The FLE-IFE network brings two important benefits

to the innovation process: 1) idea validation through peer input and; 2) collective awareness and sense-making. The process of active sense-making has a positive effect on decision-making effectiveness (van Riel, Ouwersloot & Lemmink, 2013); however, a bottom-up sense-making approach is likely to be more valuable for service innovation. For example, healthcare provider Permanente's use of collaborative communities 'requires people to think beyond their own jobs to how their roles fit within others' (Adler, Heckscher & Prusak 2011, p. 99). Thus, a self-organising, connected employee network helps implement new service ideas that are in the best interests of the organisation in a timely and effective manner.

In terms of self-organising internal networks, the music streaming company Spotify provides an example of Quadrant 4 (see Table 5). The company has 'squads' (i.e., working groups) that oversee the development of new services and are autonomous in building their task networks. Members of squads can easily cross-over back and forth to other squads to solve problems or implement ideas jointly (Mankins & Garton, 2017; Vroom & Sastre, 2016).

In proposing our taxonomy for FLE networks, it is acknowledged that FLE roles may vary significantly both *within* and *across* service categories. For example, in the hotel industry, a firm such as Red Roof Inn (an economy chain hotel) is less likely to have complex FLE roles due to its emphasis on efficiency during customer interactions. Conversely, the Ritz Carlton (a luxury hotel chain) is more likely to nurture and support the connectedness between FLEs and customers to develop more engaged and intimate relationships. FLE roles and the relative importance of network domains and flows is also likely to vary *across* service categories. For example, frontline roles in the grocery industry are likely to face markedly different challenges to FLEs in professional services.

Service contexts may be differentiated along different dimensions, but the relative emphasis on intangibility and personalisation are particularly useful to assess the degree to

which FLEs play a central or peripheral role in customer's service experience (Cunningham, Young, Lee & Ulaga, 2004; Lovelock, 1983). It is expected that service experiences that involve greater levels of intangibility and personalisation would be more likely to engage FLEs as central players in creating such experiences (e.g., 'cast members' at Disney). FLE networks in these contexts are likely to be more relevant in supporting service innovation. However, this should not be taken to imply that the yield for service innovation from FLE networks will be minimal in service contexts that do not emphasise intangibility and/or personalisation. As noted in Table 5, service contexts with moderate to low levels of intangibility and personalisation, such as Zara, may nevertheless benefit from FLE networks because customer-facing employees are the frontlines in observing changing market (fashion) trends across the diversity of customer interactions. Where agility in reading changing and dynamic customer or market trends is prized, FLE networks may play a central role in service innovation.

Table 5

Taxonomy of Open Collaborative Networks and Network-Level Mechanisms in Practice

DOMAIN NETWORKS	NETWORK FLOWS	
	Knowledge Exchange (KE)	Self-Governance (SG) Activities
Customer-FLE Networks	Customer-connected knowledge networks (Quadrant 1) General network-level mechanisms: • Knowledge exchange between customers and FLEs seeds new service ideas. • Knowledge exchange enables a better fit of existing services to customer needs and wants. • Knowledge accumulated by FLEs is codified to enable sharing across the whole organisation. Examples of mechanisms in Zappos: • Zappos do not impose time limits on FLE interactions with customers, as longer durations lead to new ideas for services. • Unscripted customer interactions allow for more customer knowledge to be generated. • Zappos creates an annual culture book of customer service stories from which Zapponians (Zappos employees) learn. See Burkus (2015b); Solomon (2017); Zappos (2018).	Customer-connected governance networks (Quadrant 3) General network-level mechanisms: • Cross-functional employee teams (comprising IFEs and FLEs) accelerate decision making with new customer knowledge. • Cross-functional teams filter new ideas for quality and relevance for service innovation. • Frontline teams operate with autonomy to implement service modifications. Examples of mechanisms in Zara: • Customers interact with ‘Commercials’ (i.e., employees charged with understanding customer preferences by geography). • Regional ‘Commercials’ work with Design ‘Commercials’ (i.e., product managers & designers) to modify product lines. • ‘Commercials’ have the authority to set designs, order supplies and change manufacturing details for the greatest local impact. See Doiron (2015); Ringel et al. (2016).

NETWORK FLOWS		
DOMAIN NETWORKS	Knowledge Exchange (KE)	Self-Governance (SG) Activities
FLE-IFE Networks	Internally-connected knowledge networks (Quadrant 2) General network-level mechanisms: • Open communication between FLEs and IFEs is encouraged. • Well-established infrastructure for transparent knowledge exchange. Examples of mechanisms in Fujitsu: • Cross-functional teams operate jointly to support a culture of creativity and innovation. • Use of network-based modes of collaboration to combine employees. • Support for engagement between employees who interact with outside firms and internally-facing employees helps to change implementation programs. See Edmondson and Harvey (2016)	Internally-connected governance networks (Quadrant 4) General network-level mechanisms: • Cross-departmental groups interact formally and informally to test new ideas. • New service and product design changes are implemented quickly through joint, decentralised decision making. Examples of mechanisms in Spotify: • Spotify's agile culture allows fast reaction times to environmental changes through collaboration between working groups called 'squads'. • Squads have autonomous leaders and members can switch seamlessly between squads. • Squads have the latitude to oversee development of new services and knowledge networks See Mankins and Garton (2017); Vroom and Sastre (2016)

2.5.5 Theorising a dark side.

Our taxonomy also permits theorising about mechanisms of a dark side. Highly connected, knowledge-rich, self-governing networks will, for the most part, have positive effects on the creativity of service innovations and their speed to market. In certain circumstances, these effects may be constrained or even become unwound. This section considers how our main effects arguments might be affected by 1) problems with identity; and 2) the salience of divergent goals. Arguably, each of these might conspire against the universally positive effects of connected knowledge and self-governance networks.

One advantage of increasing connectedness between organisational members from various departments, backgrounds and skill sets is that a higher diversity of insight and feedback is given to new ideas. Due to the greater decision-making potential of self-governing networks, it also enables innovations to be implemented more quickly. However, as members from more and varied backgrounds within an organisation connect, potential conflicts in social identity may arise (Tajfel & Turner, 1979). As diversity increases, there is potential for a ‘hunkering down’ effect (Putnam, 2007), as the diversity signal creates uncertainty and, ultimately, reduces both between- and within-group social capital. A reduction in social capital is likely to undermine the decision-making benefits of a strong mutual perception of self-governance potential. The implication is that there is likely to be an optimum level of connectedness, especially as it intensifies identity differences.

Increased connectedness between groups will also bring into focus the (often) disparate nature of organisational goals. For example, customer-facing employees are often driven by customer-focused metrics, while those in operations or finance are motivated by a cost-containment calculus. These goal differences are as much a function of professional norms as management driven metrics. Members of a group tend to engage in collective behaviour that maintains the internal cohesiveness of the group’s goals (Sandefur &

Laumann, 2000). As different groups develop ties with each other, goal differences become more salient, leading to competition, a throttling of knowledge sharing and joint decision making. The extent to which organisational members collaborate across groups is thus curtailed. Inefficiencies enter the process of service innovation as lengthy negotiations between individuals occur as they compete to reap the benefits of innovation.

2.6 Discussion

Taxonomies are core conceptual contributions that systematically organise the nature and scope of a phenomenon of interest and provide a foundation for building theory that develops a nomological net around the phenomenon of interest (Cornelissen, 2017; Doty & Glick, 1994). Theoretically grounded nomological nets connect the phenomenon of interest to other (related) bodies of literature to theorise mechanisms that advance our understanding of the phenomenon and identify its key antecedents, processes (e.g., mediators and moderators) and outcomes. These aspirations for future theoretical work (motivated by the proposed taxonomy) guide this discussion. Specifically, this section discusses the theoretical connections between our taxonomy of frontline knowledge networks and several research areas, including OC, social networks and organisational frontlines, that could be exploited in future research. This section also considers the implications of the proposed taxonomy for service practice and innovation in organisations; however, it is acknowledged that detailed managerial prescriptions must await empirical testing. Finally, a brief conclusion is drawn.

2.6.1 Frontline knowledge networks and open collaboration research.

OC research recognises the importance of networks (e.g., ego networks within an organisation) and gives attention primarily to technical boundary spanners (e.g., R&D scientists) to focus on product/process innovations. However, service firms have unique qualities distinct from manufacturing firms (Chesbrough, 2010; Mina et al., 2014). Most do

not invest heavily in R&D facilities and scaling innovations often require gains in knowledge accumulated by FLEs and customers.

Further, FLEs as boundary spanners present distinct qualities relative to R&D engineers or open source developers, who span different organisational boundaries. For example, customer-facing employees are often engaged in improvising or constructing, in real-time, solutions to customer problems that enhance the service experience and generate novel knowledge. During the product innovation or project development stage, boundary spanners often interact with customers with a ‘best-fit’ solution that is well-articulated before facing customers. Consequently, while limited time for troubleshooting may germinate an abundance of new ideas, it may also act as a stressor for FLEs, thus diminishing their subsequent knowledge sharing behaviours. This has implications for the use of dynamic controls to encourage idea generation while reducing stressors and overcoming barriers to knowledge sharing. In short, it is argued that a micro-foundational approach should be adopted to understand OC and service innovation, under which FLEs (who have unique boundary spanning qualities; see Table 2) are the basic building block.

This paper focused on the role of FLEs as sources of service innovation. However, it is acknowledged that service innovations may emerge in other ways. For example, some companies utilise dedicated innovation teams to promote a top management imperative on innovation processes (e.g., Apple). While other companies discover service innovations as a result of unexpected market conditions or regulatory changes (e.g., 3M’s post-it innovation). In open innovation research, user-led, R&D and market-research are also often key sources of innovation. Consequently, future research should examine how different sources of innovations interact within FLE networks to effect service innovation.

2.6.2 Frontline knowledge networks and social networks research.

Our study aims to extend social network theory by defining four network constructs (including domains and flows) and demonstrating their combined effects on service innovation. Connectedness as a construct and its relationship to innovation has demonstrated intriguing yet mixed results. Our approach of delineating sub-networks within organisations oriented around pivotal FLEs, while also isolating knowledge and self-governance flows, attempts to reconcile these findings. To date, network theory has predominantly explored the effects of network variables (e.g., density, clustering and closeness) on non-network dependent variables (e.g., individual performance and organisational performance) (see Borgatti & Halgin, 2011 for a review of network theory building). Conversely, this paper first considered the potential for *interactions* between network variables across both network domain and network flows and then explored the implications of these for organisational performance.

Additionally, studies taking a whole-of-network approach rather than an ego-centric view of organisational performance are few and far between (Ahuja, 2000; Burt, 1992; Uzzi, 1997; Uzzi & Spiro, 2005). Inter-organisational whole-network research has demonstrated the value of understanding the structure of whole-networks to determine its effect on business performance (Provan, Fish & Sydow, 2007). This idea was extended by exploring the effects of both intra- and inter-organisational whole-network structures for service innovation.

Finally, we added to the literature on tie *content* that has received less attention than more commonly explored concepts in network theory, such as tie strength (Burt, 1992; Levin & Cross, 2004) and nodal properties (e.g., network position and proximity studies; Burt, 2004). Previous research on tie content has focused mainly on the exchange of resources such as kinship, support, advice and assistance (Collins & Smith, 2006; Gittelman, 2007; Hansen, 2002). These resources are useful in an organisation setting but provide few insights about

the decision-making processes that are essential for getting work done, especially by employees empowered to do so. By advancing the notion of self-governance flow (e.g., negotiating, evaluating and jointly supporting to new solutions) we provide a better understanding of how social networks support the performative aspects of organisations as a whole.

2.6.3 Frontline knowledge networks and organisational frontline research.

An emergent field of organisational frontlines is taking hold in the service literature that conceives ‘frontlines’ more broadly than FLEs (Singh et al., 2018). Specifically, the organisational frontlines research conceives ‘frontlines’ as the site of contact between the organisation and customer, regardless of whether the contact is human-to-human (e.g., employee-customer), machine-to-machine (e.g., remote monitoring of customer devices, such as cars) or some combination thereof (e.g., machine-to-human or self-help technology). Our proposed typology of frontline knowledge networks conceives a central role for FLEs, but does not explicitly consider the wide range of technological or augmented (human + machine) interfaces that are increasingly observable in frontline interactions between firms and their customers. However, the proposed taxonomy is compatible with the conceptions anticipated by organisational frontlines research and can be further developed and advanced to incorporate frontline knowledge networks that are infused with technological interfaces. To motivate this development and advancement, we consider the contribution of our proposed taxonomy in the context of the increasing relevance of artificial intelligence (AI) and automation in frontline technologies (Huang & Rust, 2018).

AI is a key enabler of emergent frontline technologies, with technologies such as chatbots helping to shift the emphasis in FLE roles from the repetitive and the mundane, to the more intricate, social interactions (Huang & Rust, 2018). It is uncertain whether AI technologies can autonomously execute complex frontline roles that require a high level of

intuition, tacit knowledge and emotional labour; however, FLEs are likely to remain essential to many service contexts that require empathetic, customised and agile solutions for both internal and external customers. This suggests a growing separation between service contexts in which frontline technologies may substitute for FLEs (making human aspects less salient) and those where FLEs assume greater salience. In the latter contexts, the proposed taxonomy could be a starting point for extending the network and self-governance features to incorporate the role of feelings/emotions and response agility in designing and accelerating innovative service experiences.

In service contexts in which frontline technologies could be used as substitutes for human participation in service delivery, the challenges for adapting the proposed taxonomy are more significant but not less interesting. Substitution of human function in organisational frontlines is unlikely to diminish the relevance of knowledge and governance challenges in service innovation. Instead understanding the nature and scope of knowledge flows enabled by frontline technologies is likely to require expanding the proposed taxonomy to account for different *types* of knowledge and different *kinds* of knowledge flows that disparate frontline technologies enable. Likewise, the nature and scope of governance protocols for designing interfaces with frontline technologies goes beyond computational efficiency if the objective function is effectiveness in service innovation. Further interesting work could be conducted to build upon the proposed taxonomy to account for a phenomenon that substitutes frontline technology for human participation in frontline roles.

In addition to enabling AI-based interfaces capable of autonomous agency, digital technologies are also improving the capabilities of business analytics that can augment and supplement FLEs' capacities for processing knowledge and managing governance challenges. Similarly, there is an increasing democratisation of access to customer intelligence throughout organisations. Where customer research and insight were once the purview of the

marketing department, now all parts of the organisation have ready and convenient access to customer data. However, democratised access does not guarantee coherent interpretations of the meaning of new knowledge across groups. Indeed, democratisation may unleash multiple and competing interpretations that are tainted by internal territorial and power conflicts. This highlights the importance of connectedness *between* networks to help dissolve inter-group differences. In the context of our framework, connectedness between FLE and IFE networks is likely to help reconcile variance in service-related knowledge interpretation and transformation. Connectedness between groups will enable more complete sense-checking and the validation of interpretations, which may reduce errors in implementation of innovations deriving from this knowledge. In short, greater levels of FLE-IFE connectedness is likely to clarify knowledge flows and enhance their positive effect on service innovations.

Finally, our conception recognises parallels between FLEs and field salespeople; both are key customer-facing roles and likely to be instrumental in the flow of customer/market knowledge and self-governance activities over their external and internal networks. For example, Kraft Foods in China turned its money-losing business into a profitable one by forming a frontline team to gain insights from customers (Furr & Dyer, 2014), which led to the production of locally appealing Oreo cookie flavours (e.g., peanut butter and green tea ice cream), shapes and layers. Other product-oriented companies also deploy customer-facing employees as technical consultants, technical product sales and problem solvers. For example, Cisco Systems offers both products (such as network switches/routers) and services (such as networking management/security) and expects customer-facing employees (including network engineers and marketing employees) and IFEs (such as R&D and finance employees) to collaborate and coordinate to create effective customer experiences (Gulati & Puranam, 2009). Similarly, in many companies that engage in open innovation, R&D employees and scientists work with customers and across departments to explore and test

new ideas (e.g., new and patentable innovations). Thus, the proposed model, which highlights domain networks and network flows, is sufficiently general and can be applied to a wide range of settings.

2.6.4 Frontline knowledge networks and service practice.

The proposed framework provides both a more nuanced and more comprehensive approach to the generation, refining and implementation of service innovations. The ideas reflect recent observations by the consulting firm McKinsey & Company that service innovations are no longer the exclusive domain of in-house R&D units and managers, but rather a function of collaborations with suppliers, customers and (more specifically) FLEs, who occupy a crucial nexus connecting firms and their customers (Jong, Marston & Roth, 2015). Thus, firms should explore all possible sources of inspiration for new ideas and consider ways in which FLEs can be brought more fully into the innovation process. Organisations should beyond move ‘suggestion boxes’ or ‘idea tournaments’ that tend to reflect scattergun approaches to idea generation. Devolving some responsibility for innovation to the frontline is a first place to start. FLEs are not only natural sources of inspiration but are also great ‘filterers’ of ideas. Increasing FLEs’ ability to self-govern will mean that only the best ideas will percolate through the organisation, ensuring more cost-effective and speedier implementation.

Managers should also attempt to track the progress of ideas as they flow through the organisation. This would require a deeper understanding of the nature of intra-firm relationships. Exploring such relationships has become more feasible in recent years given the availability of Social Network Analysis Tools (e.g., UCINET and Gephi). Recent research suggests that mapping employee interactions can help managers to identify which type(s) of employees stay isolated and which are more connected than others (Yamkovenko & Tavares, 2017). Yamkovenko and Tavares’s also study mapped the firm into three types of networks:

1) decision-making, 2) idea sharing and (3) emotional networks. A similar approach should be adopted to map the service organisation to allow a better understanding of sub-network interactions. Such an approach could also uncover root causes of knowledge flow failures or idea generation scarcity. The proposed model emphasises connectivity of FLE-customer and FLE-IFE networks that could also be useful to managers in understanding service performance, customer satisfaction and service innovation.

2.7 Conclusion

This paper focused on FLEs and their open collaborative networks. The study aimed to understand how FLE networks can help organisations to leverage ideas from open innovation to advance service innovations with a bottom-up and horizontal, comprehensive and realistic view rather than a formal and top-down management driven approach. The study gathered conceptual support by exploring the informal (social) networks that form alongside an organisation's formal structures, but remain invisible and complex. Recognising that the social network layer of these collaborative employee relationships intertwine with customer networks also facilitates understandings of how market- and intra-organisational knowledge might be integrated by FLEs. The proposed theory could be extended by investigating when and why these multi-layered networks contribute to various dimensions of service innovations. Additionally, adding granularity to boundary conditions could further advance the FLE networks theory and help practitioners to use key decision-making and knowledge network conditions effectively.

3: Paper II: Service Employee Network Structures, Network Flows and Service Innovation³

3.1 Introduction

Service innovation studies in both practitioner and academic domains reveal that exclusive knowledge of service employees and collaboration with customers are two essential constituents to generate and implement innovative ideas for firm growth (Galunic & Rodan, 1998; Hargadon & Sutton, 1997; Magnusson et al., 2003). A service innovation is often recombination of knowledge as well as goods and services “that creates novel resources that are beneficial (i.e., value experiencing) to some actors” (Eisingerich, Rubera, & Seifert, 2009; Lusch & Nambisan, 2015, p. 161). Specifically, a service innovation is an organization-wide application of a new or improved service offering such as introducing robots to deliver room service or changing an event organization process to improve client experience. With services predicted to “account for three quarters of global growth over the coming decade”, without superior knowledge, a service organisation lacks access to novel ideas to competitively design new services (D’Emidio, Dorton, & Duncan, 2015, para.11). Similarly, without customer collaboration and/or co-creation, a service organisation lacks access to useful ideas to innovate. In fact, service companies that engage frontlines to work on customers problems and design better customer service experiences generated four times efficient processes, improved customer satisfaction and business outcomes (Rawson, Duncan, & Jones, 2013). Thus, service innovation’s underpinnings regarding superior knowledge and novelty of ideas

³ Paper II builds on Paper I’s taxonomy and tests a conceptual model using Paper I’s theoretical constructs. Please refer to Figure 1 for further explanation.

emphasize that service employees are critical actors or nodes in organization knowledge networks to improve services and harness the gains for competitive advantage.

As services have highly evolved into complex ecosystems with service employees and information technology, the service landscape for innovation is significantly different than a standard product development setting (Ostrom, Parasuraman, Bowen, Patricio, & Voss, 2015). This may be because research and development processes for products are often well-defined, but for service contexts, innovation often stems from choosing between multiple solutions where service problems and processes are more *complex and real-time*. The resulting innovative process embeds service employee knowledge sharing and resource negotiations to implement novel ways of servicing customers.

To date, most previous studies on the role of service employees in service innovation have been dominated by frameworks that focus primarily on attributes, features or qualities of individuals (e.g., service employees), organisations/jobs (e.g., governance structure) or the interaction between them (Melton & Hartline, 2013; Ordanini & Parasuraman, 2011; Schepers et al., 2016; Skålén, Gummerus, von Koskull & Magnusson, 2015; Storey, Cankurtaran, Papastathopoulou & Hultnik, 2015). Current studies suggest service innovation is posited to originate from service employees' attributes (e.g., creativity, mindfulness and learning orientation) or organisational features (e.g., decentralisation, control and culture) and/or the employee-organisation interaction that encourages service employees to draw from organisational affordances to promote innovation. This conceptual framing has generated several fruitful insights that leverage human capital in the frontlines of service organisations for innovation, such as bottom-up learning, open innovation and self-management (Edmondson, 2008; Gulati, 2018; Hamel, 2011).

A different, relatively less studied, conceptual framing begins from the notion that service innovations 'evolve from a joint action of a network of actors' (Lusch & Nambisan,

2015, p.155). Innovation for services ‘can also be an everyday improvement that makes complicated a bit simpler or the expensive more affordable’ (Anthony, Cobban, Nair & Painchaud, 2019, p. 94). In 2019, one of Asia’s best banks, DBS, transformed into ‘World’s Best Bank’ (according to Euromoney) after a decade-long journey when it emerged from a culture in which formal meetings and formal decision making ‘supress[ed] diverse voices’ (Anthony et al., 2019, p. 96). Similarly, Google research suggests that innovativeness depends on an ‘equal share of voice’ in teams (Anthony et al., 2019, p. 96). Thus, informal networking between organisational members is a novel and potentially fertile source of innovation both at the employee and organisational levels.

Rooted in social capital theory (Burt, 1992; Coleman, 1998; Lin, 1999), the everyday networking for innovation approach examines the structural (e.g., closure/density, centrality) and process properties (e.g., network flows) of the formal and informal networks between an actor and other actors and resources, both internal and external to the organisation, for effective innovation (Borgatti & Halgin, 2011). The agency to seed and nurture networks resides largely in actors; however, researchers study networks as the unit of analysis and examine the network properties associated with effective service innovation (Björk & Magnusson, 2009; Gummesson & Mele, 2010; Laage-Hellman, Landqvist & Lind, 2018; Mele, Pels & Polese, 2010; Subramanian et al., 2013; Rand, Rust & Kim, 2018; Verma, Gustaffson, Kristensen & Witell, 2012).

Social networks lens situated in social capital theory as a conceptual framing to investigate service innovation better suits for service innovation’s inherent challenging characteristics (e.g., stemming from *live* and *complex* interactions in service employee *ecosystems*), but this framing has generated some equivocal findings. According to social network studies, social capital often arises from structural holes, network density or actor-interconnectedness, and network diversity or actor-heterogeneity. One stream of research

finds that dense/closed networks (lack of structural holes) are conducive for better cooperation and generation of new ideas whereas another stream suggests open networks (with structural holes) are more useful for finding new opportunities, mobility, and accessing to new and diverse ideas (Ahuja, 2000; Burt, 2004; Gilsing, Noteboom, Vanhaverbeke, Duysters, & van den Oord, 2008; Gonzalez, Claro, & Palmatier, 2014; Obstfeld, 2005). The mixed findings for network structural properties and innovation relationship leave us with a question of the network *mechanisms* of social capital for innovation. With this in mind, we further investigate the call for future research on service employee relationships for service innovations (Ostrom et al., 2015).

My study will conceptualise network *structures* as the *sources* and network *flows* as the *mechanisms* for service innovation to resolve the ambivalence in the social network and social capital studies. A service employee is a frontline or a back-of-the house employee (i.e., an internal-facing employee/an IFE) with several informal networks that can facilitate how novel service ideas are seeded, shaped and selected. Building on social capital theory, in this study, network structure represents the *spatial* features of *how* a network looks, while network flows reflect the *substantive* features of *what* the network enables (Adler & Kwon, 2002; Borgatti & Halgin, 2011; Gonzalez et al. 2014). Using the *spatial-substantive* features distinction, a mediating mechanism was conceptualised, such that network flows mediate the effect of network structure on service innovation. In the proposed conceptual model, network structure embeds “resources” and network flows facilitate the “use (action-oriented)” aspects of social capital to enhance service innovativeness (Lin, 1999, p.35). Without network flows, it was posited that the potential of network structures would remain unrealised in relation to innovations in service organisations. To provide insights from mediation thesis, the study examined the differential mediation effects of knowledge and self-governance flows. Knowledge flows represent the distribution of novel ideas among service employees.

Conversely, self-governance flows reflect the negotiated distribution of service decision-making activities among service employees. Thus, this study *simultaneously* examines the effects of network structure and network flows on actor innovativeness in a service context by bridging the individual attribute/feature (e.g., innovativeness) and actor network conceptual frameworks. More specifically, this study draws upon density and diversity as core concepts of social networks research (Burt, 1992; Coleman, 1998; Phelps, 2010) to ask: What matters more for service innovation: the high density or high diversity of actor networks?

To test the conceptual framework, a leading hospitality organisation was approached to collaborate on this research. The organisation is a major 5-star hotel in a prominent Australian city and part of a multinational chain that prides itself on promoting service innovation. Hospitality settings have several features that make them suitable for service research (Ordanini & Parasuraman, 2011). A hospitality context with its focus on the servicescape mirrors other service-dominated contexts, such as fine dining experiences, gym services and events services. As hospitality services reflect the real-world settings of service employees and their environments, the research outcomes have a certain level of generalisability (Calder et al., 1981). Further, service innovations in a hospitality context can vary widely (ranging from enhancing in-room/on-premise dining experiences to deploying artificial intelligence technologies to improve guest experiences). Thus, a hospitality context combines both high-end technology and high-level personalisation that require the attention of all service employees. Such a context allows a social network and service innovation study to capture specific service network structures and flows among different types of employees.

By adopting this conceptual framework and analysis, this study seeks to make two contributions to the literature. First, it contributes to services marketing studies where the roles of service employees in innovation are under-researched from the point of a network

perspective. This study identifies the distinct contributions of diverse service employee roles to service innovation. Theoretically, actor network structures and their flows enable service innovation. Additionally, balanced internal- and customer-facing employee roles in an actor's network structure promote innovation. This study shows that cohesive network structures may be detrimental to flows and thus inhibit innovation gains. Second, this study contributes to social capital theory by conceptualising the mediating effects of network flows. Network structures and flows have been studied jointly in previous research; however, most social capital studies have little to say about the mediation effects of network flows. Most networks have multiple meanings, separating the network structure and different flows as meanings is essential to teasing out confounding network effects. Further, this study considered the special case of self-governance flows that have not been investigated to date.

The remainder of this paper is organised as follows. First, to develop the conceptual framework and articulate the hypotheses, a review of the literature on actor networks and service innovation is undertaken. Second, the research design and method for the empirical analysis of the proposed framework and hypotheses are examined. Third, the obtained results are set out. Finally, the implications for theory and practice are discussed.

3.2 Literature Review

The literature that has contributed to our understanding of innovation driven by social networks is often grounded in social capital theories (Bourdieu & Wacquant, 1992; Burt, 2001; Coleman, 1998; Putnam, 1993). Frontline employees (FLEs) as boundary spanners utilize internal and external network resources for customer service productivity. The connectedness of FLE networks can facilitate flow of multiple relationships through “coordinated action” to achieve the employee- and firm-level outcomes (Putnam 1993, p. 167). A core argument in connectedness is that actors within diverse teams can have access to novel ideas (Han, Han, & Brass, 2014). Similarly, An FLE connected to a wide variety of

customers and colleagues—based on background, interests and expertise—will be exposed to new ideas that challenge established views. Conversely, FLEs who maintain network connections that are relatively homogeneous may be more likely to rely on standard service processes and not challenge the status quo. Such FLEs are likely to process information in a similar routinised manner that privileges efficiency goals over innovation. As organisations have more heterogeneous customer and supplier ecosystems, service employees, are likely to find themselves with increased variability of interactions that will provide the foundation for service innovation.

Similar to social capital theory studies examining actor connectedness in networks, services marketing literature generated some key insights for innovation by investigating relationships between actors as sources for service productivity or quality. For example, FLEs curate important relationships with customers that lead to idea generation and innovation (Karlsson & Skåln, 2015). The service field has also extended this dyadic approach to include relations among other actors, including fellow boundary spanners and other organisational members. FLEs often initiate ties with other employees and in the process, solve problems within organisations (Ye et al., 2012). The approach adopted by services marketing scholars has been largely confined to dyadic interactions (i.e., employee-customer, employee-manager, employee-employee [peers]); however, it is well known that service employees perform diverse roles and that innovation is not simply a function of FLE behaviour, but is more often the result of joint consultation and action among many organisational members. A more nuanced relational picture of service employee innovation is largely absent from the services literature, yet it is likely to underpin our understanding of how new ideas are created and evolve within organisations (Lusch & Nambisan, 2015).

The emerging research on organisational sociology research grounded in social capital theories also has a number of implications for service innovation. Such research is highly

relevant, as it relies upon the foundational assumption that individual actors and the networks in which they are embedded are the micro-foundations of change (Burt, 2004; Cook & Whitmeyer, 1992). FLEs, as network members, interact with sources of new knowledge (e.g., customers and suppliers) and firm members and thus occupy an important nexus within intra- and inter-firm networks. Theories of social capital employ this logic in focusing on actor interactions as sources of new ideas in actors (Burt, 2004). The key insight provided by this research is that networks comprise connected actors or nodes connected to other actors (alters); the ties between them represent sources of different types of information. Network characteristics, such as strength and embeddedness, as well as an actor's position within these networks, determine information flows and consequently, an actor's innovativeness (Burt, 1992; Granovetter, 1973; Perry-Smith & Shalley, 2003). An actor's network as an 'action set' has the ability to create and diffuse new information to multiple others which provides the substrate for service innovation (Boxman, De Graaf & Flap, 1991). Cohesive and dense networks allow the translation of new information into innovative outcomes as a result of high levels of trust between actors (Coleman, 1988). However, there is a well-established literature that considers the role of disconnected actors within a network, such as those that span 'structural holes' (Burt, 1992) and their disproportionate influence on accessing opportunities and generating novel ideas. Thus, there is evidence that actors' strong and weak ties affect knowledge transfer, innovation and overall team performances (Hansen, 1999). What is common across all social capital and social networks research is the acknowledgement that the 'development and implementation of new ideas' is always underpinned by people who 'over time engage with others within an institutional context' (Baer 2012; Burt, 2001; Van de Ven, 1986, p. 591).

The literature on social capital, while underscoring the importance of structural configurations of ties between actors as a driver of innovation, has focused less attention on

the nature of resource flows between network members (Alguezaui & Filieri, 2010; Gonzalez et al., 2014; Reagans & Zuckermann, 2001; Obstfeld, 2005; Rodan & Galunic, 2004; Walker, Kogut, & Shan, 1997). A network structuralist view is necessary and useful for understanding innovation; however, a more nuanced understanding is possible when accounting for tie content (i.e., *what flows in networks*). Thus, the effects of network structures on organisational change are complemented by network flows that *enable* this change. The organisational learning literature has made significant strides in conceptualising the content of exchange focusing on what occurs within actors' social interactions that promote individual and group learning. Social content, such as information, knowledge and memory, lead to learning within networks when shared (Levinthal & March, 1993; Levitt & March, 1996). However, it is arguable that the flow of autonomy or 'authority to act' within these networks has been overlooked. One of the key strengths of taking networks as a form of social capital is to look behind formal organisational structures, but by doing so it paradoxically diminishes the role of authority in enabling innovation to happen.

3.3 Conceptual Framework and Hypotheses

Figure 3 displays the proposed conceptual framework wherein actor network density and diversity are network structure variables that enable network flows of knowledge and self-governance, which in turn promote innovativeness. The actors are service employees in service organisations and their innovative behaviour in service organisations reflect how they can generate new ideas and implement them in the organisation as a new service process or offering (Scott & Bruce, 1994). In innovation studies, innovation is "the foundation of ideas", however the individual is the one who develops innovations (Scott & Bruce, 1994, p.1994). Similarly, a meta-analysis for social networks and individual innovation finds several ways scholars conceptualized innovation, however defines it as "the process of generating new ideas for organisational products, procedures, processes, and service offerings, of testing,

developing, and refining these ideas for future use, and of implementing them” (Baer et al., 2015, p. 193) Thus, to investigate innovative behaviour at service employee-level, I define service innovation at individual-level as the service employee’s ability to generate and implement new ideas for services. In developing the theoretical logic, two types of service employees (actors) are relevant: 1) customer-facing employees or actors that interact directly with customers in accord with their frontline role (i.e., FLEs); and 2) IFEs or actors that do not interact directly with customers in accord with their back-of-the-house role. The consideration of different service employee roles allows the study of network density and diversity as distinct constructs. The next sections outline the theoretical overview of these constructs and the hypotheses developed for this study.

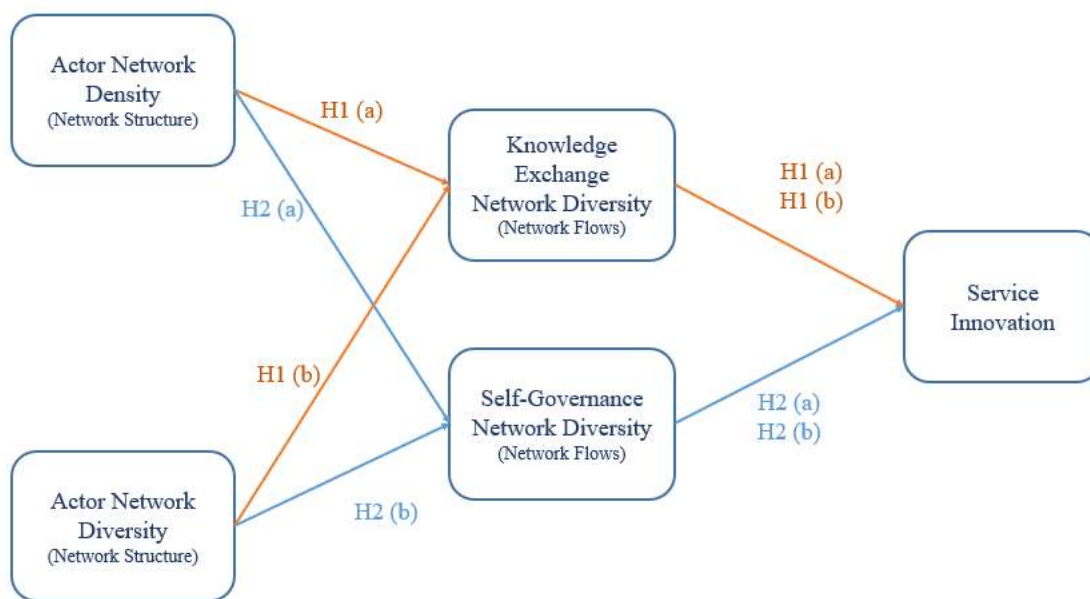


Figure 3. The hypothesised mediation model for actor networks and service innovation.

3.3.1 Density and diversity as core network constructs.

Network density is a common concept used to investigate firm and actor roles in social capital studies. Defined as ‘the extent to which links that could possibly exist among persons do in fact exist’ (Mitchell, 1969, p. 18), a dense network is often characterised by cohesiveness and is considered with relative numerosity or numerous ties between an actor

and her/his alters (i.e., the ties that exist *relative* to all those possible). Innovation studies that use inter-organisational networks (e.g., firm alliances) compare cohesive and sparse networks to understand idea generation and implementation. Previous studies have revealed mixed results. For example, when actors form sparse networks with bridging ties to otherwise disconnected actors, they can quickly access diverse information for work activities (Burt, 2004; Rodan & Galunic 2004). Further, dense networks can harm creativity-bounding individuals with strong social norms and redundancy (Sosa, 2011; Stephen, Zubscek, & Goldenberg 2016). Conversely, dense networks encourage alters to confide in each other, which results in more collaboration and coordination activities that boost performance outcomes (Coleman, 1988). Cohesive networks are also more agile in terms of knowledge reach and use (Reagans & Zuckerman, 2001) and more successful in increased communication (Ahuja, 2000; Milliken, Bartel, & Kurtzberg, 2003; Walker, Kogut, & Shan, 1997).

Network *diversity* is also used frequently in network structures and commonly defined as the extent to which an actor's ego network includes 'dissimilar' alters such as people with different age, tenure or occupations. Unlike network density, which focuses on numerosity, network diversity focuses on the heterogeneity between an actor and alters in relation to relevant attributes. Heterogeneity provides a meaningful and distinct approach to network conceptualisations because it indexes variety (Phelps, 2010). For example, homogeneous groups (i.e., less diverse networks) are often theorised to have better performance outcomes, as the members share common values through their identities and coordination (Coleman, 1988; Gilsing, Nooteboom, Vanhaverbeke, Duysters & van den Oord, 2008; Hansen, 1999). However, researchers have shown that diversity provides necessary variety for creative problem solving and innovation (Ancona & Caldwell, 1992; Pfeffer, 1983). Similarly, if a service employee's ego network is mostly composed of FLEs (and thus has low

heterogeneity), that service employee may mostly receive insights that affirm customer service demands, problems and feedback that are well known among FLEs. Conversely, if a service employee has an ego network of high heterogeneity that includes a more balanced network of FLEs and IFEs, that employee may have privileged access to knowledge, solutions and alternatives that may be unknown to FLEs. Thus, a heterogeneous network can generate more novel customer responses and thus outperform a homogenous network. In this paper, it was theorised that network diversity represents the level of heterogeneity of roles in a service employee's network.

Network density and diversity represent a service employee's *work network* structural characteristics. Service employees often form an informal work structure that can help them interpret tasks and customer service processes. Despite the existence of formal organisational structures, such as units and teams, employees often find themselves reaching out of their formal work units to coordinate and exchange service practices. Most social network researchers identify an individual's network structure as a crucial initiator in innovation processes. Thus, a service employee's network structure was conceptualised as having a foundational role in initiating an employee's new service knowledge exchange and service task decision making.

3.3.2 Mediating mechanisms of network flows.

To date, most studies have examined the direct effects of network structure density and diversity on innovation. To make a significant contribution, this paper theorises about how the structures and composition of ego networks can be mediated by different ego-level knowledge and decision networks to facilitate innovativeness. Specifically, service innovation was conceptualised as a sequence of informal idea and task decision hierarchies. This approach also provides insight into which flows are more influential in developing employee outcomes and attempts to resolve some mixed understandings about the dense

network-innovativeness relationship (Ahuja, 2000; Burt 1992, 2004; McEvily & Zaheer, 1999; Obstfeld, 2000; Rodan & Gulanic, 2000). To do so, two key variables of network flows were proposed: knowledge exchange and self-governance distribution.

3.3.3 Network flows of knowledge exchange and its mediating mechanism.

Learning theories provide three insights that are central to conceptualising the mediating role of knowledge exchange flows in actor networks. First, especially in service organisations, innovation is seeded when new knowledge is generated in the process of intentional creative work by service employees (e.g., novel problem solving) and stored as tacit knowledge stocks with *individual* service employees (Melton & Hartline, 2013; Skålén et al., 2015; Ye et al., 2012). Researchers refer to employee-driven knowledge generation as a process of bottom-up learning (Zollo & Winter, 2002). Second, the newly generated knowledge in its native form is prone to human and situational biases in that ‘it is unprocessed (e.g., low signal/noise ratio), unwieldy (e.g., high variability), unclear (e.g., ambiguous action-outcome linkages) and unusable in its original form (e.g., low generalizability)’ (Ye et al. 2012, p. 826). Third, much like a seed needs to be sowed and tended to be a tree that bears fruit, newly generated knowledge requires collective competence that resides in networks of connected actors to yield useful knowledge for service innovation. Ye et al. (2012, p. 827) explain that collective competence allows actors to engage in ‘constructive confrontations’ by sharing and exchanging their creative ideas to ‘express their preconceptions, assumptions and perspectives thereby opening up interpretive schemes for mutual scrutiny and construction’.

The conception of knowledge flows is consistent with the notion of collective competence in learning theories. Networks of connected actors enable the use of collective competence by knowledge flows, which are defined in this paper as the sharing of new ideas about service delivery among service employees in actor networks. Several inter-firm studies

suggest the productivity effect of learning and knowledge exchange for innovation (Peri, 2005) Furthermore, knowledge flows from vertical and horizontal networks affect different knowledge behaviour. For example, an employee searches for new knowledge may prefer to go to their peers (horizontal) and supervisor (vertical). When knowledge is gained and applied, the employee learns through experience (Huber, 1991; Schulz, 2001). Thus, knowledge flows enable new ideas to be transferred, combined and applied at individual- and firm-level as innovations (Lai, Lui, & Tsang, 2015; Scott & Bruce, 2004)

Recent studies also point out to distal (global) – proximal (local) knowledge exchange behaviour as well as total – balanced knowledge flows for employee innovativeness (Lai, Lui, & Tsang 2015; Siahtiri, Heirati, & O’Cass, 2020). Although distal search can produce initial gains on generating novel ideas, an employee can realise diminishing returns from distal knowledge search if the knowledge efforts are not optimised. Proximal search can counteract to balance these diminishing returns (Siahtiri, Heirati, & O’Cass, 2020). Thus, distal and proximal knowledge flows together could help improve knowledge integration for new service solutions (Kogut & Zander, 1992). To be specific, service solutions can often be referred as service innovations, because these solutions benefit the firm and/or customers by “incremental adaptations or completely new solutions for products, services, or processes” (Henrike & Schultz, 2014, p.330; Lusch & Nambisan, 2015). Similarly, external and internal flows for an employee can be complementary, but a balanced flow where inflows and outflows are equal can lead to mutual reciprocity gains for employee innovative behaviour (Lai, Lui, & Tsang 2015). My model takes into account knowledge flow heterogeneity from within- (local/internal) and between-units (global/external) and conceptualises it as mediating through diversity of roles in a service employee network for new service solutions and innovations.

In terms of density and knowledge exchange flow relationships for service innovation, it was posited that dense service employee networks will promote more learning outcomes and new idea exchange routes. As a result of their customer interactions, knowledge- and learning-related activities, service employees as boundary spanners serve as active change agents in organisations (Aldrich & Herker, 1977; Nonaka, 1994). Further, the customer embeddedness of service employee roles generates both individual and organisational learning outcomes by integrating market knowledge (Bell et al., 2010; Santos-Vijande et al., 2016; Selnes & Sallis, 2003; Slater & Narver, 1995). Embedded in both customer and intra-organisational networks, service employees also craft work and idea exchange networks with other FLEs and IFEs. It may be that service employees who are often identified with roles that emphasise creative problem solving and customer advocacy behaviour are likely to connect with other actors through relatively dense structures. These structures will allow them to reach out to another employee with relevant skills to deliver better customer satisfaction outcomes. For example, a creative salesperson aims to give the best customised offer to a customer while a salesperson with dense external and internal networks can often generate better solutions for their customers (Ustüner & Godes, 2006). Thus, dense professional networks with more FLE-IFE interactions are crucial for generating insightful ideas.

The positive effects of dense networks are prevalent; however, the detracting effects of tightly bonded networks also provide some insights. For example, socially marginal groups are often isolated and are prone to approving marginal ideas for radical innovations. Sparsity and isolation (opposite of high density) may also have some positive effects on the implementation of radical decisions. Further, as dense collaborations make employees closer, conformity to norms damages creative idea discussions, which may lessen knowledge exchanges. It has been suggested that density can sometimes harm innovativeness in

networks; however, previous studies and service employee role mechanisms provide evidence of a positive relationship of service employees' openness to new service solutions, generalised reciprocity⁴ and trust in dense service networks.

Thus, just as a dense work structure is associated with better idea generation, an actor in a dense network is also prone to creating a multi-layered (i.e., diverse vertically and horizontally) role and departmental idea exchange network. Motivated by mixed findings about the knowledge transfer activities of boundary spanners, Tortoriello, Reagans and McEvily (2012) found that network cohesion improves cross-unit knowledge transfers. Similarly, cohesion in a work network may mean employees are closely exposed to other colleague's service troubleshooting activities. As networks become denser, more information may be exchanged about work matters. Additionally, cohesive networks are conducive to norms that inspire trust and reduce free-rider behaviour (Granovetter, 2005). Thus, by reflecting trust and modelling voluntary knowledge behaviour as prosocial behaviours, open work networks can expose service employees to numerous ideas, which in turn could make employees more creative and lead them to share their ideas with those who have the relevant expertise (Fink et al., 2012; Paulus & Brown, 2007).

In addition to density causing a positive change in flows, it was posited that diversity would also positively affect knowledge flows for service innovation. Specifically, knowledge flows are meaningful for service innovation when knowledge flows over diverse (heterogeneous) networks rather than homogenous networks. In fact, the composition of

⁴ Generalised reciprocity refers to the reciprocity expected from an overall network. It differs to mutual reciprocity, where an individual shares knowledge anticipating the other person will also do so. General reciprocity is not a dyadic mechanism. Specifically, a service employee shares their expertise in anticipating that another service employee in her/his network will probably do the same (i.e., reciprocate) in the long run.

networks has been used as an antecedent of knowledge heterogeneity in studies (Burt, 1992; Granovetter, 1973). However, some previous studies have found that network diversity has a negative effect on innovation (Coleman, 1988; Gilsing et al., 2008; Hansen, 1999). For example, homogeneity (i.e., networks that do not have diverse compositions) can increase employees' innovativeness. As the homogeneity of networks increases, employees find coordination easier to initiate. Thus, a network composition of high homogeneity (i.e., less diversity) can increase new idea discussion efforts. However, it is argued that in a network in which many members share common mental models and identities, employees may avoid conflict issues at work, which could be damaging to *unique* sources of knowledge exchange within and across units and departments. Although homogeneous groups could share knowledge with less effort (by avoiding conflict and coordinating easily); it is reasoned here that a balanced FLE-IFE composition (i.e., with high network heterogeneity or diversity) leads to the identification of more 'valued' service ideas (as the result of customer problem solving) and more new service idea discussions (as the result of service employees adopting the roles of customer advocates and knowledge brokers). Some findings suggest that 'functional diversity' may not be the best mechanism for innovation (Ancona & Caldwell, 1992). This paper proposes that knowledge exchange across units in a service organisation is likely to cause more service innovativeness due to service employees' openness to solving customer problems effectively.

In sum, the sorting and sieving of knowledge as it flows among actors is more effective when actors represent heterogeneous perspectives, presumptions and preferences. Conversely, actor homogeneity amplifies biases and errors of perception and judgement because it does not promote 'constructive confrontation' as heterogeneity does naturally. Consequently, it was hypothesised that diversity of knowledge flows provides a crucial

mechanism of ‘constructive confrontation’ that enables actor networks to mobilise newly generated knowledge for service innovation. Specifically, it was hypothesised that:

Hypothesis 1 (H1): The diversity of a service employee’s knowledge exchange network positively mediates the effect of actor network structure a) density and b) diversity on service innovation.

3.3.4 Network flows of self-governance and its mediating mechanism.

As Ostrom, Walker and Gardner (1992, p. 414) observed, ‘when individuals are given an opportunity to restructure their situation, they frequently, but not always, use this opportunity to make credible commitments and achieve higher joint outcomes without an external enforcer’. Self-management theories complement bottom-up learning mechanisms by explaining that the development of useful innovations is conditional on proactive experimentation and refinement by service employees to prototype and test new learning in customer interactions (Santos-Vijande et al., 2016; Schepers et al., 2016; Stewart, Courtright & Manz, 2019). Proactive experimentation and exploration are also essential processes in pragmatic learning theories that explain how actors learn from experience by iterating between ‘inquiry’ and ‘action’ (Elkjaer, 2004). Insights from this body of research show that proactive experimentation and exploration in informally connected actors is effective when the agents successfully negotiate the distribution of ‘action’ among themselves and follow-through to make inquiry ‘productive’ for innovation (Elkjaer, 2004). The distribution of action among informally connected agents is the focus of self-governance literature that draws from self-management research (Stewart et al., 2019). Similarly, Ozkok et al. (2019) conceptualise self-governance as the mutually negotiated distribution of self-organising responsibilities among network members.

To advance the literature on self-governance in actor networks, this paper theorises that network density and network heterogeneity are important features that enhance the

potential for service innovation. Transactive memory and social capital theories suggest that innovation increases with heterogeneity levels, enabling individuals to access multiple and distinct resources and personal relationships (e.g., kinship). In fact, the flow of tasks and alternative solutions for customer problems and the flow of actions to assign and evaluate alternatives are important parts of distributed innovation activities. These flows generate contributions from a diverse group of service employees, the aggregation of which exceeds what any one individual could generate in isolation.

In terms of network density and the self-governance relationship, it was posited that dense structures would promote decision-making activities across units via service employees' daily job tasks. Service employees' tasks involve providing solutions and cross-functional knowledge brokering. These activities require a mental schema of the organisation that includes information on *who-knows-what* and thus how problems can be directed to the relevant unit or person (Bolander et al. 2015; Levine & Prietula, 2013). For example, solution-generation processes for a salesperson might involve evaluating alternatives with a procurement office or a product's alternative service plans with an engineer. This multi-layered decision network enables the salesperson to reach better solutions.

In relation to the posited positive relationship between network density and self-governance flows, an inability to comprehensively script complex service tasks (and employee roles) also suggests a positive mechanism in place. Service work often requires internal collaboration if a service script is insufficient and thus does not allow an immediate customer response. As Bimpikis & Markakis (2018, p. 1268) noted, 'a service provider may have a relatively accurate prior belief about the set of attributes describing an arriving task through historical data, these attributes, i.e., the exact type of a given task, may be unknown to her ex ante and information about them can only be obtained gradually, after the task is assigned to service'. Thus, increased service employee decision-making connections must be

formed to generate a service solution. For example, in a hospital setting, a patient's symptoms may lead to a variety of tests being undertaken to arrive at the most accurate diagnosis and care plan. The task of diagnosing a patient may require the allocation of different resources and healthcare employees to determine which exact steps are required. The task also unfolds as the patient (who has unique characteristics, such as a unique personal medical history) arrives and is assigned to the hospital staff.

Further, in economic theories, productivity is cited as a mechanism that drives social structures (Granovetter, 2005). Specifically, complex tasks can lead to individuals forming a 'goal-directed network' (Kilduff & Tsai, 2003). The high complexity attribute of tasks may be more like a norm in service organisations, such as restaurants, hotels, consultancies and legal and healthcare organisations, in which various front- and back-office employees collaborate to work on customer service and other problems. The local decision-making network formed for service problem solving often reflects an individual's attempt to reduce the time and effort required to solve a problem and keep customers satisfied with efficient solutions. Thus, a dense work network with a balanced FLE-IFE (high-density) composition often serves as a productivity mechanism for FLEs to form diverse self-governance networks within an organisation that cross unit and team boundaries. Thus, it was hypothesised that:

Hypothesis 2 (H2): The diversity of a service employee's self-governance network positively mediates the effect of actor network structure a) density and b) diversity on service innovation.

3.4 Research Method

A network comprises a set of connected nodes and actors. In this context, this paper examines service employees as nodes/actors and refers to their relationships as ties. Ego-centric network data (actor-level or micro-level) is suitable for individual- and firm-level construct studies where an ego (i.e., a person/firm) reports their ties to other alters (i.e., a

person/firm) (Provan et al., 2007). An ego's ties to others form an individual network in which network structure properties, such as density, diversity (heterogeneity or composition), centrality and size, can be calculated robustly (Gupta, Kumar, Grewal & Lilien, 2009).

Ego-centric network measures have been well utilised in innovation studies (Rodan & Galunic, 2004). In the study of innovation in social networks, sociocentric (whole-network or macro-level) data collection whereby each person reports on alter-to-alter relationships represents an alternative approach to ego-centric network data collection (Perry, Pescosolido & Borgatti, 2018). Ego-centric designs allow for investigations of individuals embedded within their immediate social circles. Conversely, a whole-network approach generates designs aimed at mapping the whole network's common properties (i.e., a team/organisation's whole service network). The present study was interested in the structures and flows of service employees' networks. Thus, actor-level data collection was deemed more suitable to understanding and evaluating employees' innovativeness. Further, the micro-levels of a group or an organisation are links that can be used to understand macro-level phenomena (Coleman, 1998). Thus, a service employee's ties to others provide insights into individual-level learning and how an organisation's whole community is constructed by such ego networks for organisational-level learning (e.g., generating service innovations).

3.4.1 Network samples and network boundaries.

It was important to explicitly determine the assumptions about organisational networks to set a research boundary for these *boundaryless* social networks (Barnes, 1969; Laumann, Marsden & Prensky, 1989). Thus, the question arose: What actors should be included in the analysis? To address boundary problems, consideration was given to the 'attributes of actors that rely on membership criteria, such as membership in an industry; types of relations between actors, such as participation in strategic alliances; and participation in a set of common events' (Laumann et al., 1989, p.22). In the present study, an actor's

membership criterion was to be part of the service networks. Further, the ‘types of connections’ sought were work, new service idea exchange and decision making. As actors’ participation in customer service processes were key to the study, I collaborated with a leading 5-star hospitality organisation that prides itself on promoting service innovation. Preliminary interviews revealed that some employees (e.g., some of the part-time and casual employees) were not participating in some of the relations I wished to study under the proposed model. Thus, the authors and the organisation’s human resource representatives jointly determined the boundaries of the network by investigating previous work shift data.

The participating hotel is a full-service facility that has 360 rooms, a fine dining restaurant and gym services and is the city’s destination centre for weddings, conferences, retreats and entertainment. The hotel employs a staff of 371 employees. Of these, approximately 50% are FLEs, who directly interact with customers and thus must provide a high-quality and personalised guest service (see Table 6 for further details about the sample characteristics). The managers of the hotel confirmed that they bookend high-quality personalised service with state-of-the-art technology and a strong culture built on the belief that service innovation requires the attention of all service employees. Interviews with employees revealed that employees have adequately distributed service networks both within and across units. Thus, the context was deemed relevant for the study’s research objectives.

Table 6

Sample Characteristics

Sample characteristics	FLE	IFE
Number of actors	107	96
Age	M = 33.54, SD =10.19	M = 44.87, SD = 13.3
Gender	Female = 58%, Male = 38%, Undisclosed = 4%	Female = 58%, Male = 38%, Undisclosed = 4%
Department		
Conference and Events Administration, Finance and Cost Control	8.4%	7.3%
Food and Beverage	51.4%	16.7%
Engineering	-	5.2%
Rooms Division	33.6%%	63.5%
Sales, Marketing, Stores Purchasing	6.5%	2.1%
Human Resources	-	5.2%
Education Level		
Higher than bachelor's degree	15.4%	6.7%
Bachelor's degree	43.3%	25.8%
Diploma	26%	27%
High school	15.4%	33.7%
Below high school	0	6.7%
Managerial Position		
Manager	14%	5.2%
Supervisor	7.5%	6.3%
Non-management position	78.5%	88.5%
Employment Type		

Full-time	59%	59.4%
Part-time	4.8%	17%
Casual	35.2%	22%
Other	1%	1%

3.4.1 Data collection.

Actor networks may be inferred from archival data (e.g., email exchanges) but such procedures tend to yield biased networks due to non-coverage and over-weighting errors. Actor exchanges, especially in a high-touch context (as in this study), more often than not occur outside the recorded channels (e.g., emails). Further, many exchanges on recorded channels comprise routine company announcements and notifications that are not indicative of an actor's 'network' in the sense required for this study. Consequently, an actor's self-reported network of exchanges is a more reasonable basis for data collection.

Notably, previous research suggest that actors' perceptions of networks represent highly accurate descriptions of real-world networks (Brashears & Quintane, 2015). Specifically, even though an actor may not cite each alter they interact with during data collection with the social network questions, the collective perceptual map often consists of regular network patterns. To help actors report their stable perceptual map of their ego networks, the alter selection process can be facilitated via a survey design that is based on the network context (e.g., the size of the network). Additionally, designing questions for selecting alter names and considering the cognitive recollection of names is important for a more representative sample.

In social networks research, there are three ways to identify the ego-centric networks with ego-alter relations: 1) provide a roster 2) have the ego recall alter names (by providing blank spaces) and 3) use a hybrid approach whereby a roster and some blank spaces are provided to fill in for external knowledge resources. In this context, I provided a roster. Due

to its sample size, having the ego recall names from the organisation network would have been challenging (the roster comprised approximately 350 employees). Further, providing blank spaces for out-of-roster alter names (i.e., the use of a hybrid approach) would have been less helpful, as it would have generated names with some errors/typographical errors and added an extra cognitive activity to the already difficult task of individuals' alter selection from a large employee list. Further, during tests of the questions, some of the participants had positive reactions to the survey design (e.g., participants were able to recognise the alter when their full name was available through the roster), as they knew they had interacted with the person, but they did not remember their full name. Additionally, the roster included the alters' nicknames/English names to help the informant to remember interactions more accurately. This confirmed that merely providing blank spaces (rather than a large roster) could generate incomplete alter responses in this context. Thus, the roster of the organisation was included to minimise false negatives (unidentified contacts) and any fatigue related to remembering and providing the names of all service employees with whom the actor interacts regularly.

Consistent with previous research guidelines, an online survey was developed with both relational (e.g., ties) and non-relational (e.g., attributes) questions for data collection. Following procedures for collecting social network data with actor self-reports as outlined by Marsden (1990), the social network questions were pretested and adapted for the specific hotel context to ensure that the participants provided data on ties and attributes based on networks-in-use. The online survey also included 10 five-item Likert-scale questions on service innovation, customer connectedness and demographics.

To enable data collection, the participating hotel gave the first author (unrestrained) access to hotel work areas with a special 'staff' identification card and arranged for the researcher to interact with hotel employees approximately 3–4 times a week over a 6-month

period. The researcher interviewed key FLEs and IFEs to understand the nature of the informal networks. Thereafter, the network questions were revised to make them more meaningful for the participants and to elicit data on network structure and study constructs. Social network scholars also recommend employing qualitative research methods *during* the survey process to make sense of network data and results (Borgatti, Everett & Johnson, 2018). To adopt this practice, qualitative data were collected via interviews with 12 FLEs and IFEs in different roles and at different levels. Qualitative data collection included field notes, informal interactions and observations to make sense of how the study constructs manifested themselves in the hotel context. Additionally, in sociometric research, the best results are achieved by including all actors while collecting network data (Wasserman & Faust, 1994). This recommended practice was adopted, but actors with customer-facing roles (i.e., FLEs) and those with the back-of-house roles (i.e., IFEs) were differentiated between. In total, 209 employees completed the subsequent actor survey (resulting in a 63% response rate). Of these responses, 201 employees (107 FLEs and 94 IFEs) provided complete data on all three networks (resulting in a 96% yield rate).

3.4.2 Measurements.

Independent variables. Previous studies suggest density and diversity are relatively robust measures for network data even with some missing value problems (Borgatti, Carley, & Krackhardt, 2006; Gupta et al., 2019). Networks are dynamic; however, research has found that even in tough ego networks with high turnover rates (of 25–50%), the network structure measures tend to remain stable (Perry & Pescosolido, 2012; Perry et al., 2018; Suitor & Keeton, 1997). Network density was operationalised by investigating the closeness of ties to an actor to determine the level of connectivity. Further, the diversity was operationalised by investigating network alter composition by role and department in relation to an individual. To ensure that the structure and flow attributes of the networks were well captured, as

suggested by network studies (Borgatti & Halgin, 2011), the first author was on the field of the study for pre-survey and survey duration (i.e., for approximately 6 months). This enabled the team to hold some preliminary meetings and interviews with different types of employees. Subsequently, initial survey items were tested using talk-aloud exercises to generate better adapted and worded network questions. Further, qualitative data collection (e.g., field notes, observations, recorded semi-structured interviews) was gathered throughout the survey period. Thus, observing service employee front- and back-of the house roles and activities provided insights into how self-governance and new service idea flows are leveraged in real-time and real-world settings.

Based on social network literature (Collins & Smith, 2006), the actor-network instrument included measures for: 1) a task-related network to obtain data on network structure density and diversity (e.g., ‘I talk about general work matters with...’); 2) a new-idea-exchange network to obtain data on knowledge-exchange networks (e.g., ‘I talk about specific new guest service ideas with ...’); and 3) a decision-making network to obtain data on self-governance networks (e.g., ‘When I need to make a work-related decision, I talk with ...’).

Network density was operationalised by a compactness measure estimated as the average reciprocal distance (ARD) based on the geodesic (graph-theoretic) distance between an actor i and each of its n alters (Everton, 2012) (see Tables 7 & 8 for further details on the operationalisation of the constructs). Previous studies have used ARD as a measure of connectedness to indicate the degree to which an actor’s ego network is closely knitted and easily traversed. The UCINET software computes ARD as follows:

$$\text{Average Reciprocal Distance}_i = \sum_{j=1}^n \frac{1}{d_{ij}} \quad (1)$$

Using UCINET, network *diversity* was calculated through an index of qualitative variation (IQV). The IQV may vary between 0 to 1. A diversity or IQV value of 1.0 implies maximal diversity of an actor network with equally distributed FLEs and IFEs (50–50), while a value of .2 implies near minimal diversity such that an actor network is dominated by FLEs or IFEs (20–80). For knowledge exchange and self-governance, similar IQV-based estimates of diversity were obtained but dimensions of diversity involved employee roles (49 unique roles were identified) and departments (6 unique departments were identified).

Table 7

Operationalisation of Constructs with Single-Item Survey Questions

Construct Name	Single-Item Survey Questions	Forming the constructs for analysis	
		Construct Calculation	Details
Network Structure (Density)	Q12. I talk about general work matters with _____	This survey item forms an employee's work network. The work ego network averages the reciprocal distance calculation in UCINET software.	ARD calculation is based on the average of the reciprocal of geodesic distances between alters in an employee's work network. Thus, this is the mean of the shortest path lengths among all connected pairs in the ego network. For example, in a network where everyone is directly connected to everyone (e.g., node 7 and 9) the distance is one.
Network Variety (Diversity)	Q12. I talk about general work matters with _____	This survey item forms an employee's work network. To calculate variety, the ego work network heterogeneity calculation is performed in UCINET software based on employee role (actor attribute) data (i.e., being a FLE vs an IFE in the ego's network).	Employees are coded as FLEs or IFEs based on their roles as front-of-the office or back-of-the-house employees (actor attribute data). Using this actor attribute data, UCINET software gives an IQV (Agresti & Agresti, 1978) of an employee's work network diversity of FLEs and IFEs. IQV can vary between 0 and 1.
Knowledge Exchange (KE) Network Variety (Diversity)	Q12. I talk about specific new guest service ideas with _____	Ego KE network's <i>heterogeneity</i> calculation in UCINET software based on employee role and department (actor attribute) data.	In the organisation there are 6 main departments and 49 distinct employee roles. Based on the role and department attribute data of the actor, UCINET software calculates an IQV (<i>heterogeneity</i> measure) for role and department. The KE construct is formed by two factors:

Construct Name	Single-Item Survey Questions	Forming the constructs for analysis	
		Construct Calculation	Details
			KE role IQV and KE department IQV in the mediation analysis.
Self-governance (SG) Network Variety (Diversity)	Q12. When I need to make a work-related decision, I talk with _____	Ego SG network's <i>heterogeneity</i> calculation in UCINET software based on employee role and department (actor attribute) data.	The same calculation in KE network variety (diversity) was applied to the actor's SG network.
Ego-betweenness (NEGOBET)	Q12. I talk about general work matters with _____	The network question forms an employee's work network. The work ego network's normalised ego-betweenness measure calculated in UCINET software is used in the analysis.	This is a normalised indicator of the betweenness centrality of an employee in their work network. Ego-betweenness in UCINET is calculated as follows: The sum of ego's proportion of times ego lies on the shortest path between each pair of alters. For alters connected to each other, the contribution to betweenness of that pair is 0, for alters connected to each other only through ego, the contribution is 1, for alters connected through ego and one or more other alters, the contribution is $1/k$, where k is the number of nodes that connects that pair of alters. Then, calculated ego-betweenness number is normalised by a function of the number of nodes in the networks.
Network Size (SIZE)	Q12. I talk about general work matters with _____	The network question forms an employee's work network. The work ego network's size based	UCINET software calculates a network size by the number of one-step neighbours/nodes in an ego's network (SIZE).

Construct Name	Single-Item Survey Questions	Forming the constructs for analysis	
		Construct Calculation	Details
		on UCINET calculation is used in the analysis.	Size variable was adjusted by using studentised residual calculations in SPSS software to account for non-normal variability in the cases. This calculated variable is shown as 'SIZE_R' variable in the Mplus analysis.

Table 8

Operationalisation of Constructs with Multi-Item Survey Questions

Construct Name	Multi-item Survey Items	Forming the Constructs for Analysis	
		Construct Calculation	Details
Service Innovation (SI)	Q1–Q5: SI1: In the last 6 months, how often have you generated new ideas about improving guest services? SI2: In the last 6 months, how often have you shared ideas about improving guest service processes with your fellow ambassadors?	The survey items used five-point Likert scales. A Confirmatory Factor Analysis (CFA) was performed based on the five SI survey items.	Calculated factor scores for SI were used in the mediation analysis.

Construct Name	Multi-item Survey Items	Forming the Constructs for Analysis	
	SI3: In the last 6 months, how often have you investigated new approaches or techniques to improve guest services? SI4: In the last 6 months, how often did you try to convince people to support a new idea for guest services? SI5: I am innovative at work.		
Customer connectedness (CCON)	Q7–Q9: CCON1: I connect with guests socially (as well as professionally). CCON2: I regularly seek feedback from guests for service improvements.	The survey items used five-point Likert scales. A CFA was performed based on three CCON survey items.	Calculated factor scores for CCON were used in the mediation analysis.

Construct Name	Multi-item Survey Items	Forming the Constructs for Analysis	
	CCON3: I have frequent guest interactions.		

Dependent variable. The service innovation measure was measured using five items adapted from Scott and Bruce's (1994) innovativeness measures, which have a Cronbach's alpha of .867 (Hu & Zhao, 2016) (see Table 9). The items used a five-point Likert scale ranging from 'never' to 'very frequently'. Scott and Bruce's (1994) innovative work behaviour (IWB) inventory was selected after careful consideration of several factors. First, an employee's service innovativeness is best reflected with idea generation, idea sharing, idea promotion and idea championing to meet customer service goals (Kanter, 1988; Lukes & Stephan, 2017; Scott & Bruce, 1994). Current research suggests that using one facet of innovation (e.g., idea championing) or creativity (e.g., the generation of new ideas) can fall short of measuring innovativeness (Lukes & Stephan, 2017; Howell, Shea & Higgins, 2005; Zhou & George, 2001). Thus, the inventory used reflects comprehensive behavioural measures of individual creativity (e.g., the generation of new service ideas), the search and flow of ideas, effective problem solving and efforts to promote and realise new ideas. Other commonly used IWB inventories, such as the Adaption-Innovation Inventory of Kirton (1976), commonly include personal attributes, such as creative thinking or personality traits (e.g., openness). However, modelling an employee's innovativeness in the service context through their service improvisation and implementation behaviours can provide insights into how collective innovative behaviours shape innovativeness at individual and organisational levels (Hult, Hurley & Knight, 2004). Second, the social network survey methodology is often burdensome on participants, as each network question requires alter name selection from a presented company roster (in the present survey, there were over 300 employees per network question and a total of three network questions). Adapting a personality-based IWB inventory could add at least 10 more questions to a survey, which could lead to participant fatigue and thus decrease the response quality and response rate. Third, personality traits and creativity, which are often associated with the *just* generation of new ideas, are often an

antecedent to innovativeness; however, innovativeness refers to an individual's ability to pursue innovative activities by demonstrating the necessary knowledge and skills through complex problem solving (Amabile et al., 1996; Anderson, De Dreu & Nijstad, 2004; Kanter, 1998). Thus, creative individuals may not always be innovative individuals. In sum, after carefully selecting innovation measures using previous research suggestions, the service innovation items were discussed and revised with the organisation the researcher collaborated with to better reflect and measure service innovation behaviours at work.

Table 9

Confirmatory Factor Analysis Estimates and P-values for Service Innovation (Actor Innovativeness) and Customer Connectedness

Factors	Estimate	SE	Est./SE	Two-Tailed P-value
Service Innovation (SI)				
SI1	.81	.07	11.81	.00
SI2	.85	.06	14.57	.00
SI3	.81	.06	12.59	.00
SI4	.86	.07	13.21	.00
SI5	.73	.06	12.45	.00
Customer connectedness (CCON)				
CCON1	.73	.06	12.25	.00
CCON2	.64	.07	9.64	.00
CCON3	.82	.07	11.93	.00

Control variables. To mitigate concerns about endogeneity and alternative explanations, reverse causation effects were controlled. Potentially, self-governance and knowledge exchange flows may cause patterns of network density and diversity for at least

two reasons. First, self-governance flows may be funnelled through strategically located actors who do not engage in the distribution of self-governance activities but simply provide pass-through channels. This strategic location may be associated with the greater density and diversity of actor networks. Second, knowledge exchange flows may be amplified by the degree of customer contact. Greater customer contact exposes actors to greater diversity. Actors with greater customer contact may be exposed to greater diversity in terms of customers' needs and requests that prompt them to reach out to more diverse service employees in the organisation. In this instance, greater customer contact prompts greater knowledge flows which results in greater actor network diversity. To address this issue, network size, an ego-betweenness measure and the degree of customer connectedness were included as instrument variables. Network size refers to the number of ties in an actor's ego network while the ego-betweenness measure reflects 'centrality'. Network size and betweenness capacity allows 'powerful', strategically located actors to be identified. Customer connectedness was also included to adjust for varying degrees of customer contact among service employees.

Social network data are known to have non-normality (e.g., skewness) and multicollinearity issues. To address these issues, a standardised residual of network size was computed and used as a control and a person's probability of location on the shortest path between two actors computed in UCINET. Additionally, a normalised version of the ego-betweenness measure was used. For customer connectedness, a latent factor score was estimated.

Estimation. The proposed mediation model was estimated using a simultaneous equations approach with a robust estimator as follows:

$$SI = \beta_0 + \beta_1 KE + \beta_2 SG + \beta_3 CCON + \varepsilon \quad (2)$$

$$KE = \delta_1 + \delta_2 DIVERSITY + \delta_3 DENSITY + \delta_4 nEGOBET + \delta_5 SIZE + \delta_6 CCON + \varepsilon \quad (3)$$

$$SG = \varphi_1 + \varphi_2 \text{DIVERSITY} + \varphi_3 \text{DENSITY} + \varphi_4 \text{nEOBET} + \varphi_5 \text{SIZE} + \varphi_6 \text{CCON} + \varepsilon \quad (4)$$

where SI = service innovation, KE = knowledge exchange diversity, SG = self-governance diversity, CCON = customer connectedness, DIVERSITY = network diversity, DENSITY = network's density, nEOBET = normalised ego-betweenness and SIZE = network size.

A simultaneous model with a robust estimator (e.g., maximum likelihood estimation with robust standard errors (such as MLR, MLM)) has several advantages, including over tests of the proposed model's fit with the data, estimates that are not overly biased due to violation of non-normality and bootstrapped standard errors that test the significance of the mediation effect. A typical regression includes one dependent variable. Conversely, a model with a simultaneous regression analysis for mediation effects enables multiple dependent variables with minimised variance to represent the causality hypothesised by a more complicated conceptual model. For data that is consistent with normality assumptions, a maximum-likelihood estimator can be suitable for structural equation model analyses. However, a robust estimator with bootstrapped standard errors is suggested. Thus, a robust estimator (i.e., maximum likelihood estimator with robust standard errors (MLM) estimation in Mplus) was used with 1,000 iterations of bootstrapping in the mediation analysis (Muthén & Muthén, 2017).

3.5 Results

Table 10 summarises the descriptive statistics and Table 11 presents the estimated coefficients for the constructs from the mediation analysis. The results for the ego network model analysis are presented separately for the FLE and IFE networks. As the results differed significantly between the two employee groups, the pooled analysis was not interpretable. The overall model fit was similar for both models: a) FLE model (N = 107): $\chi^2=32.70$ ($df = 16$), $p < .01$, RMSEA = .10, $p = .05$, CFI = .96, TLI = .92, SRMR = .06 and (b)

IFE model ($N = 94$): $\chi^2 = 14.69$ ($df = 16$), $p = .01$, RMSEA = .001, $p = .76$; CFI = 0.99, TLI = 0.99, SRMR = .03. These results confirm that the hypothesised model has a reasonable fit with the data for both the FLE and IFE ego networks.

However, the estimated coefficients differ significantly across the FLE and IFE ego networks indicating a disparate underlying process. For FLEs, the knowledge flows are a key mechanism for service innovation, as this effect is large and significant ($\beta_1 = 1.93$, $p < .01$) FLE diversity contributed positively to this mechanism ($\delta_2 = .67$, $p < .01$); however, FLE density contributed negatively ($\delta_3 = -.74$, $p < .05$) to this mechanism. Conversely, for IFEs, the flows of knowledge exchange were not a significant mechanism for service innovation ($\beta_1 = -.08$, $p = .92$). Thus, H1 is supported for the FLE ego network but not for the IFE ego network.

The results for the self-governance mechanism also differed to the results for the two ego networks. The self-governance mechanism was significant for both ego networks; however, it significantly impeded service innovation for FLEs ($\beta_2 = -1.75$, $p < .01$) but advanced service innovation for IFEs ($\beta_2 = 3.94$, $p < .01$). Network diversity contributed positively to the self-governance mechanism for both FLEs ($\varphi_2 = .39$, $p < .01$) and IFEs ($\varphi_2 = .50$, $p < .01$). Conversely, network density contributed negatively to self-governance mechanism for FLEs ($\varphi_3 = -.24$, $p = .20$) and IFEs ($\varphi_3 = -1.18$, $p < .01$), but only the latter was significant. This pattern of results supports H2 for IFEs but contradicts H2 for FLEs.

To rule out the existence of a potential confounding knowledge sharing perspective in both the knowledge exchange network and service innovativeness measures, a post-hoc analysis was performed. The item regarding the sharing of new ideas was removed from the dependent variable and factor scores for the dependent variable were calculated based on the

remaining idea generation and implementation measures (for items for the dependent variable). The mediation analysis results did not change.

Table 10

Descriptive Statistics for Frontline Employee and Internal-Facing Employee Networks

Frontline Employee Networks								Internal-Facing Employee Networks							
Variable	Mean	SD	1	2	3	4	5	Variable	Mean	SD	1	2	3	4	5
1. Service innovation	.08	.90	1.00	.35**	.12	-.34**	.22*	1. Service innovation	-.09	.99	1.00	.25*	.29**	-.20	.13
2. Knowledge exchange diversity	.00	.27	.35**	1.00	.75**	-.44**	.50**	2. Knowledge exchange diversity	.00	.18	.25*	1.00	.96**	-.06	.54**
3. Self-governance diversity	.00	.13	.12	.75**	1.00	-.35**	.49**	3. Self-governance diversity	.00	.12	.29**	.96**	1.00	-.03	.59**
4. Density	.75	.09	-.34**	-.44**	-.35**	1.00	-.70**	4. Density	.74	.08	-.20	-.06	-.03	1.00	.28**
5. Diversity	.79	.13	.22*	.50**	.49**	-.70**	1.00	5. Diversity	.86	.13	.13	.54**	.59**	.28**	1.00

**p < .01 (2-tailed), * p < 0.05 (2-tailed)

Table 11

*Estimated Coefficients from the Frontline Employee and Internal-Facing Employee Ego Network**Mediation Analysis*

Regressions	FLE Networks		IFE Networks	
	Coefficient	P-Value	Coefficient	P-Value
Service innovation				
Knowledge exchange diversity	1.93	.00**	-.08	.92
Self-governance diversity	-1.75	.00**	3.94	.00*
Customer connectedness	.35	.00**	.51	.00**
Knowledge exchange diversity				
Diversity	.67	.00**	.52	.00**
Density	-.74	.02*	-1.82	.00**
Ego-betweenness	.02	.19	.01	.14
Size	1.97	.00**	3.17	.00**
Customer connectedness	-.01	.81	-3.05	.01*
Self-governance diversity				
Diversity	.39	.00**	.50	.00**
Density	-.24	.20	-1.18	.00**
Ego-betweenness	.01	.14	.00	.99
Size	1.34	.00**	1.78	.00**
Customer connectedness	-.02	.17	-.03	.00**

**p < .01 (2-tailed), * p < 0.05 (2-tailed)

3.6 Discussion

In seeking to identify what matters for service innovation in actor networks, this study aimed to conceptualise and test *simultaneous* effects of network density and diversity on actors' innovativeness by focusing on the mediating roles of knowledge exchange and self-governance network flows. To advance previous research of ambiguous effects of network density and diversity on service innovation, this study separated analyses for the FLE and IFE ego networks. To the extent customer-facing and internal-facing roles give service employees (actors) disparate opportunities and opportunities to contribute to service innovation, it was thought that the pooling of FLE and IFE ego networks represented a source of misspecification in previous service marketing research. Finally, by including the mechanisms of network flows, this study intended to illuminate not only whether actor density or diversity matter for service innovation, but also the process by which density and diversity matter in helping (or harming) service innovation. As a result, the study contributes to broader services marketing and specifically to organisational frontlines literature by extending our view for service employee roles and their pathways to successfully implement service innovation utilising a network lens.

The study has implications for social capital theory where simultaneous study of structural and relational mechanisms is scarce. In this study, findings account for both embedded resources in structural and relational networks. In embedded resources perspective of social capital, most studies investigate status, wealth and power. In this study, a decision-making network to organise tasks conceptualised as self-governance extends the thinking about resources. Further, the composition and density of social resources are considered by investigating network closure and role diversity in service employee networks. The chain reaction of structural, accessibility, and mobilization of resources are modelled for returns for an individual for a complete theory of social

capital (Lin, 1999). Thus, the study contributes to social capital as identifying structural features of networks as facilitators for accessing knowledge and mobilizing service tasks and resources with decisions for returns on individual's service innovativeness.

Four results emerged from this study (which are discussed further below): 1) Network diversity *helps* but network density *harms* service innovation for FLEs *if they focus on knowledge flows*; 2) Network diversity *helps* but network density *harms* service innovation for IFEs *if they focus on self-governance flows*; 3) Network diversity *harms* while network density is inert to service innovation for FLEs *if they focus on self-governance flows*; and 4) Neither network diversity nor density matter in service innovation for IFEs *if they focus on knowledge exchange flows*. Together, these key findings provide nuanced and intriguing insights into the effects of actor networks in promoting innovation in service organisations.

The study's results confirmed that network diversity (rather than network density) helps to facilitate service innovation for FLEs and IFEs alike. Indeed, there is compelling evidence to suggest that network density is likely to impede and harm the realisation of service innovations (see Figure 4). Since network diversity is maximal when an actor's network is balanced between FLE and IFE alters (a 50:50 distribution), network heterogeneity appears to be a necessary ingredient to provide sufficient divergent inputs and constructive tension to yield ideas that are novel and useful for service innovation. Without such divergence and tension, a homogenous actor network is unable to provide a crucible conducive to service innovations. In addition, I found that closely-knit networks (as identified by high network density) are detrimental to service innovation. This may be because such networks are prone to homophily effects. These results differ to those in relation to diversity, as homophily may emerge in heterogeneous networks. A heterogeneous network with balanced IFE and FLE actors may nevertheless

gravitate towards homophily as the actors develop close bonds over repeated interactions that intensify around what they share in common and how they are similar. As this study controlled for network size, the effects of heterogeneity and homophily were able to be teased out, which may have been confounding previous research. This study's results clearly suggest that heterogeneity trumps homophily in facilitating service innovation.

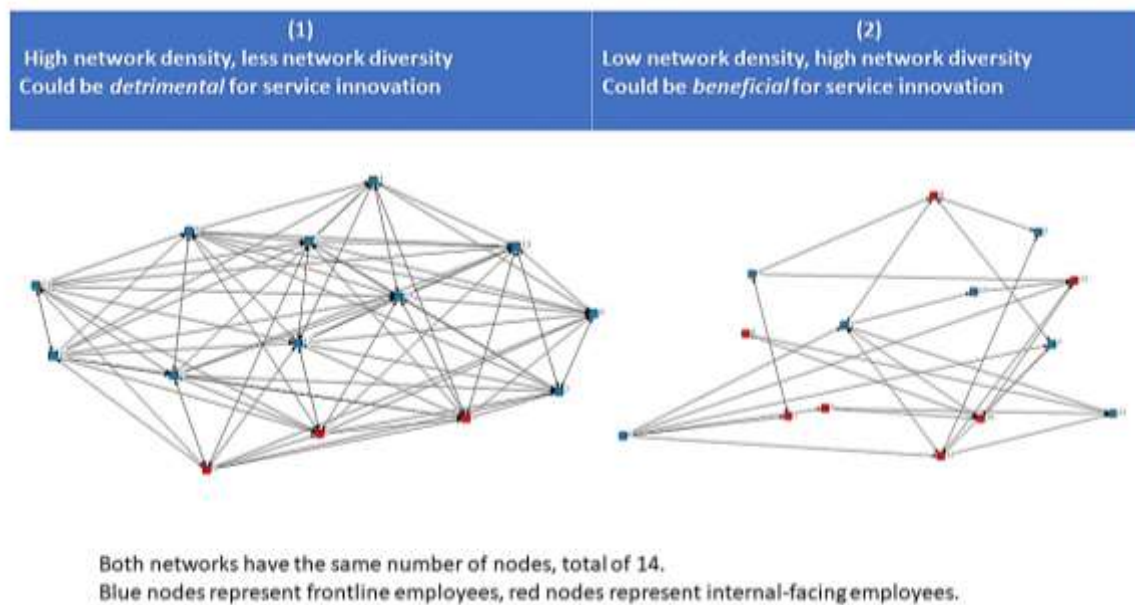


Figure 4. Service employee network structures that can be detrimental (Network 1) or beneficial (Network 2) to service innovation.

The consistency in the preceding results—in relation to diversity, *not* density—across FLEs and IFEs is nuanced, as it shows that while what matters is consistent, how it matters varies for FLEs and IFEs. Notably, knowledge exchange flows are key to realising the innovation payoffs from FLE-actor network diversity. Conversely, self-governance flows are key to realising the innovation payoffs from IFE-actor network diversity. This evidence suggests that idea sharing networks with a focus on *who-knows-what* are influential for FLEs' innovation

efforts; however, in relation to back-of-the-house IFE roles, activity negotiation networks with a focus on organising *who-does-what* assume greater significance. By uncovering the disparate focus of FLE- and IFE-actor networks, the findings revealed that while FLEs and IFEs need to be connected in common networks to infuse diversity, they are successful in producing service innovations *only* when the actors focus on their disparate goals aligned with the roles they fill—FLEs in relation to knowledge sharing and IFEs in relation to task organising. This finding is a new insight for service marketing and innovation literature and suggests that service employee roles lever different mechanisms for innovation. This may be because very few studies have examined the simultaneous effects of different network flow mechanisms (knowledge exchange/self-governance) and different employee roles (FLE/IFE). The knowledge flows that seem inert for IFEs to drive service innovation can also be due to different types of flows producing ambivalent effects. For example, I did not separate knowledge flows in terms of distal and proximal or external and internal type of flows.

The misalignment of roles and network flow mechanisms may prove costly for organisations. The study's findings show that when FLEs focus their attention on the self-governance mechanism (instead of the knowledge sharing mechanism), network diversity yields service innovation losses rather than gains (as expected). This reversal of effects was unexpected and counterintuitive. Why would FLEs paying attention to *who-does-what* organising detract and diminish their innovativeness? Are *who-knows-what* and *who-does-what* competing network flow systems that are prone to conflicted attention when activated simultaneously? These questions challenge learning theory assertions that reiterate that both knowledge and action is necessary to innovate. Future research needs to be conducted to better understand how and why these systems are conflicted in actor networks.

3.7 Limitations

Three limitations of this study require caution in relation to the generalisability of the results. First, the data were collected from a single hospitality setting; thus, it is difficult to rule out potential sample bias and assess the generalisability of the results to other service industry settings. However, a single research setting with social network data collection from a whole network with multiple informants was useful for observing the hypothesised network phenomena end-to-end in a complex service context with identified boundary conditions. Furthermore, the service context is a high-touch service where a high degree of personalization of service interactions are possible. The research findings can be more applicable to the knowledge-intensive and high-touch services where FLEs can be essential part of service delivery processes. Second, actor networks reflect an actor's perceptions and may not be accurate due to cognitive limitations. However, previous research suggests that actor networks are reasonably accurate in reflecting modal network patterns (Marsden, 1993). Additionally, field observations indicate that actor networks captured by archival sources, such as emails or phone logs are prone, to significant errors as they miss the informal interactions that are prominent in a hospitality context. For this reason, self-reported network maps are likely to be more helpful in this context. Finally, while organisations consist of formal hierarchies of managers and departments, the ego networks do not capture the richness of multi-level analyses. Future studies with a multi-level approach to research design in multiple-industry settings should be conducted to extend these research findings.

3.8 Conclusion

In sum, firms should pay attention to not only connecting service employees to customers, but also to their IFEs for service innovation. Further, without enabling knowledge

exchange and self-governance flows that are aligned with FLE and IFE roles, network structures can only execute mundane service routines. Going beyond daily activities to encourage innovativeness requires actor networks to be inclusive and diverse and to be directed towards network flow mechanisms that are aligned with actor roles. Thus, the results suggest that practitioners and researchers focus on network structures and flows of service employees in addition to dyadic interactions (frontline-customer) or individual trait-like characteristics. Service employee networks are natural and consistent sources of distributed innovation that bolster both front- and back-of-the-house innovativeness and learning.

4: General Discussion and Conclusion

This dissertation sought to investigate frontline interactions and their effect on service innovation. To meet this objective, the following tensions around FLEs' roles and the interactions that lead to learning and creativity were identified: 1) frontline knowledge is tacit and complex; 2) effective learning requires within- and across-unit interactions; 3) individual-specific characteristics can improve or detract from knowledge sharing and acquisition; and 4) organisational factors can help or harm innovation. The two papers in this dissertation provide insight into how these tensions can be minimised, particularly when frontline-driven innovation is viewed through the lens of social network theory. The first study (Paper I) suggested that while connectedness is a helpful construct in innovation studies, factors that account for the multiplexity of FLE interactions may be more useful. Specifically, frontline-customer and frontline-internal *connectedness* as distinct domains have relatively different effects on organisational and actor-level learning. Further, *what flows* in these domains will affect the different types of innovation capabilities. In sum, the first study draws upon open innovation and social network studies and conceptualises two network constructs: network domains and network flows. Network domains distinguishes between FLEs' interactions with customers and with IFEs. Network flows separate knowledge flows from self-governance activities. Knowledge flows include sharing among FLEs or the seeking of new service ideas or solutions. Conversely, self-governance flows embody mutual decision making for service tasks and resources. Thus, the proposed taxonomy, which unifies network domains and network flows, provides new levers to predict how different types of network domain flows will affect service innovation.

Paper II built on the taxonomy proposed in the first paper. It investigated the network domain connectedness, conceptualising it as two distinct constructs: network density and network diversity. Limited knowledge of how *simultaneous* effects of actor density and actor diversity may affect effective innovation was a key motivation for the second paper. It conceptualised network flows as a mediating mechanism for network density and diversity to produce service innovation. The Paper II findings were tested with service employee networks and suggest that density and diversity matter in both customer-facing and IFE networks. Further, the findings revealed that knowledge exchange is relatively more important for FLEs than IFEs; however, the opposite is true for IFEs. Thus, Paper II aimed to understand how network connectedness among different actors and flows from different types of network connectedness affected service innovation. Specifically, dense networks can be detrimental to FLEs' innovativeness, as they focus on knowledge exchange. Further, high diversity in frontline networks (as having a balanced frontline and internal employee heterogeneity) can improve service innovation, as they focus on knowledge exchange. IFEs derive innovation benefits by forming diverse networks for self-governance flows; however, the effect is nullified if IFEs focus on knowledge flows. Thus, the findings of the two studies contribute to different literatures. Next, the implications of the findings and future avenues for research are discussed.

4.1 Implications for Services Marketing

First, the dissertation contributes to organisational frontline research by constituting FLE role tensions and unique boundary spanner roles as the foundations for service innovation. Building on those, a taxonomy of frontline interactions in customer and intra-organisational domains was then proposed. The evidence from the empirical findings of this dissertation

suggest that when front- and back-office employee roles are aligned with their idea sharing and decision-making goals, service innovation can be effective.

The findings of the present studies should be extended and replicated with different network structures and flows for service innovation. Frontline interactions are not only limited to those with customers and internal employees. This dissertation adopted a multi-actor perspective to conceptualise on-the-job (social/informal) learning. Thus, future research should extend the network domains to include external firm employees, frontline technologies and suppliers. For example, future studies could examine how to conceptualise frontline interactions and interfaces (e.g., AI-enabled service technologies) in networks. Further, as knowledge flows are influential in generating service innovation, the potential type of knowledge flows, such as knowledge seeking and knowledge recombination, could be explored as mechanisms.

4.2 Implications for Open Innovation Research

In the last decade, open innovation research has begun to focus more on services and human capital as the *micro-foundations* of learning and creativity for organisations (Felin et al., 2015; Mina et al., 2013). In fact, the role of individuals, their knowledge diversity and capacity for brokerage have been cited as ‘research gaps in open innovation’ (Bogers et al., 2018, p. 219). The study situated service employees as uniquely positioned boundary spanners and explored the effects of FLEs’ networks on innovation in open collaborative settings. These findings on the social interactions of individuals (as investigated by network theory concepts, such as density and diversity) add to the scarce findings on open innovation from studies investigating human elements and their characteristics. Further, the presents study’s network perspective showed that different roles and connectedness of employee networks have different effects in knowledge flows for innovation. Specifically, dense human relations detract from new service idea sharing

flows, while a diversity of roles in a network bolster creative flows. In sum, the findings of the study suggest that employee network structures determine the effectiveness of knowledge flows as mechanisms for producing innovations.

In addition to underscoring the role of service employee networks in open innovation, this study also used network-level concepts to theorise about individual-level innovativeness. A recent literature review for open innovation suggests that studies in open innovation are scattered and theory development has been neglected. The first paper in this dissertation specifically focused on developing a taxonomy for open service innovation using network connectedness of frontlines with customers and IFEs. The second paper showed that network diversity is important to innovation for frontlines that focus on knowledge flows, but that self-governance flows harm innovation for frontlines. This finding suggests that network theory's embrace of micro-foundational elements provides fruitful insights that might advance open innovation theorising.

The findings extend the open innovation framework by conceptualising a new flow of activity (i.e., self-governance) in addition to knowledge flows. This study focused on ego networks at the individual level; however, self-governance flows could potentially also apply to investigations of open innovation within inter-firm alliances or business-to-business collaborations. Clearly, other types of network connectedness and content (acting as mechanisms) could affect service innovation. For example, future studies should seek to examine how power or friendship ties affect self-governance flows and whether other types of flows (e.g., social support) affect the innovation of open services.

4.3 Implications for Social Capital and Social Networks Research

This dissertation contributed to social networks research first by conceptualising two network constructs: network domains and network flows. Next, in relation to domain networks, it

analysed the service innovation seeded by two distinct network concepts: density and diversity. Finally, the network flows construct was extended by conceptualising decision-making activity and knowledge exchange flows as disparate mediating mechanisms to better understand current ambivalent findings around density and innovation relationships in social networks research. Given that extensive social networks research has been conducted in relation to traditional flows, such as knowledge, help and advice, the findings from this study suggest a governance flow could drive network structures for new service design. Future research should consider how governance flows can be used to analyse new product designs or organisational performance outcomes, such as growth and productivity.

This dissertation showed the effects of individual-level networks on service innovation. Specifically, a ‘network domains and network flows’ taxonomy was applied to actor-level networks in the second paper. As only one organisation was considered in the second study, the study’s analysis remains at the individual-level service innovation. However, future research should seek to explore how network structure and flows might affect organisational-level innovativeness. For example, a study for organisational-level innovations could be conducted to collect data from several organisations to generate *whole network-level* insights. Such findings could provide insight into how different organisations differ by using the density and diversity network concepts for innovation. Such research could examine what organisational factors improve or diminish the effects of network flows (e.g., organisation-level governance structures or organisational climate). Further, future research should also seek to identify whether there any cross-level effects (from individual-level networks to the whole-network level) within or across domains and/or flows. A longitudinal study could provide further insights into the causal effects suggested by this dissertation. Finally, future research could extend the taxonomy constructs by

including other network constructs (e.g., network thresholds to identify the pain points of the network flows and structures and network position [spatial characteristics] to better understand the effects of individuals on innovation) and other tie content (e.g., knowledge seek and social support to determine how seeking service knowledge for troubleshooting and getting support from social circles can enhance or detract from innovativeness outcomes).

4.4 Managerial Implications

The findings suggest that service employees and their roles initiate effective flows for innovation, as they are more diverse. Currently, organisations search for ways to build better innovation teams, rewards, interventions to enhance innovativeness (at the group and individual levels) and a creative culture that can systematically contribute to firm growth. Adding to the preceding approaches, the findings suggest that *informal* service networks can be a good start for an organic innovation design. Formal networks of knowledge sharing and decision making may be in place; however, managers have difficulty in identifying customer preferences to modify their services. As one events manager from my research field (hotel) stated:

We keep records with consumed beverages per event and our supervisors complete their event reports. Knowledge about the demographic of guests and why they are here is important to know in advance. This is something that isn't passed onto us in Operations and Kitchens from the Sales team. They sometimes lack the knowledge and understanding of the client and guest needs.

Further, managers currently focus on individual ideas or dyadic relationships (frontline-customers) to harvest new product designs and service solutions. One restaurant manager interviewed at the premier hotel at which the research was conducted explained how he made a new restaurant promotion decision at his restaurant by including the chef and operations

manager. However, managers often do not know how service employees reach out to other units and when and why these decisions result in novel service ideas and implementations. An emphasis on employee network mapping and shaping could help managers to better understand how employee-service networks are evolving within their firms. Interventions that include employee role diversity in employees' networks could interject spatial cues (i.e., provide workspaces in which service actors collide *purposefully*). Zappos, an online retailer well known for empowering employee creativity in *customer service*, introduced random employee collisions by separating drinks and food in different kitchens of the building. This enabled employees from different units to travel to different floor kitchens, which allowed informal work discussions to arise. Sensor-mapping human interactions could be used to analyse periodic and contextual factors affecting network/crowd formation patterns within the organisation. Thus, firms could (re)direct traffic for (detrimental) crowded employee-service areas to relieve tensions for effective idea sharing and discussions. Additionally, goal-aligned job descriptions could increase employees' awareness and connect individuals with the right employees to discuss new service ideas.

Self-management has been identified as a good business practice for teams; however, companies have faced some challenges in implementing it. The 'let's fire all managers' and flatten organisational hierarchical boundaries approach was first embraced by companies as a bottom-up approach to increase innovativeness and growth (Hamel, 2011). For example, as a result of empowering their employees to self-create and manage their tasks and activities, Morning Star Company has a mission of "producing tomato products and services which consistently achieve the quality and service expectations of our customers" and has seen its profit grow twice as much as the industry average (Hamel, 2011, para 20). Further, Morning

Star's Tomato Kitchens Department aims at *innovation in selling as well as deepening the customer relations* and they could stem from diverse employee collaborations (de Morree, 2017). Similarly, the company GE emphasised that self-governed teams to empower frontlines. For example, GE's Durham (US) aircraft-engine facility uses flexible team scheduling and free flow of ideas to deliver engine lines and Boeing orders on time for their customers, i.e., service innovation for *delivery* processes (Jones, 2013). As Nate Bailey, the Human Resource Director for the GE Aviation Supply Chain stated: 'People who are close to the production of the material oftentimes have the best ideas and are able to solve the problem better than the people who supervise the work ... You get people doing the work who provide the input on how we do it better every day' (Kessler, 2017, p. 1).

However, self-managed teams are not a panacea. Self-management is often associated with work overload, more complicated administration (e.g., with the scheduling of work) and role ambiguity and related stress. In fact, Zappos (a company that advocates Holacracy)⁵ has seen employees leaving organisations due to complex work environments. Self-managed governance structures remain stubbornly difficult to scale, leading many organisations to fall back on formal hierarchy as a governance solution. The present study opened up the possibility of keeping a formal governance structure within a firm and simultaneously paying attention to informal networks of individuals. In fact, for customer service environments, it is important to empower service employees to connect *freely* with customers to evaluate alternative service solutions. As such *self-governed decision-making networks* involve employees with diverse

⁵ Holacracy is defined as 'the most widely adopted system of self-management, developed in 2007 by Brian Robertson. Authority and decision making are distributed among fluid "circles" ... throughout the organization, and governance is spelled out in a complex constitution' (Bernstein, Bunch, Canner & Lee, 2016, p. 1).

roles, innovative ideas can be road tested and implemented more naturally. Thus, managers may see innovation gains by allowing service employees to make decisions and span the boundaries of different units as they perform their customer service tasks.

4.5 Conclusion— #OrganisationalFrontlinesAreCrucialforInnovation

Given the improvements in AI and advances in robotics, it has almost become fashionable to predict the decline of FLEs. Arguably, FLEs role for service organisations will become more crucial than ever as they are the key knowledge and decision-making sources to task, train, and integrate AI and machine interface input and outcomes. Further to technological advances, consider recent bushfires in Australia and the global pandemic related to Coronavirus disease (COVID-19) that demonstrate the importance of service employees (e.g., policemen, store checkout employees, doctors, teachers) as the essential forefront for creative solutions and collaborative frameworks. Indeed, this research suggests that FLEs and their networks remain critical to innovation within organisations. In contrast to gloomy predictions, FLEs could become even more important in driving innovation, as they have more time and advanced resources to solve complex service problems when machines can work on mundane service tasks. Thus, I would like to call on researchers and scholars to renew their focus on the critical role played by employees at organisational frontlines. The extended toolkit brought to this research, including the social network theory and open innovation, could be productively employed in more in-depth studies of organisational frontlines. Each of these fields is still relatively nascent and thus has terrific potential for extension. By demonstrating the role of employee networks in service innovation, this thesis sought to provide an example of how these tools might be used productively and in a small way, revitalised frontline-service research.

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