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# **Project-Based Work in Times of Covid-19: A dynamic framework for Knowledge Exchange**

## **Abstract**

Knowledge exchange is key to help Knowledge-Intensive Firms (KIFs) innovate and communicate with their clients. However, during the Covid-19 pandemic, many assumptions have been challenged, and as a consequence, this study aims to investigate the effect of the pandemic on knowledge exchange processes in KIFs and how firms responded to the pressing challenges that consequently emerged. This study illustrates how KIFs managed to navigate through the pandemic and exchanged knowledge with their clients in a new dynamic landscape despite the challenges that affected their client base and knowledge workers alike. Using multiple data sources, including 27 interviews, observation, informal conversations, and virtual guided tours, the article provides a three-phase framework with the assistance of a simplified process lens. The framework phases (disharmony, normalisation, and harmony) illustrate how KIFs responded to the challenges, developed capabilities, and provided support.

## **1 Introduction**

Our recent memory does not recall a global disaster in the scale of coronavirus. While government response varied globally, a steady line of chaos can be noticed in the first few months of the emergence of the pandemic. The disruption to businesses has initiated huge efforts to firstly face then cope with the pandemic, which eventually culminated in a more dynamic business setting that perhaps could stay with us for several years, as was the case after 2008's financial crisis (Ahlstrom et al., 2020). Despite the huge impact on businesses, some firms continued to work, and perhaps their businesses grew throughout the pandemic. One such example is knowledge-intensive firms (KIFs). KIFs are project-based firms that provide

specialised solutions through knowledge creation, and exchange (Artto & Kujala, 2008; Sergeeva & Duryan, 2021) and their services are positioned in applied research that focuses on, for example, examining and modelling demographic behaviour during the pandemic, conducting engineering consultancy, technical and management research and consultation, and participating in managing and configuring logistics and complex operations that face businesses.

KIF workers are professionals and experts in their fields (e.g. engineering, project management, language services, law, design, accounting.) who contribute their knowledge, skills, expertise, and social capital to the operations of the firm (Løwendahl, 2005; Mueller, 2015). While some of them worked remotely before the pandemic, most knowledge workers have shifted to online, and knowledge workers performed their tasks from home during the pandemic (Brussevich et al., 2020). This situation seems to have created a paradigm shift about work-from-home where more firms started to provide flexible working arrangements to their staff following the removal of all social distancing measures in the UK.

KIF business models provide non-routine, dynamic and complex services at a project level that require high adaptational configurations that necessarily draw coordination complexities between firms and clients (Siahtiri et al., 2020). This is a challenge that has been acknowledged in KIF literature (See, for example, Ajmal & Koskinen, 2008; Chuang et al., 2016; Hydle & Brock, 2020; Krylova et al., 2016; Mueller, 2015) and one way to tackle this huge challenge is to provide allowances of staff travels, high levels of knowledge exchange, and robust mechanisms to ensure business and client engagement (Zieba, 2021). The pandemic was a perfect storm to challenge the norms on which KIFs work. For example, face to face meetings was key to alleviate the coordination complexities. However, due to social distancing and

lockdown, these meetings have nearly come to a halt (Brussewich et al., 2020). KIFs, as a consequence, have resorted to video conferencing and other online channels. In the meantime, for many KIFs, social distancing has been an opportunity to grow their businesses as clients had to adapt quickly to the "new normal" (Ahlstrom et al., 2020).

In a perfectly stable business environment, knowledge exchange as an organised practice has been key in ensuring coordination between firms and clients is maintained and that services are delivered smoothly (Abualqumboz et al., 2021; Chuang et al., 2016; Mejri et al., 2018; Siahtiri et al., 2020; Swart & Kinnie, 2003). Knowledge exchange allows for adaptational configurations to take place, the production and reproduction of informed decisions, and streamlining complex operations (Vargas & Lloria, 2017). One key factor to the success of firm-client knowledge co-production is knowledge flow, which Zieba and Kończyński (2019) found crucial to establishing ground rules between clients and KIFs. That is, the client's immediate gains (e.g. new contracts, project go-live, etc.) and long-term gains (e.g. growth and expansion) were perceived to be dependent on knowledge flows, trust and communication (Zieba & Kończyński, 2019). The repeated interaction between clients and KIFs enables knowledge to exchange, coordination to emerge, and problem-solving to take place in a perceived knowledge exchange network (Bartsch et al., 2012; Lipparini et al., 2014).

The social distancing imposed by lockdown meant that most of the interaction between clients and KIFs to go online, including the initial meetings between the two parties, contract management, progress meetings, etc. This has resulted in the abolishing of informal means of communication (e.g. "corridor talks" and other forms of chat that took place on the way to a car park or over a coffee or a meal) that both client and firm considered crucial to developing trust and teamwork (Mueller, 2015; Zieba & Kończyński, 2019). Such challenges compel us

to investigate how KIFs and their clients managed to navigate the current pandemic to maintain knowledge flows essential to ongoing business. Against this backdrop, this study seeks to understand what mechanisms the two parties have resorted to exchanging knowledge and keeping knowledge flowing. This article, therefore, addresses this research question: *How did KIFs and clients maintain knowledge flows in times of major shocks such as Covid-19?* Raising that question is crucial for three reasons. First: As of writing this article, the pandemic is still alive, and KIFs are still navigating their ways through it. Second, extant literature shows that adapting or introducing new processes to KIFs is remarkably difficult (Dittrich et al., 2016) due to the varying interpretation and enactment of those new processes by knowledge workers who work from different work locations (Abualqumboz et al., 2021). Third, collaboration channels and practices have become different from those businesses and their clients are used to before the pandemic (Brussevich et al., 2020; Kodama, 2020), in which knowledge exchange practices in crisis time have become relatively underexplored. To address the research question, this article seeks to investigate the accomplishment of knowledge assignments in 5 KIFs in the UK from a processual perspective to unpack the trajectories within which knowledge is exchanged. I identified three phases; disharmonising, normalising and harmonising, through which KIFs navigated their knowledge exchanges with their clients throughout the pandemic. I have used a simple framework to describe each phase's processes, capabilities, themes, challenges, and support mechanisms.

This article makes three incremental contributions to literature and practice. First, it combines research on knowledge exchange with the current pandemic to advance our understanding of how KIFs managed to survive the pandemic by elaborating on how knowledge exchanges were managed throughout the inductive three phases. Second, it offers fruitful insights into how KIFs tackled some complexities in exchanging knowledge across firm boundaries. Third, the

article provides practical contribution by showing a simple framework that KIF managers can contemplate while facing challenging situations. Therefore, the article demonstrates to practitioners that an adaptational strategy is possible instead of resisting the change during a challenging time; the framework offered here shows the required elements to enact it. The article is structured as follows. First, I highlight key literature around knowledge exchange in stable times. Second, I outline the methods employed in collecting and analysing data. I then show and discuss findings and their contribution.

## **2 Literature Review**

Knowledge exchange is a process in which the implicit knowledge, embodied in individuals, teams, and organisations, is expressed and shared in a manner that is aimed to enhance the parties of the exchange (Fiedler et al., 2020; Sedighi et al., 2018). Accordingly, the exchange is stimulated in a supportive environment in which individuals constantly discuss their assumptions and shape and reshape ideas through knowledge networks, inter-company alliances, and social groups. Through these different platforms, implicit knowledge turns into explicit knowledge (Kakar, 2018) that can be more easily exchanged and managed, which makes it contribute effectively to understanding the problems facing the organisations and to offering effective solutions that otherwise could not be obtained (Furlan et al., 2019).

The social perspective of knowledge exchange assumes knowledge as a valuable resource exchanged between different parties (Easterby-Smith et al., 2008). Therefore, knowledge is exchanged based on mutual interest or expected benefits (Cropanzano et al., 2017). This transactional relationship means that parties have accepted the risk of sharing the knowledge, especially those initiating the exchange. In other words, the individual takes the risk of sharing knowledge with another at a perceived price. However, knowledge could also be exchanged

based on pure opportunism (Bouncken et al., 2020; Lannon & Walsh, 2019), which may cause a dilemma for knowledge exchange efforts. Larsson et al. (1998) explained that the dilemma, on the one hand, exploits knowledge that an individual seeks, but on the other hand, this behaviour would bar knowledge exchange because other individuals may feel they are being exploited. To mediate this dilemma, Larsson et al. (1998) suggested a trade-off between expanding the benefits reaped from the exchange and reducing the cost incurred throughout the exchange.

Cultural complexities are not isolated from knowledge exchange, especially if the exchange parties come from a different individual or organisational cultures and are affiliated to more than one network (Ray & Bala, 2020). Using data from 144 respondents, Kumi and Sabherwal (2019) find that social identity is key to motivate knowledge exchange and argue that using technology to encourage loyalty and emotional attachment is key for the success of knowledge exchange in online communities. The motivational perspective of knowledge exchange focuses on the importance of innovation to motivate individuals, teams and organisations to exchange knowledge (for a review, see Castaneda & Cuellar, 2020). Innovation, as such, creates an environment where bilateral exchanges accumulate to a cooperative exchange of knowledge that is embedded in the social capital of individuals of exchange (Bacon et al., 2020).

The plethora of research on knowledge exchange, although its results are inconsistent at times, indicates the paramount importance of organisational trust and commonality for the exchange of knowledge (Bouncken et al., 2020). Given the ontological complexities of knowledge in general, knowledge exchange literature reveals key factors in addition to organisational trust and commonality through which individuals and organisations resort to cost-benefit accounts to decide whether or not to embark on knowledge exchange (Siahtiri et al., 2020). For example,

through 140 survey responses, Sun et al. (2014) illustrate the relevance of exchange through cost-benefit trade-offs and argue that, while perceived cost is evident, perceived benefits are more influential in advancing knowledge exchange in virtual business communities.

As for the intra-organizational level, social interaction between employees, the frequency of communication and quality of channels, and the common language, lead to favourable conditions for knowledge exchange (Furlan et al., 2019). In the same line, by studying 34 software projects implemented by knowledge workers, (Kakar 2018) recognises a positive relationship between knowledge exchange and psychological safety in the workplace. The knowledge exchange between co-workers promotes a positive atmosphere in the workplace, which leads to higher levels of exchange in the long run (Harvey et al., 2019). Herbst (2017) explains that knowledge exchange in a positive surrounding environment provides psychological safety for employees, which increases the opportunities for cooperation between employees beyond the mere completion of basic work, in which case knowledge exchanges involve discussions of the future and possible job opportunities in the market and increased production. Psychological safety also contributes to dispelling many people's fear of exchange, including fear of prejudices, bullying, or fear of loss of status arising from perceived knowledge loss (Nurmi & Hinds, 2020). In this regard, Ghobadi and Mathiassen (2016) show that employees are not involved in knowledge exchange due to difficulty reaching key people to talk to about problems and their solutions. Similarly, Akgün Ali et al. (2017) conducted an explorative study through interviews with 18 knowledge workers and reported that the lack of a supportive environment is key to reducing motives to exchange knowledge. This can be alleviated by creating psychological safety within which knowledge can be exchanged.



The increase of the more fragmented and international business, represented by the geographic dispersion of knowledge-intensive businesses, posed serious challenges to knowledge exchange due to fragmentation of communication channels (Argote et al., 2011). In addition, the geographic dispersion of teams due to new organisational forms led to isolated and overworked individuals (Eddleston & Mulki, 2017), creating work arrangements that limit the social interaction that is key for knowledge creation and sharing.

To summarise, from a social theory perspective, the extant literature on knowledge exchange shows that it is a delicate process that entails an active interaction between exchange parties. However, despite the valuable insights that the literature provides, it has focused primarily on knowledge exchange in stable environments which means that there is little guidance on how knowledge is exchanged in troubled environments such as this time of the current pandemic.

### **3 Methodology**

This article seeks to explore real-life practices, narratives, and interpretations of knowledge exchange to capture knowledge exchange processes during the Covid-19 pandemic. Consequently, This article is based on a qualitative approach that draws on grounded theory (Strauss & Corbin, 1994) as described below:

#### **3.1 The Empirical Setting**

Following a relatively traditional case study approach (Eisenhardt, 1989), the five cases of this study were selected to maximise the quality of data collection that would allow for rich and extensive analysis. The empirical data for this article were collected from 5 KIFs in the UK specialising in delivering IT solutions to their clients. Firm details are shown in Table 1 below.

*Insert Table 1 here*

### **3.2 Data Collection**

Data were collected from five KIFs, as shown in Table 1 above. I conducted semi-structured interviews and observations with knowledge workers over the pandemic from March until May 2020. The semi-structured interviews were conducted using video technologies due to the pandemic. I used Zoom, MS Teams, and Skype depending on the platform interviewees were comfortable with or had better access to. The interviews were aimed at streamlining a baseline of comparability across interviewees. Questions focused at the beginning on the interviewee's role, responsibilities and what services they provide to clients. This was followed by specific questions on how Covid-19 changed their routines, practices and job responsibilities. The observations took place on publicly available online platforms where firms conducted webinars to introduce their services or discuss how Covid-19 impacted businesses.

### **3.3 Data Analysis**

Data were analysed in two steps. The first followed guidelines of grounded theory (Strauss & Corbin, 1994) to code the data sets of interview transcripts and observation field notes that culminated in several themes. The first step was an iterative process using Nvivo 12, in which I conducted several iterations of codes and cross-compared the emerging themes against literature. Table 2 below shows data structure with representatives quotes from interviewees. The second step was to apply a simplified process approach where activities and actions of interviewees are both individually and socially interpreted and temporally organised. This allows interpreting how events unfold over time and what means are operationalised to facilitate the change (Langley et al., 2013). As such,

*Insert Table 2 here*

## **4 Findings**

Figure 1 below illustrates the inductively derived processual overview of KIFs response to the pandemic. It shows that the studied firms went through three phases before their knowledge exchange processes were perceived as fit for purpose. The phases are (1) disharmony, (2) normalisation, and (3) harmony. The next sub-section will describe each phase's processes, strategies involved, capabilities operationalised, and support mechanisms.

*Insert Figure 1 here*

### **4.1 Phase 1: Disharmony**

The framework begins with Phase 1 as it marks the disharmony that KIFs had at the beginning of the pandemic. At that time, KIFs commenced initial investigations of the situation and initiated business network-level activity to communicate with their stakeholders to discuss plans, mitigations, survival packages, and access to resources. However, at this phase, KIFs were unaware of the scale and magnitude of the pandemic.

Processes at this phase were marked by intensive knowledge acquisition through which KIFs focused on contemplating multiple sources of knowledge dissemination platforms such as Zoom, MS Teams, Google Hangouts, and the more advanced 3D technologies such as QUBE. KIFs changed the way they exchange knowledge with their stakeholders several times due to platform compatibility or security issues. By the end of this phase, most KIFs managed to consolidate channels of communication by creating a list of stakeholders and cross-matched with the respective platforms that both parties can work with. As soon as some vision through

the lockdown in March 2020 became clear and the KIFs and their stakeholders agreed to collaborate through a specific platform, they met to discuss key issues during the current phase. In theoretical terms, this phase required dynamic sensemaking capabilities because KIFs needed to make sense of the implicit cues that the market sends in order for KIFs to work immediately to include them in any business to come. Despite the chaos that prevailed in the early days of the pandemic, companies quickly responded to the problems that emerged almost relentlessly. For example, an intellectual protection KIF encountered some problems with a client due to the obstacles of remote work and the effect of changing document storage and archival protocols while knowledge workers worked from home as the firm was concerned that this might infringe third party rights.

#### **4.2 Phase 2: Normalisation**

In this phase, KIFs absorbed the initial shock they had at the beginning of the pandemic and realised the scale of the disruption to markets. Following the realisation of certain platforms to use with their stakeholders, this phase was marked with utilising these platforms and the trialling of knowledge exchange through video conferencing tools with their clients. KIFs reported that this phase was not easy as several issues and obstacles appeared while they were navigating their way through. One of the key challenges, for example, is that a KIF reported an issue they faced with their employees to deal with video conferencing with clients due to the excessive number of meetings they started to have compared to these before the pandemic. A process improvement firm found that this phase was marked by the challenge to co-create value through close collaboration with their clients, which required dealing with ongoing or new work assignments in a manner that broke away from preconditioned norms. The firm focused more on ensuring staff are interacting well than on process flow or work routines. The abundance of guidance, weekly announcements, written, video recorded, and animated

procedures normalising staff was not as easy as KIFs thought. Improvised work practices were key to tackle situations where prescribed solutions were not fit for purpose or lack contextualisation. The interactions, improvisation, feedback, and engendering a resilient staff behaviour paved the way for staff to make sense of new knowledge practices, which facilitated the transfer of this phase through into a harmony state where the new normal (a constantly changing, dynamic landscape) is looming.

### **4.3 Phase 3: Harmony**

As KIFs were about to reach a state of resilience in their responsiveness to the pandemic, they transformed most of their operations into covid-19 compliant. KIFs organised their operations towards innovative and sustainable solutions by investing in developing interdependent sets of technical and operational capabilities of knowledge exchange. For example, a legal firm that delivers technical legal advice to clients invested in a new platform that delivers a highly communicative case management approach. The platform has a comprehensive horizontal and vertical communication channel, a revolutionary change for the firm's stakeholders. The firm reported that they built small creative networks, which included at least one champion of the new platform and 5-10 others to provide seamless support of the new platform.

## **5 Discussion and conclusion**

The purpose of this study is to illustrate how KIFs (as a proxy of project-based work) managed to navigate through the current pandemic. As "business as usual" has been disrupted when the pandemic unfolded, the way that KIFs used to exchange, manage and disseminate knowledge has been disrupted too. As a response, KIFs had to adapt and improvise new ways that may not have been necessarily used before or might have been used in modesty. The data analysis reveals some key findings, which are reported in Figure 1 above. Considering the interviewees'

various statements and the observation notes made throughout the data collection, this article concludes that knowledge exchange dynamics were manifested in a three-phased framework shown in Figure 1 above.

The theoretical contribution of this research relates specifically to knowledge exchange and project-based work. In addition, this paper contributes to the current literature on knowledge exchange by emphasising the social aspect of knowledge exchange. In particular, it provides empirical evidence showing how knowledge exchange can occur in an unstable environment through a simplified framework of three stages, as in Figure 1.

The three phases of the process-imbued framework are disharmony, normalisation, and harmony. The first phase, disharmony, illustrates the multiple challenges KIFs faced and how they responded. Literature on knowledge exchange suggests that firm capabilities and support to their task force define how knowledge is exchanged and how solutions to problems are carved. The phase begins with making sense of the current environment, its processes and requirements, which requires harnessing all capabilities, knowledge, skills, relationships, resources and corporate infrastructure to understand the emerging business environment and identify ways to deal with it. During the pandemic, KIFs invested their time and effort into extensive conversations with their clients to better curate solutions and gained buy-in to ensure a swift and smooth transition to a New Normal marked by a constantly changing and dynamic landscape. This has led to strong firm visibility that reassured existing clients that their projects will not be suspended or significantly delayed. During the second phase, normalisation, firms began to reap the benefits made in the previous phase, where the simplified framework shows the necessary processes to enact those gains and draw on those knowledge areas that were previously created and exchanged with clients. As such, this article points to the increased

interdependencies between the firm and its clients on a multilevel during the pandemic. For example, one key marker of how KIFs were responsive is how their workers adapted to new systems or routines where they effectively communicated with clients the progress of new systems, the value for money of the new adoptions and the potential gains clients will have despite the glooming economy conditions. Despite the challenges of working from home, workers showed commitment to their availability and fast-paced familiarity with new communication channels such as video streaming, automatic minutes taking, etc. In the final phase, harmony, KIFs showed maturity in a remarkably short time, reflecting the fast pace that marked the work environment during the pandemic. KIFs relied on the aggregation of their workforce knowledge and expertise to harmonise their knowledge exchange, communication and resilience. Creating social communities of practice was one way to get the buy-in to the new systems and provide instant expert-led support to less experienced colleagues.

As most literature on knowledge exchange focuses on organisations in stable times, the article contributes to theory by highlighting how knowledge exchanges unfold during disaster times. In doing so, the article makes three incremental contributions to literature and practice by adopting a differentiated context and neglect spotting strategies (Nicholson et al., 2018) to problematise our current understanding of knowledge exchange. First, the article, drawing on a simplified processual lens, advances our understanding of how KIFs managed to navigate the pandemic by elaborating on how knowledge exchanges were managed throughout a three-phased framework. The process view allowed for seeing how processes unfolded, what dynamic capabilities developed, and action strategies that marked each phase. Second, it offers fruitful insights on coordination efforts that KIFs have utilised to tackle the inherent complexities of inter-organisational knowledge exchange. For instance, intra- and inter-organisational coordination complexities were alleviated by the interplay between client-facing

communication strategies and staff-facing communication strategies. Third, the article provides practical contribution by showing a three-phased framework that KIF managers can contemplate while facing challenging situations. This article, therefore, offers managers a framework that draws on lessons learned centred on that overcoming the crisis means proactively managing its complexities. This depends not only on procedures and systems but also on individuals by understanding their variations, accepting their vulnerabilities, and providing a balanced support to enact their potential to support organisational deviations to a constantly changing and dynamic landscape.

### **5.1 Managerial implications**

Mobilising the effort to combat the current pandemic has not ever been easy, as this effort involves huge investments of the firm's time and money to hone the skills of employees, educate them, and prepare them for the emerging dynamic environment. Therefore, this article affords multiple managerial implications for managers who work in project-based work such as KIFs. The empirical framework (Fig 1 above) outlines a multilevel approach to navigate knowledge exchange during Covid-19. In the first level (Processes), the framework presents the processes the studied KIFs have followed across the three phases of knowledge exchange. In the processes of the disharmony phase, for example, managers learn about knowledge flows (acquisition, utilisation, and dissemination) in a disruptive and dynamic environment similar to Covid-19 (e.g. the studied KIFs have experimented with several knowledge platforms in order to identify the most appropriate for them and their clients and explore how employees and clients adapt to them). Subsequently, in the "normalisation" phase, evaluating these platforms took a more in-depth explorative approach by conducting webinars with clients and employees to discuss any challenges in the platforms that have been agreed upon and how to overcome them. In the "harmony" phase, KIFs began to learn more about the operational



routines that allowed them to resume their operations and even maximise the extent of benefit from cloud-human platforms and seamlessly exchange experiences and documents. In the second level of the framework (Capabilities), managers might learn about the capabilities their firms may need to develop (or benchmark against) to deal with similar crises. These capabilities are inspired by dynamic capabilities, which the framework prescribes a recipe for based on firm experiences of building dynamic capabilities across the three phases of knowledge exchange. The third level of the framework (Strategy) afford managers a simplified explanation of the challenges, opportunities, and creativity in producing an appropriate strategy. This is done in every phase by looking both internally and externally. For example, the first phase of the pandemic was marked by market chaos and uncertainty, which the framework clarified might provide opportunities. Likewise, the uncertainty of jobs and exhaustion were grounds for developing individual resilience strategies. In the fourth level of the framework (Key Challenges), the main challenges of the studied firms were identified on the organisational and technological levels, which provides a basis for managers in similar firms to benchmark against these challenges. In the fifth and final element (Supportive Mechanisms), the framework provides supportive mechanisms to respond to the challenges mentioned in the fourth level, allowing managers to benchmark against and learn from previous experiences on how to deal with those challenges. Overall, this framework can be realistically translated by similar firms by drawing lessons from previously studied KIFs, enabling them to develop systems, guidelines, and tools to help navigate similar crises.

## **5.2 Limitation and further research**

This paper provided a deeper understanding of how project-based firms exchanged knowledge with clients during the pandemic through five case studies. However, considering the reduced

generalisability of case studies, I acknowledge several limitations that warrant further studies to validate and extend the findings.

The study primarily relied on retrospective interviews during the early weeks of the pandemic to elicit fresh data to afford detailed descriptions of the challenges that faced KIFs, the strategies to mitigate them, and the capabilities and processes to enact such strategies. First, despite the plausibility of retrospective interviews, they may suffer from some biases such as hindsight, cognitive and social desirability biases (Kremser & Schreyögg, 2016). Second, the collection of cross-sectional data that immediately followed the first lockdown in the UK means that the simplified framework reflects fresh and immediate challenges about the early lockdown (March-May 2020). As this is a dynamic pandemic, fresh challenges may have emerged, which this study may not have captured in addition to fresh mitigating actions that the studied firms may have adopted or adapted at a later stage than the data collection. Third and finally, there may be contextual limitations such as the way the research was designed and implemented, the researcher's bias of analytical focus and process, and the biased choice of studied cases.

All of those limitations combine warrant further investigations such as, firstly, studying knowledge exchange throughout the pandemic (March 2020 – August 2021) in the UK or other timeframes elsewhere in the world depending on the geographic research site. Secondly, further research may investigate in more detail what elements of the suggested framework have worked (or otherwise) in other comparable environments, industries, or firms. So, for example, further research may investigate why, when and how mitigating strategies have worked and what strategies have been interrelated or otherwise. Thirdly, the research may be expanded to study how individuals may have influenced knowledge exchange or what roles to make a seamless transition from one phase to another.

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Table 1: Firm profile and data collection

KIFs pseudonym	Domain	Interviews	Other methods
MyCloud	Provides Managed Services delivering cloud-based cybersecurity, networking, and Data Recovery. Staff Size: 71	1 regional manager 2 data engineers <u>1 service controller</u> <b>Subtotal = 4</b>	Regular informal chat, virtual guided tour, 1 day observation
MyIT	Provides creative design, digital printing, marketing technology, brand management, and project management Staff Size: 190	1 senior manager 3 creative thinkers 1 senior designer <u>2 production experts</u> <b>Subtotal = 7</b>	Regular informal chat, 2 day observation
MyDigit	Accelerates digital transformation using integrated technology and management solutions. Staff Size: 108	1 digital finance transformation expert 2 senior analysts <u>3 AI consultants</u> <b>Subtotal = 6</b>	Regular informal chat, virtual guided tour, 1 day observation
MyProcess	Provides process improvement and lean concept solutions. Staff Size: 64	1 CEO 2 Process improvement consultants <u>2 operational excellence consultants</u> <b>Subtotal = 5</b>	virtual guided tour
MyCRM	Provides digital customer relationships management solutions. Staff Size: 83	1 manager 2 campaign developers 2 software developers <b>Subtotal = 5</b>	Regular informal chat, 1 day observation
<b>27 Interviews, Average duration = 1 hour, Total Duration = 28 hours</b>			

Table 2: Data Structure with Representative Quotes

Theme	Codes	Representative Quotes
<b>Phase 1: Disharmony</b>	Processes	So we were searching for new platform to communicate better with our clients.. We discussed existing licenses (KIF Manager 1)
	Capabilities	we have to get ourselves to speak to stakeholders regarding new system of work. We don't want to be seen speaking to ourselves (Cloud Engineer)
	Strategy	we've just realised that it's not only about ourselves, it's the economy completely gone into chaos (KIF Manager 3)
	Challenges	it's a performance gap. There is difference between those who previously worked from home and those who didn't (Head of Data Science)
	Support Mechanisms	but at the same time encouraging the individual to be a participant in the learning process, the support and knowledge they've gained so (Senior Financial Consultant)
<b>Phase 2: Normalisation</b>	Processes	We are beginning to work with clients, and we're kind of combining our practices together (KIF Manager 2)
	Capabilities	you try an idea with a whole bunch of clients with their their different ideas too, then you see an idea just wins... Fab! (Cloud Architect)
	Strategy	but then as they got to know the problem and they got to know what skill set we need and what we could share.. that normality, normalisation of the group emerged. (Production Manager)
	Challenges	I constantly look for motive, and you realise that people are so, so different, how they get on with things. (Account Manager)
	Support Mechanisms	Reliable system is very much a support role, more than anything (Lead Security Analyst)
<b>Phase 3: Harmony</b>	Processes	Eventually, we aligned our operations internally and externally to commit to the new normal. It took time but we are there now. (Head of Operations)
	Capabilities	We established a close cooperation with our client base to be able to continue to provide innovative solutions in such trying times. (Innovation Adviser)
	Strategy	it was a network where people come together for the same purpose. (KIF Manager 2)
	Challenges	Connectivity will be an issue for some people, IT infrastructure, the set up, etc. (Innovation Technologist)
	Support Mechanisms	We want people and processes to align..we want to keep up the momentum processes. . .for instance, we extended our licenses to be used on personal computers. (Lead Security Analyst)

	Disharmony	Normalisation	Harmony
Processes	- Knowledge acquisition (KIFs defragmented multiple platforms of knowledge and coordinated with existing knowledge artifacts)	- Knowledge Utilisation (KIFs assessed knowledge platforms, consulted internally and externally, and appropriated knowledge)	- Knowledge Dissemination (KIFs consolidated and applied newly transformed knowledge into new operational routines)
Capabilities	<b>Sensing</b> - Conversation with clients and colleagues - Brainstorming new ideas - Experimenting ideas	<b>Seizing</b> - Co-creating value - Developing new service/products	<b>Reconfiguring</b> - Engaging with Social communities of practice - Lobbying for open innovation
Strategy	<b>Mapping challenges</b> <b>External:</b> market chaos, B2B uncertainty <b>Internal:</b> Job uncertainty, Exhaustion	<b>Exploring Opportunities</b> <b>External:</b> Innovative solutions <b>Internal:</b> Resilience skills	<b>Producing creativity</b> <b>External:</b> Fostering networks <b>Internal:</b> Legitimising practice
Key Challenges	<b>Organisational</b> - Getting Staff together  <b>Technological</b> - Consolidating knowledge exchange platforms	<b>Organisational</b> - Learning and Adaptation  <b>Technological</b> - Technical issues	<b>Organisational</b> - Synthesising contributions <b>Technological</b> - Scaling up IT Support
Supportive Mechanisms	<b>Organisational</b> - Opportunity Identification - Leadership <b>Technological</b> - Sophisticated platform - Connectivity	<b>Organisational</b> - Opportunity Analysis - Incentivisation <b>Technological</b> - Sophisticated platform - ICT Support	<b>Organisational</b> - Leadership - Strategic Management <b>Technological</b> - Connectivity - ICT Support

Figure 1: Processual overview of KIFs response to Covid-19 pandemic