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## Performance Impacts of Telework, ICT and Management Control

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### Abstract

The aim of this study is to examine the relationship between implementing a higher level of telework and operational performance and explore the role of Information and Communication Technology (ICT) capability and Management Control (MC) mechanisms. More specifically, the study focuses on the role of four MC mechanisms (action, outcome, personnel and cultural controls), and three dimensions of ICT capabilities (internal use, collaboration and communication) by taking a Dynamic Capability View (DCV). The results suggest that mandated use of telework in response to a crisis (COVID-19 pandemic) has a negative impact on operational performance. However, higher levels of telework increase the scope and use of MC, which in turn improves performance. Accordingly, we conclude that MC positively mediates the negative effect of TW on performance.

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*Keywords:* Telework; Management Control; ICT capability; Environmental Uncertainty; Operational Performance; SEM-PLS.

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### 1. Introduction

The COVID-19 pandemic and related government mandates forced organizations globally to introduce or expand telework (TW). In Australia, the pandemic resulted in nearly half (46%) of employees working from home regularly

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in 2022, representing a significant increase of 30% compared to pre-pandemic levels, and the trend towards TW has continued in the post-pandemic period (Australian Bureau of Statistics, 2023). TW is defined as an alternative working arrangement that enables employees to work outside their regular office by using information and communication technology [1]. Despite many potential benefits associated with implementing TW, it is still a matter of discussion whether it is an efficient and productive work arrangement. In fact, TW has also been associated with significant challenges, such as employee isolation, work intensification, disengagement, reduced dedication and commitment, and employers' loss of control over employees' work processes.

The widespread and continuous use of Information and Communication Technologies (ICT) enabled the development and expansion of TW. ICT is now used more frequently to achieve and maintain competitiveness, increase profitability and succeed in dynamic markets. We study ICT capability by drawing on the Dynamic Capability View (DCV), which argues that enterprises must evolve their resources and capabilities to secure sustainable competitive advantage.

The profound challenges the COVID-19 pandemic imposed on organizations provided a unique setting to study how organizations respond to a pandemic by adapting management control (MC) mechanisms. As an efficient tool to monitor behavior and minimize the need for direct supervision, MC can assist in coordinating appropriate organizational actions and processes, support managers in making timely decisions and manage internal and external risks associated with implementing TW. However, little is known whether and how MC changes in line with increased TW and environmental uncertainty [2].

Therefore, the *aim* of this study is to explore the effects of implementing more TW and the use of resources and capabilities such as management controls and ICT when environmental uncertainty increases, as during a pandemic. To shed more light on the interplay of TW, resources and capabilities, we seek to address two critical *research questions*: 1. *How does TW affect operational performance in organizations?* 2. *What is the impact of MC and ICT capabilities on operational performance when increasing TW in highly dynamic environments?*

We develop a theoretical model of the relationships between TW, ICT capability, MC, environmental uncertainty, and operational performance. The theoretical model is tested through survey data from CFO and senior managers in medium and large Australian organizations. The results of Structural Equation Modelling (SEM-PLS) analysis support the theorized relationships. Our findings show that a higher level of TW has a negative impact on operational performance. We also find that action, results, personnel, and cultural controls bundled together have a mediating effect on the impact of TW on operational performance. Building on the DCV, we also confirm that ICT capabilities enhance operational performance. Finally, our analysis suggests that environmental uncertainty plays an important role in shaping MC.

The remainder of this paper is structured as follows: Section two presents the theoretical background and hypothesis development. In section three, we explain the research method followed by an analysis of the results in section four. In the final two sections, we discuss the results, implications and limitations, with possible future research avenues.

## 2. Hypotheses development

### 2.1. Telework (TW) and performance

TW (telecommuting or virtual working) activities are facilitated by utilizing ICT and digital assistive technologies. TW has rapidly expanded and recently become a common organizational venture due to changing social, environmental, and economic challenges. The existing knowledge and research on TW have mostly been generated from a context in which TW was only occasionally or infrequently practiced, rather frequently or permanently. Before the COVID-19 pandemic, many organizations implemented TW voluntary and with time limitations, such as one or two days per weeks. Also, previous TW literature mainly focused on traditional teleworkers in information/communication and knowledge-based services, but only recently TW has been expanded into new professions and job categories, including more routine and administrative work [3].

Numerous studies have been conducted on the relationship between TW and organizational performance, but the results are contradictory. On the one hand, researchers of TW find a positive impact on productivity and organizational performance, both at the individual and organizational levels. At an *individual* level, TW can reduce commuting costs and increase employee performance and satisfaction, provided the TW environment is better tailored to employees

and provides fewer distractions than the office [4]. TW also provides a more flexible work environment, which can reduce the work-family trade off. Moreover, teleworkers often have more control over their work schedule, in terms of when and where they work, and the way and speed of doing their work [5]. At an *organizational level*, TW helps organizations to reduce costs and decrease employee turnover intention. The adoption of TW can increase firm-level productivity because of more satisfied and focused employees, by allowing organizations to access a broader pool of geographically distant talent and by reducing fixed asset costs. Moreover, TW enables changes in an organization's resources and capabilities, which may have a positive impact on organizational performance [6]. TW is also considered to promote change in organizations and enable better control.

Despite the suggested benefits of TW, researchers have also identified *disadvantages* of TW, at the employee and organizational levels. From the *individual* perspective, some adverse results of TW include employee isolation, work intensification, disengagement, reduced dedication and commitment, and reduced support of employees' work processes [7]. TW may negatively impact on job satisfaction because of a lack of interpersonal contacts, reduced face-to-face communication and increased self-discipline requirements. It may lead to psychological and professional isolation, which has a negative impact on job performance and teamwork [8]. TW can also increase work-family conflicts, which may cause teleworkers' moral hazard, thus decreasing their performance. At the *organizational level*, organizations need to face some potential challenges of implementing TW, such as new performance measures, impact on teamwork, safety and liability, provision of adequate technology, security of information, selection of suitable employees, and supervisor discomfort. Although TW benefits from advancements in ICT, many nonverbal communication cues are filtered out. It creates some new complexities in the workplace, which makes the connectivity of coordination and management more challenging, and TW can create more conflicts and reduce managers' effectiveness in controlling, coaching, and setting goals for employees [9]. The lack of adequate ICT infrastructures may result in teleworkers not working as productively remotely as in traditional work arrangements. TW frequently reduces real-time manager-worker communication, which hinders managers' ability to quickly assist employees or recognize situations of employee dissatisfaction. Moreover, TW reduces social, non-task interaction and informal interaction, making it more difficult to build support and trust between managers and teleworkers, and detaches employees from managers and other employees. TW also tends to attract less productive new workers than those who were hired into on-site jobs. Another critical finding is that TW might not be suitable for everyone, because not everyone feels equally productive under a remote working environment. Since most employees chose working remotely voluntarily before COVID-19 pandemic, some earlier TW research have suffered from self-selection bias [10]. Therefore, the benefits of TW identified in previous studies may not fully apply to the recent pandemic-enforced situation. Overall, we conclude and predict that:

**H1: Increased levels of telework have a negative direct effect on operational performance.**

## 2.2. Telework, management control and performance

Management control (MC) is defined as all mechanisms supporting decision-making, coordinating and integrating different parts of an organization to ensure that resources are obtained and used effectively and efficiently in the accomplishment of the organization's objectives [11]. MC types and designs have been distinguished by different frameworks. Our research uses the control framework developed by Merchant and van der Stede [12] in 2007, which distinguishes between four separate MC elements based on the objects they are intended to control, i.e. *action*, *results*, *personnel* and *culture* controls. This provides a conceptually clear and consistent taxonomy for investigating different MC elements within organizations. This framework presents the various MC elements in a kind *neutral* manner, which means it does not state explicitly whether these controls are positive or negative.

Analyzing isolated MC practices may limit the validity and reliability of empirical research results and fail to adequately represent the complexity of MC. Organizations use a *mix of various types of MC* to encourage desirable employee behavior. Our study also uses a broader concept of MC and explores how a set of MC practices achieve effective outcomes in a fast-changing environment [13]. TW received very little attention in the MC literature before the COVID-19 pandemic. Managers and employees traditionally worked in the same physical workplace and managers often used centralized work arrangement to coordinate, motivate and control employees directly. Since there was only a small percentage of teleworkers and/or most of them spent only a small proportion of their time working remotely, organizations often saw very little need to question and revise established MC.

Due to the COVID-19 crisis, in particular lockdowns, organizations had to move much of their functions into remote spaces and change their work arrangements to keep their employees safe and to continue normal operations. Organizations needed to use more and modified MC mechanisms to overcome difficulties and reduce control problems. *Action* controls are used in remote working environments because they can reduce amplified control problems. During the pandemic organizations needed increased action controls, such as standardization, pre-action reviews and planning participation. Stronger action controls reduce the necessity for time-consuming meetings under TW conditions, which can improve employee productivity. *Results* controls identify the important objectives within employee activities and provide employees with more direction and freedom to achieve desired goals. Prior research suggests that organizations place emphasis on using pay for performance, key performance indicators and management by objectives. As TW is typically related to low levels of collaboration, it is important to develop teleworkers' skills and self-motivation. Organizations can use *personnel* controls to keep track of the output and process and collect information to determine whether the skills of employees are adequate for their tasks or the organization. Managers use several task-specific tactics to monitor teleworkers' behavior, such as choosing appropriate teleworkers and conducting TW training. Organizations use *culture* controls to direct employees' creative efforts towards their work and improve their intrinsic motivation. In summary, we propose that:

**H2: An increased level of teleworking is associated with higher levels of management control.**

Since the aim of MC research is to provide relevant findings to assist managers in achieving organizational goals, it is noteworthy to include performance as an independent variable to explain key characteristics of MC. MC can be used not only to monitor whether performance outcomes are in accordance with plans, but also to promote staff involvement, coordinate actions, organizational goals and communications [14], thereby promoting performance. Accordingly, it is predicted that the overall operational performance of organizations will be improved based on adjustments to MC in response to the challenges of implementing or extending TW. In combination with H2, we therefore formulate the following hypotheses:

**H3: Higher levels of management control are positively associated with operational performance.**

**H1b: An increased level of teleworking is positively associated with operational performance via MC.**

### 2.3. Information and communication technology (ICT) as dynamic capability

The DCV is a prolongation of the resource-based view (RBV). It emphasizes the importance of improving management capabilities for integrating, building and reconfiguring internal and external resources to address, shape and change the business environment [15]. The term *capability* refers to a company's ability to use resources urgently, and it includes both tacit and explicit processes, as well as the leadership and know-how ingrained in the processes. As a result, capabilities are frequently firm-specific and evolve over time because of intricate interactions between the resources of the company. Dynamic capabilities include the ability to find threats and opportunities, act on opportunities, and reallocate organizational resources in rapid changing environments, thus driving companies to achieve sustainable competitive advantage [16]. Performance is eventually strengthened because dynamic capabilities increase the efficacy, speed, and efficiency of organizational responses to environmental turbulence and uncertainty.

ICT has been defined as "shared, unbounded, heterogeneous, open, and evolving socio-technical systems comprising an installed base of diverse information technology capabilities and their use, operations, and design communities" [17, p. 749]. ICT provides useful solutions to share ideas, information and documents, manage complex projects and identify opportunities, all of which can improve the coordination of activities and processes. ICT changes the way people get information about business boundaries, hierarchical structures, and patterns of interactions between people, communities and organizations. ICT is a key enabler of TW and revolutionizes the way many tasks are carried out at work or remotely. This can help organizations develop a common knowledge base amongst employees and enhance cross-department collaboration. In summary, we propose that:

**H4: Higher ICT capabilities are associated with increased levels of teleworking.**

From the DCV point of view, ICT capability involves an ability to use ICT functions or applications strategically in their business operations, such as intranet, extranet, enterprise resource planning, supply chain management, e-commerce, and other related technological applications [18]. To gain competitive advantage in the constantly changing business environment, ICT capability is required to adapt, integrate, reconfigure and recreate internal and external

competencies. The IS literature identifies ICT capability as a multi-dimensional latent construct with various dimensions, including increased internal use and initiating and maintaining collaboration.

There are numerous DCV-based studies exploring how ICT affects firm performance [19]. ICT helps organizations to develop competence and skills of their employees and improve the knowledge base of employees by accessing new information. Organizations use ICT to help employees coordinate different tasks effectively and efficiently, which can enhance work processes and increase work efficiently. All these services have the potential to foster the growth of satisfaction, commitment, and trust to maintain positive relationships. ICT supports MC decisions and improves the accuracy of employees' activities by collecting, storing, accessing, and analyzing data. ICT is a strategic resource as it can contribute to competitive advantage by facilitating the creation, integration, growth, and improvement of important resources over time. Accordingly, we propose that:

**H5: Higher ICT capabilities are associated with higher operational performance.**

#### 2.4. Environmental uncertainty

Organizations operate in competitive environments with different levels of *uncertainty*. Environmental uncertainty is an essential factor in DCV assuming that dynamic capabilities influence competitive advantage contingent upon the degree of uncertainty in the external environment of organizations. Environmental uncertainty refers to the unpredictability and instability of the environment and an organization's difficulty to predict the future because of incomplete information or changing conditions. In turbulent environments, it is important for organizations to adapt to changes to meet both internal and external demands. Previous literature argues that organizations must prepare and develop a set of capabilities to quickly respond to changing customer needs and process information more rapidly than in a stable environment [20].

The COVID-19 crisis is one of the most prominent examples of high uncertainty affecting most organizations globally. The COVID-19 crisis promoted using new ICT to work, organize, communicate and offering control options. MC changes in responses to COVID-19 and its effects have been considered important areas to explore in future research, because there is an increasing demand for using tighter and more constraining controls over employees in highly dynamic environments. According to this, we propose that:

**H6: Higher levels of environmental dynamism are associated with (a) higher levels of management control and therefore indirectly with (b) higher levels of operational performance.**

### 3. Research design

#### 3.1. Research method, construct measurements and data collection

Data were collected through an online survey administered to CFOs and senior financial managers in medium and large Australian-based organizations. The survey was developed based on established constructs and measurement instruments. Most constructs in our study are latent and therefore measured with multiple indicators (see Table A1a in the [online appendix](#)) and data were analyzed using the SEM-PLS method [21]. MC and ICT capability are multi-dimensional second-order constructs, while all other latent variables are unidimensional. The measurement of *TW* is based on the differences of number of days of implementing TW between pre-COVID and the current situation.

For MC, we developed reflective constructs by following the *MC framework* created by Merchant and van der Stede (2007), i.e., outcome controls (OC), action controls (AC), personnel controls (PC) and cultural controls (CC). *ICT capabilities* are measured based on scales previously developed and validated [22]. There are three first-order dimensions of ICT capabilities: internal purposes (four items), collaboration (three items) and communication (three items). The final ICT construct is derived from the three first-order constructs as second-order reflective construct [23]. For the measurement of *environmental uncertainty*, we used a seven-item variable to measure the extent of environmental change in organizations over the past twelve months. We used a seven-item variable [24] to measure *operational performance*. *Firm size* (number of full-time employees) was *controlled* for in the research model.

The data for hypotheses testing were collected over a three-months period using an online survey administered to 4,399 senior managers of Australia-based organizations with more than 200 full-time equivalent employees, excluding



managers with less than one year working experience. A total of 148 responses were received from individual organizations, but 55 responses were incomplete or otherwise unusable.

### 3.2. Measurement model quality and results

To determine the most appropriate analysis and testing techniques, we further tested for the univariate normality of all the main constructs. We found all results in normality tests to be significant, indicating the data is not normally distributed. This study uses SEM-PLS path modelling to validate the constructs' measures and test the research model and hypotheses based on the survey data. SEM-PLS is recommended to be suitable for analyzing non-normal datasets, relatively small sample size, complex models with mediating and moderating constructs, second-order constructs [25] and formative measurement models. A two-stage analysis was performed in the PLS method to assess the measurement and structural models, estimate the path coefficients at second-order levels, and show the strength of the associations between the dependent and independent variables as per R-square and *f*-square values. As our structural model includes both reflective and formative constructs, it is required to conduct a separate set of quality analysis. The measurement model was tested for internal consistency, indicator reliability, convergent validity and discriminant validity. The formative measurement quality was determined having tests for multicollinearity, indicator weights, significance of the weights, and indicator loadings [25].

*Reliability* is measured based on the composite reliability and indicator reliability, relating to the internal consistency and accuracy of the measurement items, and the results are summarized in table A1a in the [online appendix](#). For the reflective *constructs*, Cronbach's alpha ( $> 0.6$ ) and composite reliability ( $> 0.7$ ) meet the required threshold. All factor loadings of all measurement *items* in our first order model exceed the benchmark of 0.5 ( $p < 0.01$ ). As for convergent validity, item loadings have high and significant loadings, and average variance extracted (AVE) scores are between 0.55 to 0.75 ( $> 0.5$ ) as required. As shown in tables A1b and A1c ([online appendix](#)), *discriminant* validity criteria (Fornell-Larcker criterion and indicators' cross-loadings) are all met. In addition, the heterotrait-monotrait ratios (HTMT) are all  $< 0.9$  as required. The variance inflation factor (VIF) values of all formative constructs are below the threshold value of 5 [25], which means that there were no major multicollinearity problems.

Table 1: Test Results for Hypotheses

Hypothesis / Result	Path:	Effect <sup>1)</sup>	Test statistics		
			Coefficient <sup>2)</sup>	f Square	
H1a	conf.	TEL → OP	D –	-0.202*)	0.056
H1b	borderline conf.	TEL → MC → OP	I +	0.090 <sup>^)</sup>	n/a
H2	conf.	TEL → MC	D +	0.187*	0.043
H3	conf.	MCs → OP	D +	0.484**	<b>0.246</b>
H4	conf.	ICT CAP → TEL	D +	0.176*	0.032
H5	conf.	ICT CAP → OP	D +	0.222*	0.062
H6a	conf.	ENV → MC	D +	0.379*	<b>0.175</b>
H6b	conf.	ENV → MC → OP	I +	0.184*	n/a
Control		SIZE → ICT CAP	C	-0.061	0.004
		SIZE → MCs	C	-0.044	0.002
		SIZE → OP	C	-0.010	0.000
		<b>R-squares:</b>			
H1, H3, H5, H6b		OP		0.318	
H2, H6a		MC		0.192	
H4		TEL		0.031	

<sup>1)</sup>D = direct effects, I = indirect effects; C=control, <sup>2)</sup> Significance 1-tailed:  $p < 0.05^*$ ;  $p < 0.01^{**}$ ;  $p < 0.001^{***}$ ; <sup>^)</sup> $p = 0.07$

We used both procedural and statistical remedies to control for *common-method bias* and minimize its potential effects [26]. As *procedural* remedies, we pilot tested the survey with several academics to ensure that all the measurements were appropriate and clear. Moreover, participants were given assurance that all identities and responses are anonymous, and all information is kept confidential, to ensure that they are more likely to answer honestly and have less evaluation apprehension. In terms of *statistical* remedies, we conducted a post hoc Harman's one factor approach to identify the number of factors important for the description of variance. The test shows that the strongest factor explains 32% ( $< 50\%$ ) of the total variance indicating that CMB problems were unlikely in our

research. Table 1 provides summaries of the results for the effects in the structural model. All the hypotheses in our model were tested for magnitude and significance of path coefficients estimated using SEM-PLS. In terms of effect size ( $f$  square), the results provide strongest support from hypotheses 3 and 6a.

#### 4. Discussion of Contributions and Limitations

Our study claims to make several *theoretical contributions*. Extant studies have found positive effects on firm performance at a particular point in time (see section 2.1.). Our research extends this approach by measuring TW *change* based on the differences of the number of days average of TW before and after a crisis (pre-COVID19 and situation in 2022). The results show that increasing TW may hamper operational performance. Our study's data were collected during the later stage of the COVID-19 pandemic, when managers and employees may have largely adapted to work from home. This provides a stronger reflection on the operational performance impacts of TW than studies from the early stage of the pandemic when individuals had an ever-increasing concern about unemployment and organizations struggled adapting to unusually rapidly increasing external pressures.

This study advances IS literature used to examine distinct capabilities of ICT: increased internal use, use for internal and external communication, and collaboration. Extending previous TW studies, which focused on different capabilities, the current study investigates ICT capabilities and its effects. Based on the DCV, we argue that ICT capabilities can increase performance in rapidly changing business environments by improving informal communication, develop competence and skills of their employees and improve the knowledge base of employees by accessing new information, coordinating, and managing business operations, and maintain collaboration within the team and organization. As expected, higher ICT capabilities facilitates the use of TW and increase operational performance. Therefore, this study provides empirical evidence that ICT capability is important to foster the work efficiency of employees in the TW environment.

This study contributes to the literature on management accounting and control by highlighting the importance of MC in high environmental uncertainty. Following the control framework developed by Merchant and van der Stede in 2007, we assumed that action controls, outcome controls, personnel controls and cultural controls exist in organizations simultaneously. Rather than investigating single MC types separately, our study confirms that combined and balanced MC influences operational performance. Our study extends the MC literature by considering the relationship between TW and MC after the pandemic. Moreover, we conclude that organizations should deploy higher levels of MC when environmental uncertainty is high. Furthermore, MC can mediate the relationship between environmental uncertainty and operational performance, thus indicating that it is critical to add contingent variables in understanding the combination of MC choices.

This study provides important *insights for practitioners*, as TW is likely to continue in the future, organizations must ensure to align TW with their MC and ICT. Our results show that higher levels of TW may reduce operational performance, which emerges as a paramount concern. Our research sheds light on the significance of this concern for organizations, and the guidelines presented in this study are to reduce this concern. To mitigate the negative direct effects, organizations need to develop and use ICT capabilities to facilitate employees' work from home effectively. In this context, managers should enable their employees to use ICT to access relevant and useful information, interact with managers and team members, and maintain collaboration within the organization. The results of the study will help managers to nurture ICT capabilities in their company to develop their strategies, especially in response to increasing level of environmental uncertainty. Furthermore, the shift to TW amplifies MC problems and thus poses severe challenges to organizations. MC of an organization can influence its chance of survival and success in a fast changing environment [13], and as such improving the understanding of how MC affects operational performance is critical for management effectiveness. This study provides evidence that TW requires higher levels of MC to realize operational efficiency and effectiveness. This requires more inputs from managers, such as clearly defined tasks and deliverables, establishing specific milestones, setting up frequent meetings and casual online conversations, providing suitable training, promoting core values of the organization and encouraging mutual monitoring. The findings also provide insights into how MC is influenced by environmental uncertainty more broadly. Managers must analyze and interpret the external environment so that they can prepare appropriate contingency plans for important future events.

This study has several *limitations* which suggest additional exploration for future research. First, because of the cross-sectional nature of the survey method, we were unable to fully understand the changes of MC over time. Future

research on MC might consider the changes of MC and use longitudinal field research methods. Second, our results are based on the perception of *managers* only. Investigating the employee perspectives would be beneficial to provide more comprehensive understanding of their experiences with TW, MC and ICT. Moreover, our data is based on the Australian context, so the results obtained in this research may not be generalizable for all countries. Finally, it would also be worthwhile to investigate the moderating effects of ICT capability and environmental uncertainty on the linkages between TW and operational performance in TW environments.

## 5. References

Online appendix: Follow the link below or contact the corresponding author @ [bernhard.wieder@uts.edu.au](mailto:bernhard.wieder@uts.edu.au);

- [https://studentutsedu-my.sharepoint.com/:w:/g/personal/bernhard\\_wieder\\_uts\\_edu\\_au/EW8sO3eHGIlDv\\_v9ZLFy3UcBiGmrrTsAEHh80Lxp3X-r8g?e=uQuS0b](https://studentutsedu-my.sharepoint.com/:w:/g/personal/bernhard_wieder_uts_edu_au/EW8sO3eHGIlDv_v9ZLFy3UcBiGmrrTsAEHh80Lxp3X-r8g?e=uQuS0b)
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