International Journal of Managing Projects in Business

Exploring the impact of absorptive capacity to navigate the challenges of uncertainty in digitalization projects

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Received 17 January 2024
Revised 24 May 2024
Accepted 24 May 2024

Abstract

Purpose – This research fills a gap in digitalization project studies by exploring them through the lens of organizational learning. It investigates the impact of uncertainty on digitalization project success and the role of absorptive capacity.

Design/methodology/approach – A mixed-methods approach is adopted, incorporating qualitative and quantitative analyses. The qualitative part assesses how uncertainty affects digitalization project success, while the quantitative side explores absorptive capacity as a mediating factor between adaptability to uncertainty and project success.

Findings – The qualitative results uncover challenges facing digitalization projects under uncertainty and suggests coping strategies at individual, project, and organizational levels. Quantitative results show that both potential and realized absorptive capacities significantly mediate the link between adaptability to uncertainty in the environment and project success.

Originality/value – This research offers new insights into digitalization project studies, merging organizational learning theory with a mixed-methods approach. It highlights how uncertainty and absorptive capacity influence digitalization project success.

Keywords Absorptive capacity, Learning, Project performance, Digitalization projects, Project success

Paper type Research paper

1. Introduction

Most digitalization projects fail even before they are fully implemented. One of the primary reasons for this failure is that organizations lack the necessary skills and knowledge to address challenges associated with digital transformation (Davenport and Westerman, 2018; Mielli and Bulanda, 2019). Learning is emphasized as crucial for organizations operating in fast-paced environments (Akgün *et al.*, 2007), positioning the management of knowledge as a significant precursor to innovation (Ngereja and Hussein, 2022).

A key factor for success in digital transformation is an organization's ability to learn from experiences and use this knowledge to stay competitive (Baier *et al.*, 2022). March (1991) identifies two learning strategies: learning from past experiences (exploitative learning) and gaining knowledge from external sources (explorative learning). The skill of assimilating external knowledge into actionable insights is known as absorptive capacity (Cohen and Levinthal, 1990).

Since its origin, absorptive capacity has evolved significantly, expanding into fields like strategy, knowledge management, and innovation (Mirza *et al.*, 2022). Cohen and Levinthal (1990) emphasize that firms need more than just exposure to external knowledge; they must

International Journal of Managing Projects in Business

1753-8378
DOI 10.1108/IJMPB-01-2024-0013

develop the ability to recognize, assimilate, and apply new external information commercially. This concept includes acquisition, transformation, assimilation, and exploitation capacities (Camisón and Forés, 2010; Zahra and George, 2002).

Zahra and George (2002) proposed differentiating between potential absorptive capacity (acquisition and assimilation) and realized absorptive capacity (transformation and exploitation). In addressing ambiguity and the multidimensional construct of absorptive capacity, Camisón and Forés (2010) builds on the work of Zahra and George (2002) and suggests encapsulating acquisition capacity, transformative capacity, assimilation capacity and exploitation capacity into potential absorptive capacity (PACAP) and realized absorptive capacity (RACAP). The theoretical distinction between PACAP and RACAP suggests that externally acquired knowledge undergoes multiple iterative processes before the firm can successfully apply the knowledge to create value (Camisón and Forés, 2010).

Absorptive capacity has been quite influential in management and innovation research (Aldieri *et al.*, 2018) and has extensively covered various aspects, including barriers (Cuervo-Cazurra and Rui, 2017), antecedents (Van Den Bosch *et al.*, 2003), and its impact on management and new project integration (Saeed *et al.*, 2020), the mediating role in organizational performance (Daspit *et al.*, 2014; Liu *et al.*, 2013). Various authors have explored the measurement of absorptive capacity in several context and found it to be quite significant in influencing competitive advantage in areas such as innovation, learning, productivity and new product development (Coronado-Medina *et al.*, 2020; Harris and Le, 2019; Harris and Yan, 2019; Lane *et al.*, 2006; Vlačić *et al.*, 2020).

This study adopts a knowledge-based view (KBV), offering an opportunity to perceive organizations as dynamic, evolving, and somewhat autonomous systems that produce and apply knowledge (Spender, 1996). The KBV is a theoretical framework that emphasizes knowledge as a pivotal strategic resource for organizations. It postulates that an organization's short and long-term success hinges on its capability to create, transfer, and leverage knowledge (Grant, 1996). While the KBV has its origins in the resource-based view (RBV) of organizations, it contends that an organization's resources, including knowledge, form the bedrock of its competitive advantage (Grant, 1996). However, the KBV distinctly centers on the role of knowledge and the processes of knowledge creation, transfer, and utilization within the organization (Grant, 1996).

The Knowledge-Based View (KBV) proposes that knowledge is tacit and highly context specific, making it challenging to codify or transfer. It is embedded in an organization's social relationships, routines, and practices (Nonaka, 1994). KBV research identifies key contributors to an organization's knowledge-based competitive advantage. One is the organization's absorptive capacity (Zahra and George, 2002). Another is its network, including relationships with customers, suppliers, and stakeholders. These external interactions improve access to knowledge and resources, and foster collaboration in creating new knowledge (Dyer and Singh, 1998).

Digitalization has shaped a world characterized by volatility, uncertainty, complexity, and ambiguity (VUCA) (Bennett and Lemoine, 2014). Digitalization projects are thus conducted in highly dynamic and unpredictable environments (Hafseld *et al.*, 2021; Li, 2020; Morakanyane *et al.*, 2017). The dynamic nature of these environments increases project failure risks, necessitating agile methods (Cavaleri *et al.*, 2012) and rapid decision-making (Li, 2020). To capitalize on digital transformation, organizations must continuously update their knowledge, both internally and externally (Camisón and Forés, 2010). Furthermore, research has shown that the ability of an organization to understand and apply comprehensive approaches to competence management in knowledge intensive and dynamic environments enables to better navigate the related complexities (Medina and Medina, 2015). Therefore, understanding how individuals in organizations absorb and adapt

to new knowledge amidst constant change and limited preparation is crucial for both researchers and practitioners (Vey *et al.*, 2017).

This study aims to explore the impact of absorptive capacity on digitalization project performance, a topic not extensively covered in current research (Dultra-de-Lima and Brito, 2022). The research on digitalization projects is still in its early stages, with calls for more in-depth analysis (Appio *et al.*, 2021; Baier *et al.*, 2022; Morakanyane *et al.*, 2017). While some studies, like those on complexities in digitalization projects in public organizations (Hafseld *et al.*, 2021), have been conducted, they do not fully cover the subject, leaving scope for further exploration. This study also provides insights on the relationship between digital transformation and learning, addressing a research gap identified by Fernandez-Vidal *et al.* (2022), and indicating the novelty and potential impact of this research. Therefore, this study addresses these key research gaps, offering insights valuable to researchers and practitioners by addressing two research objectives;

RO1. To investigate the challenges that are associated with high uncertainty and how they impact an organization's ability to succeed in digitalization projects.

RO2. To investigate the role of absorptive capacity as a mediator in the relationship between organizational adaptability and project outcomes.

The paper is structured as follows: Section 2 outlines the theoretical background of absorptive capacity and digitalization projects. Section 3 details the study's mixed method approach. Section 4 discusses the findings, Section 5 delves into the discussion, and Section 6 concludes the study.

2. Theoretical background

2.1 Absorptive capacity

Absorptive capacity has been identified as a key driver of competitive advantage (Lane *et al.*, 2006; Yildiz *et al.*, 2019). It encompasses a set of organizational routines that are essential for recognizing and using external knowledge (Liao *et al.*, 2003). Cohen and Levinthal (1990) initially defined absorptive capacity as *"the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends"*. Over a decade later, Zahra and George (2002) reconceptualized the absorptive capacity concept through the differentiation between potential (knowledge acquisition and assimilation) and realized (knowledge transformation and exploitation) absorptive capacities.

Acquisition capacity is defined as the firm's ability to locate, identify, value, and acquire external knowledge that is critical to its operations (Liao *et al.*, 2003; Zahra and George, 2002). Assimilation capacity pertains to the processes and routines that allow the new information or knowledge acquired to be analyzed, processed, interpreted, understood, internalized, and classified (Szulanski, 1996; Zahra and George, 2002). Transformation capacity is the firm's capacity to develop and refine the internal routines that facilitate the transfer and combination of previous knowledge with the newly acquired or assimilated knowledge (Zahra and George, 2002).

Transformation may be achieved by adding or discarding knowledge, or by interpreting and combining existing knowledge in a different innovative way (Camisón and Forés, 2010). Exploitation involves the organizational capacity to incorporate acquired, assimilated, and transformed knowledge into their operations and routines. This not only refines and expands existing routines, processes, and competencies but also creates new operations, competencies, routines, products, and organizational forms (Camisón and Forés, 2010; Zahra and George, 2002). Although there are two components of ACAP, knowledge goes through multiple iterations before an organization can exercise its value, thus organizations need to foster both RACAP and PACAP to facilitate the process (Camisón and Forés, 2010).

Todorova and Durisin (2007) provided additional concepts to those of Zahra and George (2002) and (Cohen and Levinthal, 1990) by reconceptualizing the construct of absorptive capacity. In their reconceptualization, Todorova and Durisin (2007) suggest that knowledge transformation is not a subsequent step to knowledge assimilation but an alternative process connected to assimilation through multiple paths. However, accepting this notion would blur the distinction between PACAP and RACAP (Todorova and Durisin, 2007), which is contrary to the aim of this study. Thus, this study relies on the reconceptualization of ACAP by Zahra and George (2002) which includes both components of PACAP and RACAP.

Furthermore, measuring absorptive capacity is crucial as it helps organizations identify areas needing more focus, investment, and effort, and how these areas relate to performance, thus serves as a valuable tool for benchmarking and cross-comparisons (Vlačić *et al.*, 2020). Additionally, assessing the individual dimensions of absorptive capacity (acquisition, assimilation, exploitation, and transformation) reveals the unique influence of each on performance as each dimension is distinctive and all four should be considered when measuring absorptive capacity (Flatten *et al.*, 2011). Nevertheless, there is a need for exploring absorptive capacity within the context of digitalization projects, where change is constant (Larjovuori *et al.*, 2016), and complexity is high (Hafseld *et al.*, 2021), to enable timely responses to opportunities and challenges (Ali *et al.*, 2018).

2.2 Digitalization projects

Organizations achieve digital transformation through digitalization projects (Baier *et al.*, 2022; Gertzen *et al.*, 2022; Leyh *et al.*, 2021; Sanchez-Segura *et al.*, 2021). While there is no universally accepted definition of digitalization projects, there is a consensus among scholars that such projects involve the introduction or use of digital enablers (Barthel and Hess, 2020; Garavaglia and Petti, 2013; Grahn *et al.*, 2020; Sept, 2020). Moreover, these projects are undertaken to drive the organization's digital transformation process (Barthel and Hess, 2020; Henriette *et al.*, 2015; Sanchez-Segura *et al.*, 2021).

According to the Project Management Institute (PMI), about 70% of organizations were engaged in digitalization projects by 2020 (Badewi, 2022). Uchihira and Eimura (2022) view this as a sign of the increasing trend to implement such projects in the rapidly evolving business world. For many, digitalization is now a matter of "when" and "how," not "why." Yet, despite extensive research and practice, these projects often have poor success rates (Li, 2020; Mielli and Bulanda, 2019; Ross *et al.*, 2019; Sanchez-Segura *et al.*, 2021).

In the volatile, uncertain, complex, and ambiguous realm of digitalization projects, effective planning and intentional change management are crucial for organizations (Mielli and Bulanda, 2019). Poor management of these changes can result in chaos, seen as delays, cost overruns, and subpar quality (Jun *et al.*, 2011). With the advent of a new technological era, organizations grapple with choosing the right digitalization initiatives to prioritize (Davenport and Westerman, 2018).

Digital transformation necessitates thorough exploration and understanding for clear definition of matters (Davenport and Westerman, 2018). The uncertainty in these projects can lead to negative impacts (Jiang *et al.*, 2002; Jun *et al.*, 2011). Enhancing environmental responsiveness helps organizations manage this uncertainty and avoid the constraints of path dependence. Path dependence theory explains how past decisions can trap organizations in inflexible patterns, hindering adaptability to new, changing environments (Sydow *et al.*, 2009).

To adapt to unexpected changes, organizations need to strategically manage their internal resources for competitive advantage (Žitkienė and Deksnys, 2018). Transforming relevant knowledge into daily routines is essential for project success (Dultra-de-Lima and Brito, 2022). Harsch and Festing (2020) identified a notable research gap in human resource management, particularly in understanding workforce agility from a dynamic capability perspective.

Davenport and Westerman (2018) highlight how the excitement and uncertainty of the new technological era challenge organizations in making decisions about digitalization. Adapting to external environments is often difficult for organizations, despite recognizing the need (Liao *et al.*, 2003; Tripsas and Gavetti, 2017). Therefore, the organization's success is constrained by its ability to align with environmental realities (Lengnick-Hall and Beck, 2005). While all aspects of VUCA present challenges in managing digitalization projects, this study specifically addresses challenges stemming from uncertainty within the VUCA framework.

3. Methodology

This study employs a mixed-method sequential approach with two phases of data collection. This allowed first exploring the challenges and strategies to manage such challenges in digitalization project environment using qualitative method involving interviews and a focus group. The insights gathered from the qualitative study uncovered strategies related to learning at individual, project and top management levels as a critical for addressing challenges in digitalization project environments. Thereafter, the insights enabled formulating hypotheses to test how the strategies would impact digitalization project success if implemented in organizations. The quantitative study enabled testing the formulated hypotheses using the absorptive capacity construct in a larger scale, enabling better objectivity and generalizability (Lund, 2012). Furthermore, the mixed methods enabled triangulation for completeness purposes which increased the in-depth understanding of digitalization projects which is a less explored phenomenon (Hussein, 2009). The research design is shown in Figure 1.

3.1 Phase 1: qualitative study

17 semi-structured interviews were conducted with participants chosen through purposive sampling to ensure their involvement in digitalization projects at strategic and project levels. Participants were identified through recommendations from their organizations for personnel actively engaged in digitalization in various roles. This ensured insights from both project and strategic levels, including project managers, senior managers, and top managers (Table 1).

Interview questions were sent to participants in advance. At the start of each interview, a brief introduction to the research project and its motives was provided. Interviews lasted approximately one hour and were conducted from April to October 2022. To maintain anonymity and meet ethical standards, no personal identification information was collected or analyzed, and no audio recordings were made to encourage open information sharing. Two additional people were present in the interviews: one assisted with note-taking and follow-up

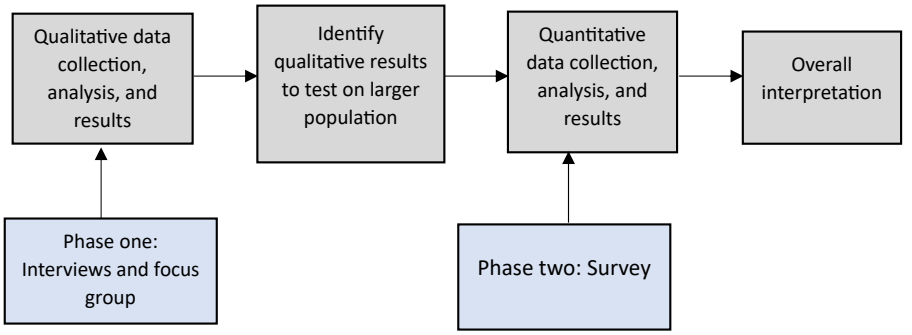

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Figure 1. Mixed methods research design adopted for the study

Interview ID	Organization ID	Position	Experience (yrs)
P1	Organization A	Project manager	5
P2		Project manager	6
P3		Senior project manager	8
P4		Top management	24
P5		Senior management	25
P6	Organization B	Top management	17
P7	Organization C	Top management	15
P8	Organization D	Top management	15
P9		Top management	22
P10		Senior project manager	17
P11		Project manager	13
P12	Organization E	Top management	25
P13		Top management	25
P14	Organization F	Senior project manager	14
P15		Project manager	5
P16		Top management (Managing director)	14
P17	Organization G	Senior project manager	16

Source(s): Created by author

Table 1. Interview respondent profiles

questions, while the other focused solely on note-taking. The interviews covered challenges in digitalization project environments and the role of knowledge management in digitalization.

Notes from each interview were converted into detailed documents within 24 h for optimal information retention. Once all interviews were completed, these documents were imported into NVIVO, data analysis software by Lumivero, for further thematic analysis, following Braun and Clarke (2006) methodology. This involved repeatedly reading the raw data, coding emerging patterns, and continuing iteratively until no new patterns appeared, indicating data saturation.

Following the interview data analysis, a focus group discussion was held. This interactive session, as defined by Hennink (2013), involved six to eight pre-selected participants and was led by a moderator, focusing on specific issues. The group comprised seven participants from five organizations, aiming to validate interview findings and gain further insights. Participants were purposively selected (Easterby-Smith *et al.*, 2021) from organizations engaged in digitalization projects. The discussion lasted 2 h.

3.2 Phase 2: quantitative study

3.2.1 Hypothesis development.

3.2.1.1 Organizational project environment.

Adapting to ever-changing external environments is challenging yet essential for organizations to gain a competitive advantage (Liao *et al.*, 2003). Organizational capabilities often limit this adaptability (Liao *et al.*, 2003; Tripsas and Gavetti, 2017). Organizations manage complexity by ignoring, absorbing, or reducing it (Lengnick-Hall and Beck, 2005), influenced by their past experiences, resources, and capabilities (Boisot and Child, 1999; Lengnick-Hall and Beck, 2005). Facing changes and uncertainty, organizations can either thrive or fail (Lengnick-Hall and Beck, 2005). Success depends on implementing strategies aligned with environmental realities, influencing performance through the speed and coordination of these strategies (Lengnick-Hall and Beck, 2005). Therefore, we propose that an organization's adaptability is directly proportional to its digitalization project success (Figure 2), hence;

H1. There is an overall positive relationship between the organization's ability to adapt to the changing environment and digitalization project success.

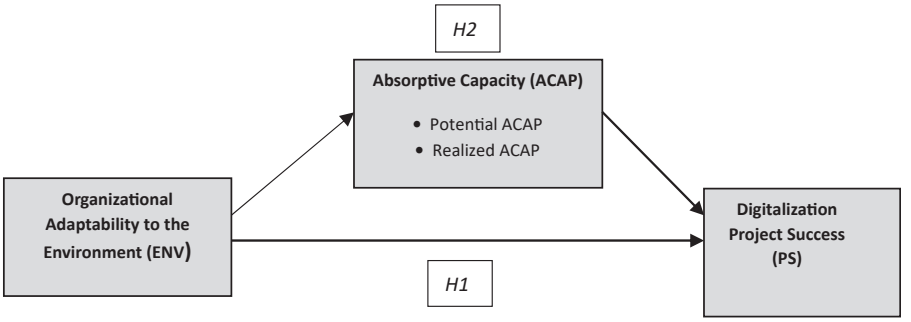

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Figure 2. Illustration of the hypothesized relationships

3.2.1.2 Absorptive capacity.

In rapidly changing and complex project environments, absorptive capacity has a positive impact on project performance (Singh *et al.*, 2023). Studies, including (Bjorvatn and Wald, 2018), indicate its mediating role. Leal-Rodríguez *et al.* (2014) demonstrate that potential and realized absorptive capacities play different yet complementary roles in boosting competitive advantage. Lengnick-Hall and Beck (2005) identified a link between performance outcomes and organizational responsiveness, which ties to both external and internal knowledge acquisition.

Popaitoon and Siengthai (2014) found that realized absorptive capacity boosts short-term project performance, like meeting time and cost goals, while potential absorptive capacity (PACAP) enhances long-term outcomes. This aligns with Dultra-de-Lima and Brito (2022), who found that, realized absorptive capacity positively affects project performance both directly and indirectly. Similarly, Bjorvatn and Wald (2018) noted that transformation and exploitation capacities (realized absorptive capacity) significantly reduce project overspending and delays compared to acquisition and assimilation (potential absorptive capacity). Absorptive capacity links an organization's adaptability to changes in its environment with the success of its digitalization projects, thus we hypothesize (Figure 2);

H2. Absorptive capacity plays a mediating role between organizational adaptability to the changing environment and digitalization project success.

The two hypotheses are derived from a combination of insights generated from both the qualitative study and existing literature on project management and absorptive capacity. From the qualitative study, generated insights provided an initial hypothesis formulation, which was further supported by theory.

3.2.2 Survey instrument.

3.2.2.1 Dependent variable.

3.2.2.1.1. Project success.

Digitalization project success in this study was measured using 9 items developed from 3 of the 4 dimensions of Ika and Pinto (2022) four-dimensional (Tesseract) model of project success, suitable for modern contexts. This model assesses project plan, business case, green efficacy, and stakeholder perceptions of success. Our items covered only three dimensions: project plan (short-term) success with 3 items, business case (mid-term) success with 2 items, and stakeholder perceptions (long-term) success with 4 items. The green efficacy dimension, focusing on long-term societal effects, was excluded as its impacts may only become apparent long after project completion, as noted by Ika and Pinto (2022).

3.2.2.2 Independent variables.

3.2.2.2.1. Organizational adaptability to the environment (ENV).

The ability of the organization to cope with the environmental changes resulting from digitalization was measured using 5 scale items developed from the existing works. These are related to market changes (Li, 2022), skills and competencies changes (Jha *et al.*, 2020; Kadir and Broberg, 2021; Luthra and Mangla, 2018; Sarantis *et al.*, 2010; Da Silva *et al.*, 2020), regulation and standards changes (Bencsik, 2020; Tijan *et al.*, 2021), technological requirements changes (Henriette *et al.*, 2015; Hess *et al.*, 2016), new business objectives (Snow *et al.*, 2017). Out of the 5 items developed, 2 measured environment aspects internal to the organization and 3 measured environment aspects external to the environment.

3.2.2.2.2. Absorptive capacity (ACAP).

17 items for measuring ACAP (realized and potential ACAP) were found from the interviews and supported by existing literature. Furthermore, the items were comparable to the items validated and used by Camisón and Forés (2010). Since the items originated from our own interview findings, they can be built based on the existing work of Camisón and Forés (2010). Out of the 17 items, 10 were measuring PACAP and 7 for RACAP (Table 2).

Absorptive capacity	Dimension	Factors (adapted from the interviews and updated based on the scale developed by Camisón and Forés (2010))	Code	References
Potential ACAP	Acquisition	Internal competence development	ACQ1	Arbussà and Coenders (2007), Tu *et al.* (2006)
		Openness towards the environment	ACQ2	Jansen *et al.* (2005), Soo *et al.* (2007), Tu *et al.* (2006)
		External co-operation	ACQ3	Arbussà and Coenders (2007), Jansen *et al.* (2005), Liao *et al.* (2003)
		Knowledge of the competition	ACQ4	Tu *et al.* (2006), Lane *et al.* (2001)
	Assimilation	Technology assimilation	ASM1	Jansen *et al.* (2005), Matusik and Heeley (2005)
		Mentorship accessibility	ASM2	Matusik and Heeley (2005)
		Human resources	ASM3	Tu *et al.* (2006), Hayton and Zahra (2005)
		Knowledge management	ASM4	Matusik and Heeley (2005)
		Industrial benchmarking	ASM5	Tu *et al.* (2006)
		Attending trainings	ASM6	Jansen *et al.* (2005), Soo *et al.* (2007)
Realized ACAP	Transformation	Transmission of knowledge	TRA1	Jansen *et al.* (2005), Wong *et al.* (1999)
		Renewal capability	TRA2	Jansen *et al.* (2005)
		Adaptation capacity	TRA3	Jansen *et al.* (2005), Nieto and Quevedo (2005)
		Exchange of information	TRA4	Soo *et al.* (2007), Tu *et al.* (2006), Jansen *et al.* (2005)
	Exploitation	New knowledge exploitation	EXP1	Jansen *et al.* (2005)
		Support on experimentation	EXP2	Khoja and Maranville (2010)
		Application of experience	EXP3	Soo *et al.* (2007)

Table 2.
Scales and items of PACAP and RACAP

Source(s): Created by author

The respondents involved in the qualitative study were few and would not have been sufficient as respondents for the quantitative study. Thus, the quantitative study was opened to a wider audience. The respondents of the quantitative study spanned multiple organizations different from those in the qualitative study. The criteria for recruiting the respondents was the same for both phases which is that the respondents should actively been involved in a digitalization project either as a team member, project manager or decision maker (top management) and their organization should have implemented digitalization project successfully in order for their responses to be relevant. Therefore, a non-probability purposive sampling technique was employed (Obilor, 2023). A total of 70 potential participants were identified from their organization's information that was readily available online and by snowballing technique. They were contacted via email and upon agreeing to participate; the survey was shared via email. To ensure anonymity, no personal identifiers were collected in the survey.

4. Findings

4.1 Phase 1 insights: understanding uncertainty in digitalization projects

Phase one findings highlight various factors that magnify challenges in managing uncertainty in digitalization projects. Rapid changes demand high agility, often outpacing decision-makers' ability to respond effectively. Given the volatility of technology and business environments, fast responses are necessary to keep pace, adding complexity. While general expectations are known, specific outcomes and impacts on people and the organization remain uncertain. Contributing factors to uncertainty in digitalization projects are identified at three levels: individual, project, and organizational.

4.1.1 Challenges at the individual level: adaptation capacity.

4.1.1.1 Persisting knowledge-gap.

The findings suggests that the continuous evolution of digital transformation creates a persistent knowledge gap, suggesting that individuals in organizations to constantly update their knowledge. A respondent stated, "*with digitalization projects, you may need to find non-standard solutions, so creativity is necessary as there are no existing solutions to copy from. This is different from other projects which it is usually clear from the start what is needed."* The findings infer that rapid changes in digital technologies increase uncertainty, necessitating new knowledge, skills, and competencies. At the same time, individuals must balance their regular duties with ongoing learning, presenting challenges in managing digitalization project environments.

4.1.1.2 Dynamic work-environment.

It appears that the unpredictability of digitalization projects demands considerable flexibility and adaptability from employees. This infers that team members must be able to adjust to the dynamic project environment, such as collaborating with colleagues from different departments, sharing expertise in unusual team configurations, transferring between teams based on project needs and expertise, and working from various locations. A respondent noted, *"digital technology comes with very high speed. We always have to remind ourselves that if we don't do it now, someone else will. On a response time scale, this makes digitalization projects very different from normal projects."*

4.1.1.3 Impaired understanding of the outcome.

Findings suggest that lacking clear understanding on why the changes need to occur and how these changes impacts the current and future tasks of individuals poses challenges on managing the project. As stated by a respondent, "*when there is lack of clear information on the goal that is to be achieved. The information fades away, changes occur, and people [in the organization] fail to understand why they are happening."* It seems that, it is more challenging when individuals are expected to undertake their project tasks in an environment where uncertainty is high and is characterized by unclear or "*blurry*" information.

4.1.2 Challenges at the project level: resource and knowledge management.

4.1.2.1 Resource management challenges.

In the unpredictable environment of digitalization projects, it appears that project managers must initially identify and commit necessary human resources. However, the nature of these projects often requires a mix of personnel from various cross-functional units, like technical and business departments, who may already be committed to other projects, thereby limiting their availability. A respondent stated, *"you need people from several departments . . . you need a multidisciplinary and diverse team. IT people are involved but you also need other disciplines working together."* This suggests that the planning and timely allocation of resources becomes more complicated.

4.1.2.2 Knowledge-needs challenges.

Within the digitalization project environment characterized by high uncertainty, findings show that there is still an expectation on project managers to plan upfront for the skills and expertise that will be required to undertake a project. However, it seems that due to the exploratory nature of digitalization projects and most things not clear upfront, it is highly challenging to plan upfront. As stated by a respondent, "*the outcome [of the projects] is not completely described at the start of the project. It requires learning during the process, regulating and reworking the product based on what you learn as the project progresses."*

4.1.3 Challenges at the organizational level: change management and vision.

Findings show that digitalization calls for a change culture throughout the organization. Change management in its own is a huge task for the organization and requires the right strategies that support change to be embedded in daily tasks of individuals, thus leading to challenges in managing digitalization projects. Factors that increase challenges at organizational level were identified as:

4.1.3.1 Impaired vision of expectations.

The interviews showed that organizational leaders and top managers are unable to clearly define *"all"* the value, impact, risks of the project on organizational processes upfront. But people are purpose-driven and prefer to know how they fit in the bigger picture; thus, it seems that unclear information builds frustration among the people in the organization, which can be challenging to manage when there is no buy-in of the people. Consequently, it becomes challenging to achieve the value. As stated by a respondent, "*It is not easy being completely honest of the change that is expected to occur and how it may affect them [the people]. It would be easier if people know what is expected and they decide if they want to be a part of the change."*

4.1.3.2 Embracing familiarity over innovativeness.

Within the digital transformation context, findings show that the main issue that has led to organizations becoming obsolete is because they were either too late to adopt to the technological changes, or they were too stuck on doing things the same way they have done it for a long time. As stated by a respondent, *"digitalization is about understanding how the entire process relates to the business. This includes identifying which processes work and which do not work."*

4.2 Addressing challenges at individual, project, and organizational levels

From phase one, 11 measures were identified that can facilitate organizations to tackle challenges associated with uncertainty in digitalization project. The measures were identified for each level (individual, project and organizational).

4.2.1 Individual level: adaptation capacity.

The high uncertain environment of digitalization projects impacts individuals undertaking project tasks by requiring them to increase their individual adaptation capacity to be able to tackle the challenges. The following measures were identified that can foster individual adaptation capacity.

4.2.1.1 Fostering individual knowledge development.

Findings infer that providing opportunities for employees to attend conferences, exhibitions, and other external events enables them to gain and bring back new knowledge from industry

peers. This practice appears to help in disseminating and assimilating external knowledge within the organization. Findings suggest that employees need to allocate time for acquiring new knowledge, sharing it with colleagues, and applying it in their daily tasks, based on their willingness. One respondent said, "*we are trying to learn . . . all our available time we try to use it to learn . . . we are learning internally from colleagues and externally.*" Another respondent stated, "*learning and development is more of an individual issue rather than an organizational one. It is usually up to the employees to identify what they need and make effort to learn.*"

4.2.1.2 Personalized learning journeys.

Findings show that personalized learning journeys involve tailoring learning experiences to individual needs, interests, and styles, instead of relying on generic training programs. This approach seems to allow individuals in shaping their learning paths, including choosing projects they find valuable and identifying specific training needs. Emphasizing personal discussions and assessments with supervisors or managers is crucial. One respondent shared, "*In my team, I have personal talks every 2 weeks with each member. This builds trust, enabling further discussions. We use these talks to resolve issues and decide on necessary training and its timing.*" Such personal interactions appear to provide a safe space for employees to discuss career growth and learning opportunities aligned with their interests.

4.2.2 Project level: resources and knowledge challenges.

In order to address resource and knowledge challenges at project level, the following measures were identified to be suitable:

4.2.2.1 Through cross-team and functional exposure.

Findings show that at the project level, the presence of clearly outlined strategic learning plans becomes crucial. One effective approach found was rotating individuals across projects, allowing them exposure to diverse teams, technologies, and customers. As stated by a respondent, *"[in our organization] an employee is supported to do many projects within a short time. This allows them to know exactly which tasks are interesting for them and what they want to do for their career. Then we can provide the necessary trainings needed."* This strategy seems to offer a continuous array of learning opportunities while mitigating the risk of relying solely on a limited number of individuals, thus averting potential resource constraints.

4.2.2.2 Embracing challenges.

Organizations are in an 'era of creativity,' where the focus is on innovation, not just problem-solving. Findings show that such environment requires employee learning, fostered by strategically placing them in challenging environments to enhance learning and adaptability. Assigning demanding tasks helps them cope with the unpredictable, rapidly changing environment. A respondent stated, *"For specific skills or knowledge needs, we encourage team members to learn new skills for the project. This self-chosen involvement leads to knowledge gain, which they can share in future projects, inspiring others by their increased expertise."*

4.2.2.3 Mentorship and coaching.

Findings show that active coaching and mentoring within projects foster strong social bonds and trust. It also seems that having learning buddies can lighten the project lead's workload and ease the integration of new team members. A respondent noted, *"We ensure that there are competent people in strategic areas and expect others to learn from their expertise. We avoid scenarios where only one person holds unique knowledge. Our aim is for at least two or three people to have a comparable level of knowledge, reducing dependency on specific individuals."*

4.2.2.4 Continuous identification of knowledge gaps.

Findings show that managers should frequently hold project meetings and discussions to identify knowledge gaps and find ways to fill them. A respondent emphasized, *"As managers, observing how people work and suggesting improvements is important, as well as giving them opportunities to learn new things."* Additionally, findings show that managers should create a safe environment for team members to initiate personal meetings when needed. This approach appears to shift control, balancing it between the individual and the project manager, depending on the situation.

4.2.2.5 Fostering sharing of reflections on lessons-learned.

Findings show that it is crucial to hold kick-off meetings and collect lessons learned after project completion. These lessons should not just be archived, but actively shared and reflected upon with the team to identify past successes and areas for improvement. A respondent shared, "*In our project team, we conduct kick-off meetings to identify best practices and incorporate client feedback into our frameworks*." It appears that encouraging teams to share experiences and insights from past projects aids in learning from both successes and failures, enhancing their capacity to handle future challenges.

4.2.3 Organizational level: change management and vision.

Challenges related to change management and vision were identified to be tackled though the following measures:

4.2.3.1 Embracing external collaborations.

Collaboration with experts in the field was emphasized in the interviews as an important measure to manage digitalization projects in the unpredictable environment. A respondent stated, *"to cope with ongoing changes, we have now changed our structure and collaborate with startups and other companies in the implementation of various projects. We have found that knowledge acquisition and sharing is very helpful in this aspect."*

Furthermore, the need to "buy knowledge" if necessary was also inferred. Buying knowledge includes searching strategically beyond organizational boundaries for the right people with the expertise needed and compensating them on an agreed basis so they bring in new knowledge to the organization.

4.2.3.2 Establishing an inclusive mind-set.

Findings show that, in the digital landscape, organizations are encouraged to embrace innovation and deviate from conventional approaches. Two methods for fostering openness emerged from the interviews. The first involves open dialogues between top management and external stakeholders about new technologies and market trends, helping prepare individuals for technological changes. The second method focuses on inclusive, transparent internal discussions, providing a safe space for sharing ideas, exploring scenarios, and collaboratively solving problems. A respondent noted, *"To identify our knowledge needs, we hold open events with employees discussing desired technologies and potential risks, and then seek solutions together."* It appears that openness builds trust, valuing employees' perspectives and opinions.

4.2.3.3 Tailoring safe learning spaces.

From the interviews, top management personnel are encouraged to visit external exhibitions to learn about technological advancements and practices in other organizations. Furthermore, findings show that in order to promote continuous learning, the organization can set aside specific "time and financial learning budgets" for its members. This may include a certain number of hours annually for training, extra learning days for new hires, or tailored learning paths for experienced staff, aligning with organizational goals. A senior manager explained, *"Employees discuss their career needs quarterly with their project managers. [we] project managers and managing directors meet almost weekly to review upcoming projects and team compositions, we consider employees' needs and career aspirations in these decisions."*

4.2.3.4 Prioritizing change initiatives.

Findings infer that, individuals handle change more effectively when faced with a limited number of alterations at a time, and managing change sequentially proves most efficient. A senior manager noted, "*We usually implement one change at a time, allowing people to adapt before introducing another. This prevents overwhelming them with too many changes at once."* It therefore seems crucial for top management to critically assess the need for and reasoning behind changes, and then decide the implementation order to avoid overwhelming staff with simultaneous changes. It appears that strategic prioritization of key initiatives ensures effective resource allocation and addresses the most urgent challenges or growth opportunities.

These factors can be summarized holistically in a Table 3 combining the challenges and how they can be addressed at three levels in the organization.

4.3 Phase 2: the mediating effect of absorptive capacity

Of the 70 questionnaires distributed, 51 were returned and useable. The respondents comprised team members (51%), project managers (31%), and top management (18%). In terms of project experience, 45% had 6–10 years, 23% had 11–15 years, 16% had over 20 years, 12% had 0–5 years, and 4% had 16–20 years. A majority agreed or strongly agreed that their organization was actively pursuing digital transformation (82.4%) and that the adoption rate of digitalization initiatives had increased (84.3%), confirming the effectiveness of purposive sampling. Most respondents also agreed that their organization had successfully completed at least one digitalization project in the last three years, either internally (80.4%) or externally (68.7%). While recognizing the value of learning from failed projects, our study focused on successful ones.

4.3.1 Validity and reliability.

The items were validated using principal components factor analysis for unidimensional constructs. Factor reduction was conducted and all items with factor loading <0.7 were removed (Henseler *et al.*, 2009). Appendix presents all the items that were retained (factor loading >0.7). The Kaiser–Meyer–Olkin (KMO) values of all of the variables exceeded the recommend value of 0.60 (Kaiser, 1974) and Bartlett's Test of Sphericity was statistically significant at <0.001 (Bartlett, 1954) implying appropriateness of the data obtained in each construct. Cronbach's alpha was also calculated for all scales (composite and individual) and found to be greater than 0.7 (Figure 3) indicating a great internal consistency for all scales (Gliem and Gliem, 2003).

4.3.2 Hypothesis testing.

Figure 3 summarizes the descriptive statistics and correlation coefficients for the independent variable (ENV), the mediation variable (ACAP), and the dependent variable (PS). The results of the combined effects of all ACAP dimensions show a positive and significant correlation between ENV and PS ($r = 0.490$, $p < 0.001$), thus signifying the important role of organizational adaptability in facilitating success in digitalization projects. These findings support H1 confirming that there is an *overall positive relationship between the organization's ability to adapt to changing environment and digitalization project success*.

Regression analysis was conducted to uncover the strength of the relationship between the variables, to identify the mediating role of ACAP on the relationship between ENV and PS. Collinearity is a major issue and if detected, interpretations cannot be trusted (Daoud,

Level	Digitalization projects Challenges associated with uncertainty	Strategies to address the challenges
Individual	Persisting knowledge-gap Dynamic work-environment Impaired understanding of the outcome	Fostering individual knowledge development The use of personalized learning journeys
Project	Resource management challenges Knowledge-needs challenges	Through cross-team and functional exposure Embracing challenges Mentorship and coaching Continuous identification of knowledge gaps Fostering sharing of reflections on lessons-learned
Organizational	Impaired vision of expectations Embracing familiarity over innovativeness	Embracing external collaborations Establishing an inclusive mind-set Tailoring safe learning spaces Prioritizing change initiatives

Source(s): Created by author

Table 3. Addressing challenges associated with uncertainty in digitalization projects

Cronbach's alpha values

Scale	Cronbach's alpha	
	Composite	Individual
Organizational adaptability (ENV)	0.935	-
Absorptive capacity (ACAP)	0.949	
• **Potential ACAP**		0.937
• **Realized ACAP**		0.851
Project success (PS)	0.937	
• **Project planning success**		0.842
• **Business case success**		0.706
• **Stakeholder perception**		0.935

Descriptive statistics and correlation coefficients for combined ACAP

Variables	ENV	ACAP	PS
Mean	3.75	3.74	3.37
SD	0.98	0.85	0.83
ENV	1		
ACAP	0.623**	1	
PS	0.490**	0.592**	1

Note(s): Significance: $p < 0.001$**; $n = 51$

Source(s): Created by author

Figure 3.
Cronbach's alpha values, descriptive statistics, and correlation coefficients for combined ACAP

2017), and this applies also in our case. The VIF (variance inflation factor) values for each step were less than 2, which were below 10 hence considered good (Hair *et al.*, 2019). The tolerance values were greater than 0.6 for all steps, which were above 0.1, hence good (Daoud, 2017). The results presented in Table 4 confirm the mediation role of ACAP in the relationship between ENV and PS by the significant interaction ($\beta = 0.469$, $p = 0.002$). The β coefficient explains the extent to which the mediator variable explains the relationship between the independent variable and the dependent variable. Hence, the results support H2 confirming a mediating role of absorptive capacity on the relationship between organizational adaptability to the changing environment and digitalization project success. The results also showed that (ENV) explained 23% of the variance in project success, but both ENV and ACAP explained approx. 35% of the variance in project success, indicating an increase of about 12%, which could be attributed to ACAP.

A robust analysis was conducted where ACAP was decomposed into potential absorptive capacity (PACAP) and realized absorptive capacity (RACAP) as separate variables. The aim

Variables	Step 1(β)	Step 2(β)	Step 3(β)	Step 4(β)	Collinearity statistics Tolerance	VIF
Step 1						
ENV	0.490**				1.000	1.000
PS						
Step 2						
ENV		0.623**			1.000	1.000
ACAP						
Step 3						
ACAP			0.592**		1.000	1.000
PS						
Step 4						
ENV				0.198	0.612	1.635
ACAP				0.469***	0.612	1.635
PS						
F	15.476**	31.131**	26.444**	14.317***		
R^2	0.240	0.388	0.351	0.374		
Adj. R^2	0.225	0.376	0.337	0.348		

Note(s): Significant at: **p < 0.001; ***p < 0.01
Source(s): Created by author

Table 4.
Mediating role of combined ACAP

was to identify the individual contributions of PACAP and RACAP to digitalization project success. The variables were subjected to factor analysis and only factors with a loading >0.7 were retained, (Henseler *et al.*, 2009) (*See* Appendix).

The regression results in Table 5 showed that both PACAP and RACAP had a positive and significant relationship with project success. However, the relationship between digitalization project success and RACAP was slightly stronger with a higher β coefficient

Variables	Step 1(β)	Step 2(β)	Step 3(β)	Step 4(β)	Step 1(β)	Step 2(β)	Step 3(β)	Step 4(β)
	PACAP				RACAP			
Step 1								
ENV	0.490**				0.490**			
PS								
Step 2								
ENV		0.612**				0.547**		
PACAP/RACAP								
Step 3								
PACAP/RACAP			0.577**				0.600**	
PS								
Step 4								
ENV				0.219				0.231
PACAP/RACAP				0.443***				0.474**
PS								
F	15.476**	29.384**	24.405**	13.644***	15.476**	20.938**	27.569**	15.823**
R^2	0.240	0.375	0.332	0.362	0.240	0.299	0.360	0.397
Adj. R^2	0.225	0.362	0.319	0.336	0.225	0.285	0.347	0.372

Note(s): Significant at: **p < 0.001; ***p < 0.01
Source(s): Created by author

Table 5.
Mediating roles of PACAP and RACAP

($\beta = 0.60, p < 0.001$) than that between digitalization project success and PACAP ($\beta = 0.577$, $p < 0.001$). Both relationships were statistically significant.

When mediating the relationship between the environment and digitalization project success, the results show that both RACAP and PACAP had partial mediation effects. However, the variance explained by RACAP was higher (37%) indicating that RACAP explains a higher percentage of the variability in digitalization project success compared with that explained PACAP (34%). Thus, indicating that RACAP variable has a stronger influence in accounting for the changes in the success of digitalization projects compared to PACAP.

The mediating effects of PACAP and RACAP were further identified on each project success dimension. Both PACAP and RACAP were found to have a positive and significant mediating effect on project-plan, business case and stakeholder perception dimensions of project success (Table 6). Results show that PACAP and RACAP impact different dimensions of project success and how they explain variance in those dimensions. RACAP was found to have a stronger influence in explaining project planning and stakeholder perception success by 6 and 2% difference in variance respectively. Thus, the influence of RACAP on project planning is more substantial than the influence of RACAP on stakeholder perception success. Moreover, PACAP was found to be influential in explaining business case success by 1% difference. Although RACAP and PACAP have differing influences on the different dimensions of project success, the extent of this difference is relatively small.

5. Discussion

This study illustrates the application of organizational learning theory to enhance our understanding and address the challenges of uncertainty facing digitalization projects. The findings emphasize two key aspects in tackling these challenges: (1) organizations should adopt a holistic approach to address challenges at every organizational level, and (2) the concept of absorptive capacity can be utilized by organizations to improve their ability to manage uncertainty effectively.

5.1 Addressing uncertainty through a holistic perspective

Recognizing the flow of learning between individuals and the organization highlights the need for decision-makers to foresee and address challenges at various levels. Adopting a multi-level approach, as suggested by Popaitoon and Siengthai (2014), offers a holistic perspective. Digitalization project management faces challenges not only from uncertainty, but also due to volatility, uncertainty, complexity, and agility in the project environment. These challenges emerge from different interpretations of factors at each organizational level and are linked to the transition of knowledge from acquisition to value creation.

Continuous learning across all levels of an organization is crucial for understanding and resolving digitalization challenges. In today's volatile, uncertain, complex, and agile environment, organizations need to ensure adaptability in their processes, tasks, routines,

Table 6. Mediating effects of PACAP and RACAP on project success dimensions

Project success dimension		PACAP		RACAP	
	Adj.R^2	(β coefficient)	Adj.R^2	(β coefficient)	Adj. R^2
Project planning success x ENV	0.155	0.400 ***	0.241	0.506 *	0.324
Business case success x ENV	0.198	0.366***	0.268	0.325***	0.258
Stakeholder perception x ENV	0.196	0.421**	0.294	0.429 **	0.313

Note(s): Significant at: *$p < 0.001$; **$p < 0.01$; ***$p < 0.05$
Source(s): Created by author

and staff. This requires internal mechanisms such as project-based learning, mentorship, and knowledge reflection, along with external collaborations for knowledge exchange.

Applying newly acquired knowledge significantly improves decision-making, resource selection, action navigation, awareness of actionable changes, and the probability of project success. Furthermore, skillful application of this knowledge demonstrates the organization's adaptability and innovation, thereby strengthening stakeholder confidence and satisfaction with project progress and results.

5.2 Absorptive capacity construct to enhance the ability to cope with uncertainty in digitalization projects

The study discovered a direct positive link between an organization's adaptive capacity in volatile, uncertain, complex, and agile environments and the success of digitalization projects. This finding aligns with prior research that emphasizes the importance of absorptive capacities, both potential and realized, for effectively using knowledge to create value (Camisón and Forés, 2010; Zahra and George, 2002). The research indicates that both recognizing and assimilating new knowledge (potential ACAP) and applying that knowledge (realized ACAP) contribute to digitalization project success. However, the practical application of new knowledge (realized ACAP) has a more significant impact on project success.

The study shows that potential and realized ACAP have about equal effects on stakeholder perception and business case success. However, applying new knowledge (realized ACAP) has a greater impact on project planning, suggesting that focusing on transforming and exploiting knowledge can lead to short-term success (time, budget, scope, quality) through immediate value creation. For stakeholder perception and business case aspects, both potential and realized ACAP should receive similar attention due to their comparable influence.

To overcome digitalization challenges and achieve project success, newly acquired knowledge must be comprehended, integrated with existing organizational knowledge, and applied effectively. Both potential and realized ACAP are pivotal in driving overall digitalization project success. Therefore, merely exploring external knowledge through activities like attending conferences or seeking training paths is insufficient unless the organization holistically transforms and applies this newfound knowledge in their digitalization projects.

6. Conclusion

In today's increasingly digital landscape, organizations face a web of challenges characterized by Volatility, Uncertainty, Complexity, and Ambiguous (VUCA). This study explored one of the dimensions of VUCA, i.e. uncertainty and its contribution towards adding challenges in the management of digitalization projects. We addressed this objective through two research questions:

RQ1. To investigate the challenges that are associated with high uncertainty and how they impact an organization's ability to succeed in digitalization projects.

Conclusion: The findings show that challenges are multi-faceted and arise at individual, project, and organizational levels while navigating the highly changing environment of digitalization projects. The study recommends a holistic, multi-level approach focusing on learning and adapting to navigate the challenges associated with uncertainty of digitalization projects environments. At the individual level, adaptations strategies should be placed on creating personalized learning journeys and supporting external knowledge acquisition. At the project level, adaptation strategies may include rotating team members for cross-

functional exposure, embracing challenges for creativity, mentorship programs and continuous identification of knowledge gaps and sharing lessons-learned. At the organizational level, external collaborations and "buying knowledge" when necessary are crucial strategies.

Additionally, an organization must establish an inclusive mindset involving both top management and staff in decision-making processes concerning technological shifts and market dynamics. Safe learning spaces, both financial and time-allocated, are encouraged for continuous learning. Lastly, top management must prioritize change initiatives sequentially to avoid overwhelming employees.

RQ2. To investigate the role of absorptive capacity as a mediator in the relationship between organizational adaptability and project outcomes.

Conclusion: Our study underscores the important role of both potential and realized absorptive capacities in achieving project success. While both are important for project success, the study finds that the active utilization of knowledge (realized ACAP) has a more pronounced influence on plan success (time, budget, scope, quality) due to value creation.

The study contributes a comprehensive framework that incorporates a layered, holistic approach and the concept of absorptive capacity as pivotal elements for successfully managing digitalization projects amidst uncertain environments. It is our hope that organizations that pay attention to these insights will not only better position themselves to adapt but will more likely succeed in their digitalization initiatives.

6.1 Implications

6.1.1 Theoretical implications.

(1) Supports existing studies on absorptive capacity by confirming the need for organizations to focus on developing their absorptive capacity through employee training, knowledge management systems, and partnerships with external entities. These efforts enable them to effectively acquire, assimilate, and apply new knowledge in digitalization projects.

(2) Provides empirical evidence on the factors that contribute to uncertainty in digitalization project environments and offers strategies to effectively manage this uncertainty at various organizational levels.

(3) Highlights knowledge as a critical organizational resource especially in the digital transformation context by utilizing the Knowledge-Based View as a theoretical lens.

6.1.2 Practical implications.

(1) Findings indicate that digitalization projects, characterized by constant change, require continuous learning and innovation for competitive advantage.

(2) Highlights the importance of absorptive capacity in helping organizations acquire and develop the knowledge and skills needed to adapt to environmental changes. This enhances organizational agility and responsiveness, ultimately facilitating the success of digitalization projects.

7. Limitations and future studies

This study focused on organizational learning and absorptive capacity at individual, project, and organizational level. However, digitalization projects involve inter-organizational interactions and collaborations which create the need for understanding

learning not only from an organizational lens but from an inter-organizational lens. Future studies can look into aspects of inter-organizational learning and inter-organizational absorptive capacity.

References

Akgün, A.E., Byrne, J.C., Lynn, G.S. and Keskin, H. (2007), "New product development in turbulent environments: impact of improvisation and unlearning on new product performance", *Journal of Engineering and Technology Management*, Vol. 24 No. 3, pp. 203-230, doi: 10.1016/j.jengtecman.2007.05.008.

Aldieri, L., Sena, V. and Vinci, C.P. (2018), "Domestic R&D spillovers and absorptive capacity: some evidence for US, Europe and Japan", *International Journal of Production Economics*, Vol. 198, pp. 38-49, doi: 10.1016/j.ijpe.2018.01.015.

Ali, I., Musawir, A.U. and Ali, M. (2018), "Impact of knowledge sharing and absorptive capacity on project performance: the moderating role of social processes", *Journal of Knowledge Management*, Vol. 22 No. 2, pp. 453-477, doi: 10.1108/jkm-10-2016-0449.

Appio, F.P., Frattini, F., Petruzzelli, A.M. and Neirotti, P. (2021), "Digital transformation and innovation management: a synthesis of existing research and an agenda for future studies", *Journal of Product Innovation Management*, Vol. 38 No. 1, pp. 4-20, doi: 10.1111/jpim.12562.

Arbussà, A. and Coenders, G. (2007), "Innovation activities, use of appropriation instruments and absorptive capacity: evidence from Spanish firms", *Research Policy*, Vol. 36 No. 10, pp. 1545-1558, doi: 10.1016/j.respol.2007.04.013.

Badewi, A. (2022), "When frameworks empower their agents: the effect of organizational project management frameworks on the performance of project managers and benefits managers in delivering transformation projects successfully", *International Journal of Project Management*, Vol. 40 No. 2, pp. 132-141, doi: 10.1016/j.ijproman.2021.10.005.

Baier, M.-S., Lockl, J., Röglinger, M. and Weidlich, R. (2022), "Success factors of process digitalization projects–insights from an exploratory study", *Business Process Management Journal*, Vol. 28 No. 2, pp. 325-347, doi: 10.1108/bpmj-07-2021-0484.

Barthel, P. and Hess, T. (2020), "Towards a characterization of digitalization projects in the context of organizational transformation", *Pacific Asia Journal of the Association for Information Systems*, Vol. 12 No. 3, pp. 31-56, doi: 10.17705/1pais.12302.

Bartlett, M.S. (1954), "A note on the multiplying factors for various $\chi 2$ approximations", *Journal of the Royal Statistical Society. Series B, Methodological*, Vol. 16 No. 2, pp. 296-298, doi: 10.1111/j.2517-6161.1954.tb00174.x.

Bencsik, A. (2020), "Challenges of management in the digital economy", *International Journal of Technology*, Vol. 11 No. 6, p. 1275, doi: 10.14716/ijtech.v11i6.4461.

Bennett, N. and Lemoine, G.J. (2014), "What a difference a word makes: understanding threats to performance in a VUCA world", *Business Horizons*, Vol. 57 No. 3, pp. 311-317, doi: 10.1016/j.bushor.2014.01.001.

Bjorvatn, T. and Wald, A. (2018), "Project complexity and team-level absorptive capacity as drivers of project management performance", *International Journal of Project Management*, Vol. 36 No. 6, pp. 876-888, doi: 10.1016/j.ijproman.2018.05.003.

Boisot, M. and Child, J. (1999), "Organizations as adaptive systems in complex environments: the case of China", *Organization Science*, Vol. 10 No. 3, pp. 237-252, doi: 10.1287/orsc.10.3.237.

Braun, V. and Clarke, V. (2006), "Using thematic analysis in psychology", *Qualitative Research in Psychology*, Vol. 3 No. 2, pp. 77-101, doi: 10.1191/1478088706qp063oa.

Camisón, C. and Forés, B. (2010), "Knowledge absorptive capacity: new insights for its conceptualization and measurement", *Journal of Business Research*, Vol. 63 No. 7, pp. 707-715, doi: 10.1016/j.jbusres.2009.04.022.

Cavaleri, S., Firestone, J. and Reed, F. (2012), "Managing project problem-solving patterns", *International Journal of Managing Projects in Business*, Vol. 5 No. 1, pp. 125-145, doi: 10.1108/17538371211192937.

Cohen, W.M. and Levinthal, D.A. (1990), "Absorptive capacity: a new perspective on learning and innovation", *Administrative Science Quarterly*, Vol. 35 No. 1, pp. 128-152, doi: 10.2307/2393553.

Coronado-Medina, A., Arias-Pérez, J. and Perdomo-Charry, G. (2020), "Fostering product innovation through digital transformation and absorptive capacity", *International Journal of Innovation and Technology Management*, Vol. 17 No. 06, 2050040, doi: 10.1142/s0219877020500406.

Cuervo-Cazurra, A. and Rui, H. (2017), "Barriers to absorptive capacity in emerging market firms", *Journal of World Business*, Vol. 52 No. 6, pp. 727-742, doi: 10.1016/j.jwb.2017.06.004.

Da Silva, V.L., Kovaleski, J.L., Pagani, R.N., Silva, J.D.M. and Corsi, A. (2020), "Implementation of Industry 4.0 concept in companies: empirical evidences", *International Journal of Computer Integrated Manufacturing*, Vol. 33 No. 4, pp. 325-342, doi: 10.1080/0951192x.2019.1699258.

Daoud, J.I. (2017), "Multicollinearity and regression analysis", *Journal of Physics: Conference Series*, Vol. 949, p. 012009, doi: 10.1088/1742-6596/949/1/012009.

Daspit, J.J., Ramachandran, I. and D'Souza, D.E. (2014), "TMT shared leadership and firm performance: investigating the mediating role of absorptive capacity", *Journal of Managerial Issues*, Vol. 26 No. 3, pp. 219-239.

Davenport, T.H. and Westerman, G. (2018), "Why so many high-profile digital transformations fail", *Harvard Business Review*, Vol. 9, p. 15.

Dultra-de-Lima, R.G. and Brito, L.A.L. (2022), "How absorptive capacity influences project performance", *International Journal of Managing Projects in Business*, Vol. 16 No. 3, pp. 610-637, doi: 10.1108/ijmpb-02-2022-0025.

Dyer, J.H. and Singh, H. (1998), "The relational view: cooperative strategy and sources of interorganizational competitive advantage", *Academy of Management Review*, Vol. 23 No. 4, pp. 660-679, doi: 10.2307/259056.

Easterby-Smith, M., Jaspersen, L.J., Thorpe, R. and Valizade, D. (2021), *Management and Business Research*, Sage, London.

Fernandez-Vidal, J., Perotti, F.A., Gonzalez, R. and Gasco, J. (2022), "Managing digital transformation: the view from the top", *Journal of Business Research*, Vol. 152, pp. 29-41, doi: 10.1016/j.jbusres.2022.07.020.

Flatten, T.C., Engelen, A., Zahra, S.A. and Brettel, M. (2011), "A measure of absorptive capacity: scale development and validation", *European Management Journal*, Vol. 29 No. 2, pp. 98-116, doi: 10.1016/j.emj.2010.11.002.

Garavaglia, A. and Petti, L. (2013), *Needs Analysis in Classroom Digitalization Projects*, ATEE-SIREM, Genoa.

Gertzen, W.M., van der Lingen, E. and Steyn, H. (2022), "Goals and benefits of digital transformation projects: insights into project selection criteria", *South African Journal of Economic and Management Sciences*, Vol. 25 No. 1, p. 4158, doi: 10.4102/sajems.v25i1.4158.

Gliem, J.A. and Gliem, R.R. (2003), "Calculating, interpreting, and reporting Cronbach's alpha reliability coefficient for Likert-type scales", *The 2003 Midwest research-to-practice conference in adult, continuing, and community education, Columbus, Ohio*, Vol. 1, pp. 82-87.

Grahn, S., Granlund, A. and Lindhult, E. (2020), "How to deal with differing views of resource efficiency when carrying out digitalization projects", *The 9th Swedish Production Symposium*, Jønkøping, doi: 10.3233/atde200144.

Grant, R.M. (1996), "Prospering in dynamically-competitive environments: organizational capability as knowledge integration", *Organization Science*, Vol. 7 No. 4, pp. 375-387, doi: 10.1287/orsc.7.4.375.

Hafseld, K., Hussein, B. and Rauzy, A.B. (2021), "An attempt to understand complexity in a government digital transformation project", *International Journal of Information Systems and Project Management*, Vol. 9 No. 3, pp. 70-91, doi: 10.12821/ijispm090304.

Hair, J.F., Risher, J.J., Sarstedt, M. and Ringle, C.M. (2019), "When to use and how to report the results of PLS-SEM", *European Business Review*, Vol. 31 No. 1, pp. 2-24, doi: 10.1108/ebr-11-2018-0203.

Harris, R. and Le, T. (2019), "Absorptive capacity in New Zealand firms: measurement and importance", *Science and Public Policy*, Vol. 46 No. 2, pp. 290-309, doi: 10.1093/scipol/scy058.

Harris, R. and Yan, J. (2019), "The measurement of absorptive capacity from an economics perspective: definition, measurement and importance", *Journal of Economic Surveys*, Vol. 33 No. 3, pp. 729-756, doi: 10.1111/joes.12296.

Harsch, K. and Festing, M. (2020), "Dynamic talent management capabilities and organizational agility—a qualitative exploration", *Human Resource Management*, Vol. 59 No. 1, pp. 43-61, doi: 10.1002/hrm.21972.

Hayton, J.C. and Zahra, S.A. (2005), "Venture team human capital and absorptive capacity in high technology new ventures", *International Journal of Technology Management*, Vol. 31 3/4, p. 256, doi: 10.1504/ijtm.2005.006634.

Hennink, M.M. (2013), *Focus Group Discussions*, Oxford University Press.

Henriette, E., Feki, M. and Boughzala, I. (2015), "The shape of digital transformation: a systematic literature review", *MCIS 2015 proceedings*.

Henseler, J., Ringle, C.M. and Sinkovics, R.R. (2009), "The use of partial least squares path modeling in international marketing", in *New Challenges to International Marketing*, Emerald Group Publishing.

Hess, T., Matt, C., Benlian, A. and Wiesböck, F. (2016), "Options for formulating a digital transformation strategy", *MIS Quarterly Executive*, Vol. 15 No. 2, pp. 123-139.

Hussein, A. (2009), "The use of triangulation in social sciences research: can qualitative and quantitative methods be combined?", *Journal of Comparative Social Work*, Vol. 4 No. 1, pp. 106-117, doi: 10.31265/jcsw.v4i1.48.

Ika, L.A. and Pinto, J.K. (2022), "The 're-meaning' of project success: updating and recalibrating for a modern project management", *International Journal of Project Management*, Vol. 40 No. 7, pp. 835-848, doi: 10.1016/j.ijproman.2022.08.001.

Jansen, J.J.P., Van Den Bosch, F.A.J. and Volberda, H.W. (2005), "Managing potential and realized absorptive capacity: how do organizational antecedents matter?", *Academy of Management Journal*, Vol. 48 No. 6, pp. 999-1015, doi: 10.5465/amj.2005.19573106.

Jha, A.K., Agi, M.A. and Ngai, E.W. (2020), "A note on big data analytics capability development in supply chain", *Decision Support Systems*, Vol. 138, 113382, doi: 10.1016/j.dss.2020.113382.

Jiang, J.J., Klein, G. and Ellis, T.S. (2002), "A measure of software development risk", *Project Management Journal*, Vol. 33 No. 3, pp. 30-41, doi: 10.1177/875697280203300305.

Jun, L., Qiuzhen, W. and Qingguo, M. (2011), "The effects of project uncertainty and risk management on IS development project performance: a vendor perspective", *International Journal of Project Management*, Vol. 29 No. 7, pp. 923-933, doi: 10.1016/j.ijproman.2010.11.002.

Kadir, B.A. and Broberg, O. (2021), "Human-centered design of work systems in the transition to industry 4.0", *Applied Ergonomics*, Vol. 92, 103334, doi: 10.1016/j.apergo.2020.103334.

Kaiser, H.F. (1974), "An index of factorial simplicity", *Psychometrika*, Vol. 39 No. 1, pp. 31-36, doi: 10.1007/bf02291575.

Khoja, F. and Maranville, S. (2010), "How do firms nurture absorptive capacity?", *Journal of Managerial Issues*, Vol. 22 No. 2, pp. 262-278.

Lane, P.J., Koka, B.R. and Pathak, S. (2006), "The reification of absorptive capacity: a critical review and rejuvenation of the construct", *Academy of Management Review*, Vol. 31 No. 4, pp. 833-863, doi: 10.5465/amr.2006.22527456.

Lane, P.J., Salk, J.E. and Lyles, M.A. (2001), "Absorptive capacity, learning, and performance in international joint ventures", *Strategic Management Journal*, Vol. 22 No. 12, pp. 1139-1161, doi: 10.1002/smj.206.

Larjovuori, R.-L., Bordi, L., Mäkiniemi, J.-P. and Heikkilä-Tammi, K. (2016), "The role of leadership and employee well-being in organizational digitalization", *26th Annual RESER Conference*, Naples.

Leal-Rodríguez, A.L., Roldán, J.L., Ariza-Montes, J.A. and Leal-Millán, A. (2014), "From potential absorptive capacity to innovation outcomes in project teams: the conditional mediating role of the realized absorptive capacity in a relational learning context", *International Journal of Project Management*, Vol. 32 No. 6, pp. 894-907, doi: 10.1016/j.ijproman.2014.01.005.

Lengnick-Hall, C.A. and Beck, T.E. (2005), "Adaptive fit versus robust transformation: how organizations respond to environmental change", *Journal of Management*, Vol. 31 No. 5, pp. 738-757, doi: 10.1177/0149206305279367.

Leyh, C., Köppel, K., Neuschl, S. and Pentrack, M. (2021), "Critical success factors for digitalization projects", *16th Conference on Computer Science and Intelligence Systems (FedCSIS)*, Sofia, Bulgaria, doi: 10.15439/2021f122.

Li, F. (2020), "Leading digital transformation: three emerging approaches for managing the transition", *International Journal of Operations and Production Management*, Vol. 40 No. 6, pp. 809-817, doi: 10.1108/IJOPM-04-2020-0202.

Li, L. (2022), "Digital transformation and sustainable performance: the moderating role of market turbulence", *Industrial Marketing Management*, Vol. 104, pp. 28-37, doi: 10.1016/j.indmarman.2022.04.007.

Liao, J., Welsch, H. and Stoica, M. (2003), "Organizational absorptive capacity and responsiveness: an empirical investigation of growth–oriented SMEs", *Entrepreneurship Theory and Practice*, Vol. 28 No. 1, pp. 63-86, doi: 10.1111/1540-8520.00032.

Liu, H., Ke, W., Wei, K.K. and Hua, Z. (2013), "The impact of IT capabilities on firm performance: the mediating roles of absorptive capacity and supply chain agility", *Decision Support Systems*, Vol. 54 No. 3, pp. 1452-1462, doi: 10.1016/j.dss.2012.12.016.

Lund, T. (2012), "Combining qualitative and quantitative approaches: some arguments for mixed methods research", *Scandinavian Journal of Educational Research*, Vol. 56 No. 2, pp. 155-165, doi: 10.1080/00313831.2011.568674.

Luthra, S. and Mangla, S.K. (2018), "Evaluating challenges to Industry 4.0 initiatives for supply chain sustainability in emerging economies", *Process Safety and Environmental Protection*, Vol. 117, pp. 168-179, doi: 10.1016/j.psep.2018.04.018.

March, J.G. (1991), "Exploration and exploitation in organizational learning", *Organization Science*, Vol. 2 No. 1, pp. 71-87, doi: 10.1287/orsc.2.1.71.

Matusik, S.F. and Heeley, M.B. (2005), "Absorptive capacity in the software industry: identifying dimensions that affect knowledge and knowledge creation activities", *Journal of Management*, Vol. 31 No. 4, pp. 549-572, doi: 10.1177/0149206304272293.

Medina, R. and Medina, A. (2015), "The competence loop: competence management in knowledge-intensive, project-intensive organizations", *International Journal of Managing Projects in Business*, Vol. 8 No. 2, pp. 279-299, doi: 10.1108/ijmpb-09-2014-0061.

Mielli, F. and Bulanda, N. (2019), "Digital transformation: why projects fail, potential best practices and successful initiatives", *2019 IEEE-IAS/PCA Cement Industry Conference (IAS/PCA)*, doi: 10.1109/citcon.2019.8729105.

Mirza, S., Mahmood, A. and Waqar, H. (2022), "The interplay of open innovation and strategic innovation: unpacking the role of organizational learning ability and absorptive capacity", *International Journal of Engineering Business Management*, Vol. 14, doi: 10.1177/18479790211069745.

Morakanyane, R., Grace, A.A. and O'reilly, P. (2017), "Conceptualizing digital transformation in business organizations: a systematic review of literature", *2017 Bled eConference (BLED), Bled, Slovenia*, doi: 10.18690/978-961-286-043-1.30.

Ngereja, B.J. and Hussein, B. (2022), "Employee learning in the digitalization context: an evaluation from team members' and project managers' perspectives", *Procedia Computer Science*, Vol. 196, pp. 902-909, doi: 10.1016/j.procs.2021.12.091.

Nieto, M. and Quevedo, P. (2005), "Absorptive capacity, technological opportunity, knowledge spillovers, and innovative effort", *Technovation*, Vol. 25 No. 10, pp. 1141-1157, doi: 10.1016/j.technovation.2004.05.001.

Nonaka, I. (1994), "A dynamic theory of organizational knowledge creation", *Organization Science*, Vol. 5 No. 1, pp. 14-37, doi: 10.1287/orsc.5.1.14.

Obilor, E.I. (2023), "Convenience and purposive sampling techniques: are they the same", *International Journal of Innovative Social and Science Education Research*, Vol. 11 No. 1, pp. 1-7.

Popaitoon, S. and Siengthai, S. (2014), "The moderating effect of human resource management practices on the relationship between knowledge absorptive capacity and project performance in project-oriented companies", *International Journal of Project Management*, Vol. 32 No. 6, pp. 908-920, doi: 10.1016/j.ijproman.2013.12.002.

Ross, J.W., Beath, C.M. and Mocker, M. (2019), "Creating digital offerings customers will buy", *MIT Sloan Management Review*, Vol. 61 No. 1, pp. 64-69.

Saeed, M.A., Jiao, Y., Zahid, M.M., Tabassum, H. and Nauman, S. (2020), "Organizational flexibility and project portfolio performance: the roles of innovation, absorptive capacity and environmental dynamism", *International Journal of Managing Projects in Business*, Vol. 14 No. 3, pp. 600-624, doi: 10.1108/ijmpb-02-2020-0058.

Sanchez-Segura, M.-I., Medina-Dominguez, F., de Amescua, A. and Dugarte-Peña, G.L. (2021), "Knowledge governance maturity assessment can help software engineers during the design of business digitalization projects", *Journal of Software: Evolution and Process*, Vol. 33 No. 4, p. e2326, doi: 10.1002/smr.2326.

Sarantis, D., Smithson, S., Charalabidis, Y. and Askounis, D. (2010), "A critical assessment of project management methods with respect to electronic government implementation challenges", *Systemic Practice and Action Research*, Vol. 23 No. 4, pp. 301-321, doi: 10.1007/s11213-009-9161-9.

Sept, A. (2020), "Thinking together digitalization and social innovation in rural areas: an exploration of rural digitalization projects in Germany", *European Countryside*, Vol. 12 No. 2, pp. 193-208, doi: 10.2478/euco-2020-0011.

Singh, A.K., Jain, N.K., Sharma, M.G. and Nigam, S. (2023), "Reconceptualization of absorptive capacity as potential and realized absorptive capacity for project-based organizations", *International Journal of Project Management*, Vol. 41 No. 2, 102449, doi: 10.1016/j.ijproman.2023.102449.

Snow, C.C., Fjeldstad, Ø.D. and Langer, A.M. (2017), "Designing the digital organization", *Journal of Organization Design*, Vol. 6 No. 1, pp. 1-13, doi: 10.1186/s41469-017-0017-y.

Soo, C.W., Devinney, T.M. and Midgley, D.F. (2007), "External knowledge acquisition, creativity and learning in organisational problem solving", *International Journal of Technology Management*, Vol. 38 Nos 1/2, p. 137, doi: 10.1504/ijtm.2007.012433.

Spender, J.C. (1996), "Making knowledge the basis of a dynamic theory of the firm", *Strategic Management Journal*, Vol. 17 No. S2, pp. 45-62, doi: 10.1002/smj.4250171106.

Sydow, J., Schreyögg, G. and Koch, J. (2009), "Organizational path dependence: opening the black box", *Academy of Management Review*, Vol. 34 No. 4, pp. 689-709, doi: 10.5465/amr.2009.44885978.

Szulanski, G. (1996), "Exploring internal stickiness: impediments to the transfer of best practice within the firm", *Strategic Management Journal*, Vol. 17 No. S2, pp. 27-43, doi: 10.1002/smj.4250171105.

Tijan, E., Jović, M., Aksentijević, S. and Pucihar, A. (2021), "Digital transformation in the maritime transport sector", *Technological Forecasting and Social Change*, Vol. 170, p. 120879, doi: 10.1016/j.techfore.2021.120879.

Todorova, G. and Durisin, B. (2007), "Absorptive capacity: valuing a reconceptualization", *Academy of Management Review*, Vol. 32 No. 3, pp. 774-786, doi: 10.5465/amr.2007.25275513.

Tripsas, M. and Gavetti, G. (2017), "Capabilities, cognition, and inertia: evidence from digital imaging", in *The SMS Blackwell Handbook of Organizational Capabilities*, pp. 393-412.

Tu, Q., Vonderembse, M.A., Ragu-Nathan, T.S. and Sharkey, T.W. (2006), "Absorptive capacity: enhancing the assimilation of time-based manufacturing practices", *Journal of Operations Management*, Vol. 24 No. 5, pp. 692-710, doi: 10.1016/j.jom.2005.05.004.

Uchihira, N. and Eimura, T. (2022), "The nature of digital transformation project failures: impeding factors to stakeholder collaborations", *Journal of Intelligent Informatics and Smart Technology*, Vol. 7, pp. 1-6.

Van Den Bosch, F.A., Van Wijk, R. and Volberda, H.W. (2003), "Absorptive capacity: antecedents, models and outcomes", *ERIM Report Series Reference No. ERS-2003-035-STR*, pp. 1-51.

Vey, K., Fandel-Meyer, T., Zipp, J.S. and Schneider, C. (2017), "Learning & development in times of digital transformation: facilitating a culture of change and innovation", *International Journal of Advanced Corporate Learning*, Vol. 10 No. 1, p. 22, doi: 10.3991/ijac.v10i1.6334.

Vlačić, E., Dabić, M. and Božac, M.G. (2020), "The Relevance of absorptive capacity in firms' innovation strategies measured via bibliometric analysis", *The Journal of Corporate Governance, Insurance, and Risk Management (JCGIRM)*, Vol. 7 No. 1, pp. 1-14, doi: 10.56578/jcgirm070101.

Wong, V., Shaw, V. and Sher, P.J. (1999), "Intra-firm learning in technology transfer: a study of Taiwanese information technology firms", *International Journal of Innovation Management*, Vol. 03 No. 04, pp. 427-458, doi: 10.1142/s1363919699000219.

Yildiz, H.E., Murtic, A., Zander, U. and Richtnér, A. (2019), "What fosters individual-level absorptive capacity in MNCs? An extended motivation–ability–opportunity framework", *Management International Review*, Vol. 59 No. 1, pp. 93-129, doi: 10.1007/s11575-018-0367-x.

Zahra, S.A. and George, G. (2002), "Absorptive capacity: a review, reconceptualization, and extension", *Academy of Management Review*, Vol. 27 No. 2, pp. 185-203, doi: 10.5465/amr.2002.6587995.

Žitkienė, R. and Deksnys, M. (2018), "Organizational agility conceptual model", *Montenegrin Journal of Economics*, Vol. 14 No. 2, pp. 115-129, Podgorica: Economic Laboratory Transition Research Podgorica-Elit, 2018, doi: 10.14254/1800-5845/2018.14-2.7.

Appendix

	PART A	PART B
Factor 1: Organizational environment		
1) When it comes to digitalization changes that align with our business objectives, I would characterize my organization as highly adaptable	0.910	0.910
2) In terms of meeting new technological requirements, I would say that my organization is adept at adapting	0.904	0.904
3) My organization is skilled at adapting to acquire new skills and competencies in the context of digital transformation	0.919	0.919
4) My organization is capable of adapting to meet market expectations effectively	0.858	0.858
5) My organization is proficient in adapting to incorporate new digitalization regulations and standards	0.863	0.863
Factor 2: Absorptive capacity		
(Potential ACAP) acquisition		
1) My organization allocates both finances and time for us to engage in acquiring new knowledge	0.851	0.852
2) My organization creates a safe space/environment where I can share my ideas, develop scenarios and search for solutions together with my colleagues	0.783	0.793
3) My organization keeps us with digital trends by sending employees to attend fairs	0.786	0.809
(Potential ACAP) assimilation		
4) We have a culture of collecting lessons learnt from completed projects and sharing the experiences	0.828	0.845
5) I have access to a learning buddy or mentor who helps me with any work-related queries or uncertainties	0.816	0.811
6) My organization is receptive to my needs for developing additional skills and competencies to carry out tasks effectively	0.887	0.883
7) My organization encourages attending conferences and seminars that offer learning opportunities about other organizations	0.873	0.871
8) My organization offers essential training programs to equip individuals with the skills needed to perform their tasks proficiently	0.851	0.868
(Realized ACAP) transformation		
9) My organization promotes knowledge transfer by moving people between projects	0.879	0.841
10) My organization remains vigilant about emerging digital technologies and ensures that we update our knowledge base to stay up to date	0.868	0.823
11) My organization recruits personnel with specific technology experience to facilitate knowledge sharing		0.722
(Realized ACAP) exploitation		
12) My organization collaborates with experts from various industries, including academic institutions and other organizations to generate new knowledge	0.714	0.700
13) My organization supports experimentation of new solutions		0.745
Factor 3: Project success		
Project plan success (short term)		
1) The project was completed within the allocated time/schedule	0.760	0.760
2) The project met its planned scope	0.842	0.842
3) The project was completed within the allocated budget/cost	0.703	0.703
Business case success (medium-term)		

(*continued*)

Table A1. Items for variable and factor analysis

	PART A	PART B
1) The targeted benefits were achieved after project completion, e.g. financial or productivity benefits	0.878	0.878
1) The benefits from the project were noticeable beyond the organization, i.e. in the market	0.878	0.878
Stakeholder perceptions		
1) Employees were satisfied with the project outcome and easily accepted the changes that occurred	0.864	0.864
2) The customers were satisfied with the project outcome	0.862	0.862
3) Top management/executives were satisfied with the project outcome	0.883	0.883
4) The project manager was satisfied with the project outcome	0.898	0.898

Table A1. **Source(s):** Created by author

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