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ROLE OF MIDDLE MANAGERS IN MODULAR DIGITAL TRANSFORMATION: THE CASE OF SERVU

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Research paper

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Abstract

In the information systems (IS) literature, there is a gap in understanding the role of middle managers (MMs) in the digital transformation in organizations. IS research has focused on understanding top management and user roles in IT-related transformational change but the role of MMs has rarely been examined. To fill this gap, this paper reports on an open-ended exploration of the influence and contribution of the MMs in the digital transformation of a large Finnish public sector meal production company. Data were collected from a ten-year digital transformation effort in the company. The analysis suggests that MMs play an active role in influencing both top management and end users and importantly shows that the role MMs play differs from one stage to another of the digital transformation of the organisation. The study identifies a three-stage model of modular digital transformation, where MMs acted as implementers and negotiators in the initial core digitalisation stage of digital transformation, as champions in the digital expansion stage, and as shakers and strategists in the shake down and complementary stage. The paper concludes by discussing the implications for theory and highlighting the practical consequences of our results.

Keywords: Middle managers, digital transformation, modular change, public sector, case study.

1 Introduction

Business processes and services are being digitalised in almost every part of society. However, for many organizations digital transformation brings a lot of challenges particularly for the more "traditional" government organizations. Digital transformation is the use of new digital technologies, in order to enable major business improvements in operations and markets such as enhancing customer experience, streamlining operations or creating new business models (Horlacher and Hess, 2016). Information Systems (IS) research has over the years developed a good understanding of the challenges and the critical success factors for managing Information Technology (IT) related change in organizations. It is well established in literature that top management support is important for IS projects and that users play an important role during and after technology implementation. However, IS research has nearly ignored the role played by middle managers (MMs) in digital transformation. This is surprising considering the importance of MMs in any organisation. There is significant research in organisation studies that showed that MMs, because of their intermediate position, play a key role as interfaces between otherwise disconnected actors and domains (e.g. Nonaka, 1991; Wooldridge et al., 2008). MMs also play an important role as mediators between levels and units of the organisation. They are the "hub through which most strategic information flows" (Floyd and Lane, 2000, p.164). Hence, a MMs perspective provides a complementary and contemporary view of the organization that recognizes the complexity of organising in contemporary distributed organisations where top management cannot be the only source of influence (Balogun and Johnson, 2004; Conway and Monks, 2011).

MMs are either managers or other professionals who understand the operational issues in the organization and who have access to top management (Wooldridge et al., 2008). In the organizational studies literature, the role of MMs in innovation and strategic renewal has been examined (Kuratko et al., 2005). The literature suggests that they are well positioned to develop innovative ideas and to promote them in the organization (Dougherty and Hardy, 1996). MMs take the role of both proposing divergent ideas and implementing strategy (Floyd and Wooldridge, 1992). In the organisational literature, the contribution of MMs has been linked to positive outcomes, such as enhanced competitiveness (Maritan and Brush, 2003), profit growth (Mair, 2005), overall effectiveness in reaching established goals (Floyd and Wooldridge, 1997), strategy realization (Floyd and Wooldridge, 1992), efficiency of operations (Floyd and Wooldridge, 1997), implementation speed (Maritan and Brush, 2003), and steering the organisation during difficult times (Beck and Plowman, 2009). MMs have a role in innovation implementation that is distinct from that of top managers or frontline employees (e.g. Klein et al., 2001). Furthermore, MMs can utilize both their internal and external networks to access timely information and to gain support for their ideas (Glaser et al., 2015).

Despite their important role, an extensive literature review shows that there is little IS research on MMs role in IT adoption and change (Jeyaraj et al., 2006). Indeed, little is understood on what their role is in digital business transformation. Moreover, IS research has not yet been able to establish what would be the role of MMs in different types of organisational change. This study contributes to closing this gap in the IS literature. It aims to understand the contribution of MMs in digital business transformation and answer the following research question: How do MMs contribute and influence to digital business transformation? To answer this question, we conducted an open-ended exploration of the contribution of the MMs in the digital transformation of a large Finnish public sector organisation. We identify three distinct stages for digital transformation in the case organisation and report on how MMs influence and contribute to the digital transformation in each stage. In doing so, we highlight the key role that MMs play in long-term digital transformation and how they influence both top management and users. The paper consists of five sections. Following the introduction, section 2 provides a brief review of the literature on organisational transformation and the role of different organisational actors including MMs. Section 3 describes the research methodology and section 4 presents the research findings. Section 5 discusses the findings and draws the research conclusion.

2 Related Research

2.1 Digital business transformation in organizations

The role of information technology in business transformation has been a key area in IS research since the seminal work of Morton (1991) and Hammer and Champy (1993). Since then research has examined many aspects including the value of IT investment (Barua et al., 2004; Tallon et al., 2000), the need for aligning business and IT strategies (Henderson and Venkatraman, 1993; Venkatraman, 1994), IS capability (Peppard and Ward, 2004; Gordon and Tarafdar, 2007) among many other topics. The top management support and end users' support have been identified as critical in IT adoption and transformation. However, very few studies have been undertaken to specify the actual activities and characteristics of these roles and the individuals involved (Jeyaraj et al., 2006).

Traditionally, there are three models of IT-related organisational transformation namely; discontinuous, punctuated, and evolutionary (Robey and Sahay, 1996). The discontinuous school of thought view organisational transformation as radical change led by a clear vision and strategy driven by top management. The discontinuous or punctuated change school view change as incremental punctuated by episodes of radical change (Lyytinen and Newman, 2008; Lyytinen et al., 2009; Newman and Zhu, 2009). They view it as small adjustments to responding to operational needs interrupted by episodes of radical change largely to respond to environmental or market needs. The evolutionary school see transformation as a series of small changes usually initiated locally by operational level employees and managers (Ciborra, 2001; Ciborra, 1992; Ciborra, 1999; Elbanna, 2006). The advancement of technology and in particular the layered modular architecture instigates profound changes in the ways organisations organise, which is yet to be investigated (Yoo et al., 2010). Modular architecture components are loosely coupled which allows for flexibility in substituting and adding systems components. As opposed to planned change (Lewin, 1952) a modular change would be more incremental and evolutionary in nature. Research on IS adoption and change has not studied the impact of the increasing modularisation of technology, however it is expected to bring about different models of organisational change (Yoo, 2013).

It is argued that empirical research did not examine the interpretive capacity of the existing models of IT organisational change and the conditions under which one model could be more suitable than other (Besson and Rowe, 2012; Robey and Sahay, 1996). Importantly, for this research, managerial roles have not been distinguished among the three views of organisational transformation. However, the role of top management has been consistently and constantly considered as critical for any type of organisational transformation regardless of the nature of transformation (Elbanna, 2013). Top management role has been seen as important for IS planning (Earl, 1993), systems implementation such as Enterprise Resource Planning (ERP) (Al-Mudimigh et al., 2001; Holland and Light, 1999; Hong and Kim, 2002), Executive Information Systems (EIS) (Cottrell and Rapley, 1991), and different large IS projects such as enterprise application integration (Lam, 2005; Sharma and Yetton, 2003).

The role of end users in organisational transformation has also received the attention of research. Transformation was seen as "endemic to the practice of organizing" and hence as enacted through situated practices of users as they improvise (Orlikowski, 1996). Arguments of improvisation and situated change have been developed to reflect users' practices and the evolvement of technology use (Ciborra, 2001; Ciborra, 1992; Ciborra, 1999; Elbanna, 2006; McGann and Lyytinen, 2010; Verjans, 2005).

While the role of MMs has rarely received mention in IS research, Elbanna (2013) showed that when top management have competing priorities and when they withdraw their support to a major IS project, MMs are capable of carrying the project through and delivering it successfully. However, this research did not explain what MMs actually do to enable the successful IS delivery and how they play an effective role in IS initiates.

2.2 Middle manager role in organizational transformation

Kuratko et al. (2005) defined the role of MMs in strategic renewal in organisations as follows: "middle-level managers endorse, refine, and shepherd entrepreneurial opportunities and identify, acquire, and deploy resources needed to pursue those opportunities" (Kuratko et al, 2005, p. 705). MMs have been found to have an important influence on the strategy process and earlier research has established that MM involvement can positively impact firm performance (Floyd and Wooldridge, 1994). More knowledgeable MMs are naturally likely to have a higher impact (Floyd and Wooldridge, 1997). MMs in boundary spanning positions with access to internal and external knowledge and additionally having extensive operational knowledge are invaluable sources of innovative ideas for organisations. The MM perspective has been declared as one of the main areas in strategy process research (Hutzschenreuter and Kleindienst, 2006).

MMs can take actions that have either upward or downward influence. Furthermore, strategic ideas can be divergent or integrative. Thus, four types of middle management involvement can be defined (Floyd and Wooldridge, 1992): championing alternatives (upward, divergent), synthesizing information (upward, integrative), facilitating adaptability (downward, divergent) and implementing deliberate strategy (downward, integrative). Championing alternatives means that MMs actively promote certain ideas in the organisation and aim to convince top management to follow a certain strategic direction. Through synthesizing information MMs help top management to interpret information in the strategic context. By facilitating adaptability MMs foster flexible organisational arrangements and in this way, help new ways of doing things emerge in the organisation. Implementing deliberate strategy is about aligning organisational action with the strategic objectives. (Floyd and Wooldridge, 1992)

MMs can provide a valuable input to strategy making because of their information sources and different interpretive schemes as compared to top management (Wooldridge et al., 2008). MMs in boundary spanning positions can have a significant influence in the strategy making process (Floyd and Wooldridge, 1997). They are able to see new opportunities and reduce groupthink in the organisation (Dutton and Ashford, 1993; Ahearne et al., 2013). MMs provide sponsorship for ideas stemming from the operational levels (Hornsby et al., 2002). However, Raes et al. (2007) found that, although top management acknowledge the great impact MMs have in the organisation, they often resist the ideas from MMs. Later, Raes et al. (2011) concluded that information exchange and mutual influence positively affects strategic decision quality in organisations.

Because MMs know their responsibility area very well, they can suggest solutions that are suitable for that specific area and can reduce the possibility that the implemented solutions would not support reality (Gargiulo and Benassi, 2000; Mintzberg, 1996). Ren and Guo (2011) presented a two-staged model for MMs' process of discovering and evaluating entrepreneurial ideas, including the pre-screening phase (assessing and choosing which ideas from lower levels to sponsor) and the screening phase (selling the ideas to top managers).

MMs also play an important role in implementing strategy through mediating between strategy and day-to-day activities (Birken et al., 2012). Balogun (2003) stressed that the MMs interpret the strategic change intent into tangible actions for themselves and for their subordinates. MMs need to motivate and sell the implementation of the ideas to their subordinates in the organisation (Rouleau, 2005).

Huy (2002) argued that MMs play four specific and competing roles during change implementation: entrepreneur, communicator, therapist and tightrope artist. All of the roles require balancing strategic and operational change issues (Huy, 2002). Similarly, Floyd and Wooldridge (1997) maintained that MMs connect the organisation's strategic and operational levels through mediation, negotiation and interpretation.

MMs can have a negative impact on change if they see it should not be supported (Floyd and Wooldridge, 1992; Sayer, 1998; Huy, 2002). That is why a dialogue between the MMs and top management is essential. Mantere (2007) took the four MM role expectations by Floyd and

Wooldridge (1992) as a starting point and presented enablers for these role expectations. He concluded that reciprocal action by top management is needed to fulfil these role expectations; for example, top management needs to be responsive to synthesized information provided by the MM so that this role expectation could be fulfilled (Mantere, 2007). Moreover, he emphasized having a dialogical view on the strategy process and assigning of legitimacy by top managers to MMs, to enable MMs' strategic agency (Mantere, 2007).

3 Research Methodology and Case Description

3.1 Research methodology

This exploratory research belongs to the qualitative tradition of information systems. It adopts a case study approach to understand the role of MMs in corporate digital transformation. Case study approach is appropriate for understanding the dynamics present in a single setting and exploring a phenomenon within its context (Walsham, 1995; Yin, 2013). The paper presents a longitudinal case study that covers the period from 2004 to 2015. Data collection is based on in-depth interviews and documents review. All the MMs of the involved projects were interviewed as well as two persons from the top management and one from the end users' groups. One of the interviewees was not working in the case company anymore and three had been reassigned to another job within the company. This helped us obtain more versatile viewpoints. Each interview lasted between an hour and two and half hours. Interviews were attended by two of the researchers. They both made notes simultaneously during the interview to the same digital memo and discussed the results after each interview. A summary of interview was produced after each interview and served as the basis of discussion of the key ideas that emerged in the interview. Based on the discussion, interviews were followed by emails to participants to explore and clarify emerging ideas. Projects' documents and meeting minutes were also reviewed. One of the researchers was the Chief Information Officer (CIO) in the case company and acted in this role in the case projects for around six years. The research was conducted ex post. We were aware of the potential bias when conducting the analyses and had frequent reflective discussions between the first and the second author to alleviate the problem. We see the participation of the researcher in the case as a strength because it enabled richer access to data.

To triangulate the findings, direct observations from the projects and informal interviews were made by the researchers. Also, meeting notes, emails and project documentation were used as data sources. The data consisted of 13 interviews, about 17 hours of interview recordings (over an hour per interview), 358 pages (A4) of interview transcriptions, 9 pages (A4) of interview memos, several hundred emails, dozens of pages of meeting memos, and about 200 pages of technical documentation. All of it was in Finnish.

Data analysis followed an inductive approach based on Goetz and LeCompte (1981). First the open coding around the roles of MMs in digital transformation was done. Then prior literature in the field of organisation studies and digital transformation was engaged. The literature provided concepts and a lexicon that were used to make sense of the data. The literature has been used as sensitizing device that allowed the researchers to remain open to data and emerging codes (Klein and Myers, 1999).

3.2 Case description

The case company, SERVU (a pseudonym) is the Finland's biggest public sector meal producing company. It has over a thousand employees and produces over eighty thousand meals per day for over 400 schools, nursery schools and health care centres including hospitals and sheltered homes. The production process can be considered as unique in terms of its complexity because of the great variety of meals produced per day. Most of the meals are produced in a big central kitchen (PAQLA from now on, a pseudonym) and delivered to the serving kitchens in each client organisation. SERVU was established in 2004 through merging all kitchens in Helsinki. It has several business units; however,

the meal services business unit is the largest which is the focus of this study. The meal services unit has five departments: school, day care, healthcare, PAQLA production, and development services. When SERVU was formed in 2004, it inherited a simple meal producing information system called OLDE (a pseudonym). There was a need to develop efficient operations to optimise the meal production processes across all the kitchens. SERVU studied a big software company QLS's (a pseudonym) meal producing system (NUUHQ from now on) capabilities in 2005 and decided to acquire their modular products in 2006. NUUHQ was built in a modular way and the SERVU implementation was done module by module. Over the duration of the study, the meal production systems' portfolio has grown significantly to provide full digitalisation of the business. Figure 1 depicts the development of the meal production system project portfolio over time.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Production module	■	■		■	■	■	■	■		
Production planning module		■								
Inventory module					■		■			
Billing module				■		■		■		
Materials requirement palnning module						■				
Purchase module								■		
Supplier catalog integration						■				
Ordering module						■		■		
Medical report system integration						■				
Financial system integration							■			
Scanner module									■	
Data cleaning									■	
Supplier purchase integration									■	■
National ingredient forecast integration										■
Electronical menus module										■

Figure 1.   The project portfolio of the case study.

High production volumes of PAQLA are unique in Finland. It produces over 15.000 kilos of different types of meals every day, which equals to about 80.000 plates. The NUUHQ was first implemented to PAQLA. The Production module included a meal ingredient catalogue, recipes for meals, meal menus, and a calculation logic to make meals for certain number of customers. The implementation of the module lasted a year. The idea was first just to replace OLDE with NUUHQ and use OLDE in parallel with NUUHQ, but the users quickly started using only the NUUHQ Production module. There occurred about 250 new feature requests and bug reports so QLS was forced to do many updates to the system. There were some implementation problems like insufficient training of the end users and the development cycle of NUUHQ was perceived as rather slow.

In 2006, the NUUHQ Production module was implemented to a few other smaller kitchens of SERVU. The kitchens operated mostly in the healthcare sector. At first NUUHQ only stored the recipes of the meals and it was used to plan the menus of individual kitchens, which served meals to their canteens. Most of the processes were manual, such as ordering the meal ingredients from producers by phone.

In 2007, The Production planning module project started. The data in the system included the recipes, informative labels, nutritional statuses, and the menus. The implementation project started slowly changing the business processes of PAQLA. Focus was on meal production and product development processes. Business started to change from person centric use of manual or Excel processes to more NUUHQ enabled business.

From mid-*2007 to late 2008*, the implementation project went back a few steps as there were some significant employee changes and redefinition of the system requirements. The NUUHQ Production module requirements didn't support the emerged business processes, which had been developing over time. The usage of NUUHQ faced also some problems with the end users since they started using it in a similar way that they used OLDE before. If they didn't find what they were looking for, they created their own tools, mostly Excel based. NUUHQ was again to be implemented to PAQLA in order to replace paper or Excel based manual processes from sales through to delivery. At the same time, Materials requirement planning (MRP) module implementation project was started to make PAQLA warehouse process more efficient.

In 2009, all of the capital city of Finland's elderly home meal delivery of 1.500 meals per day was given to SERVU. SERVU already had about 2.000 elderly meals delivered per day, but they were still handled in the OLDE system. There was only a couple of weeks' deadline to implement the NUUHQ Production and Billing modules to serve the new and the old business.

In 2011, the Order module was implemented and hospital staff (nurses) started to make patient meal orders through NUUHQ and meals were produced in healthcare kitchens with the help of the Production module. The implementation lasted for three years because there were 300 healthcare kitchens, which had to be implemented and the end users had to be trained one by one. The NUUHQ Ordering module helped the nurses because when inputting patient information to the medical report system they could start ordering hospital meals for the patient immediately.

Later in 2011, all the capital city of Finland's day-care kitchens (340) were given to SERVU so there was a large NUUHQ Production module implementation project to be able to manage the new kitchens. A new NUUHQ module that made the billing process automatic was implemented and end users trained. The project had to be conducted since SERVU faced an organisational change and all of its billers were outsourced and manual billing became very expensive.

Also, in 2011, PAQLA started to use the Ordering module. The implemented module enhanced greatly the process and lowered the inventory value by about 30 % when the value of the yearly purchases was over 28 M€. Also, the creation time of collecting lists dropped from about 5 hours to about 30 minutes. All of PAQLA's employees were trained to use the module but there was some resistance especially from the foremen. PAQLA's ingredient data (thousands of individual ingredients) had to be cleaned before the Ordering module could be implemented. At the same time the module handling ingredient integration from standard XML files was implemented. This allowed ingredient catalogues from producers to be brought in an electronic form to NUUHQ.

In 2012, there were some big changes in the organisation of SERVU. The implementation projects were considered to move slowly again. It took time to train new MMs and projects in the portfolio had to be more convincingly justified to the new director of business unit.

Moreover, an Inventory module implementation was done to PAQLA *in 2012*. It was supposed to solve problems with ingredient purchases, managing inventory and collecting ingredients for production. However, the response from the end users wasn't so good and they started to use Excel instead. At the same time the capital city of Finland started a big Financial system project. NUUHQ had to be integrated into the system so that the NUUHQ based billing would work. This project pushed other NUUHQ implementation projects forward. Other smaller mandatory projects also pushed NUUHQ projects such as the changes in Finnish VAT and the organisation changes of bureaus in the capital city of Finland (clients).

In 2013, PAQLA started to sell its meals to smaller kitchens using the NUUHQ Ordering module. The project decreased the need for customer service resources to half as compared to before. At the same time the Electronic billing of the school meals project started which improved the accuracy of the billing process. However, other projects weren't getting enough resources. One of the other projects was implementing a scanner to collect meal orders from elderly homes. This project was challenging because top management had hard time to see the potential improvements and clients were worried how this change would affect them. QLS couldn't provide all the necessary changes at short notice

because they were developing NUUHQ for other customers also. The Scanner project took almost half a year.

In 2014, SERVU started the implementation of the Electronic purchasing of meal ingredients. The cleaning of the data, which was a prerequisite for the electronic purchasing, took a year. The Electronic purchasing project was very complex technically since it included many ingredient suppliers and their own systems. Data security became a major issue because connections were required to be opened from the internal network of SERVU to outside parties and there was some personal patient data in NUUHQ.

In 2015, SERVU was divided into two organisations. The meal services business unit was left in the capital city of Finland, but other three business units were privatised. This affected also the NUUHQ project portfolio by pushing ongoing projects forward. There were also two big organisation changes in what was left of SERVU. Project management practices (e.g. the steering groups of the projects) of SERVU took a hit and almost stopped. Two NUUHQ projects were still implemented in 2015: National ingredient forecast integration and Electronic menus. The Ingredient forecast integration project was considered rather easy as producers were willing to fund it because it benefitted them and it made sure that necessary ingredients were available for production. In 2005, the Finnish law changed and required presenting certain allergy causing ingredients (like peanuts). This made the implementation of Electronic menus module mandatory. At the time this study is being written, the Electronic purchasing project is still ongoing.

4   Analysis and Findings

Based on interpretive analysis, the case of SERVU shows that the company was involved in what we can call 'modular' digital transformation, which aimed at fully digitalising the business through adopting and combining separate, functionally different and compatible technological components. Almost every component of the technology was capable to operate separately, however, it is the effort of the organisation and the drive to make the business more efficient that drove the adoption of different and related digital components. This modular digital transformation has lasted for ten years and passed through different stages. Three distinct stages for SERVU modular digital transformation were identified namely; core, expanded, shaking down and complementary digitisation. The core stage represents a period when the company acquired and implemented a module for core business (production of meals). This was followed by an expansion stage where the company extended its acquisition and adoption of modules to cover different aspects of the business. The third stage represents streamlining and full digitisation of the business. The analysis also reveals that in each of these stages, MMs conducted different actions contributing to the digital transformation of the company. The following two sections provide an analysis of the MMs' actions and their relationships with the three identified stages of modular digital transformation.

4.1   Analysis of MMs' actions during stages of digital transformation

The data was analysed and (open) coded regarding the actions MMs took that had an effect on the project portfolio. There were 25 different open codes and 72 occurrences of the codes in total. Next, axial coding was conducted utilizing the initial categories from the Floyd and Wooldridge's (1992) study. Accordingly, the actions of the MMs were classified based on whether they were directed towards the end users (Downwards), towards top management (Upwards), considered as information gathering and synthesis (Integrative), or considered as presenting alternative ways to do things (Divergent). Since MMs can engage in both strategic and operational activities (Floyd and Wooldridge, 1997), actions were also coded based on whether they were considered as being strategic such as proposing a new way of working (Strategic), or operational such as guiding end users how to use the system (Operational). Two new categories emerged from the data regarding the type of

communication MMs were involved in. These are Internal and External to the organisation. Table 1 presents examples of how the coding was done.

Quote	Interpretation	Open coding	Axial coding
Pirkko: "[if we didn't implement the Billing module] we would have had to hire two billers...and some wheelbarrows to move the billing data. I draw the billing processes comparing the old way and the new and the new process filled half of the paper compared to the old process... I didn't really have to prove anything else [to the top management]."	Pirkko and NUUHQ team figured out that the Billing module helped saving resources worth of three persons' full time work so they succeeded in selling the module to the top management.	• Ideation based on operational understanding and cost calculation • Convincing top management (based on the operational idea and costs)	• Upwards • Divergent • Strategic • Internal
Matleena: "Usually it goes in a way that you keep your eyes and ears open and sensors on. And then you go to poke to somebody's work (which could be dangerous) and ask like "do you really do it that way?" and "I have an idea how this could be done""	Matleena did some field research and figured out how the end users were doing their jobs and trained them to use the Billing module more effectively. She got some development ideas from the interaction with end users.	• Ideation based on end user use experiences	• Downwards • Divergent • Operational • Internal
Raija: "I sat there [in PAQLA] and I knew them [end users] ... I have discussed with them directly about the new features to be done. When I think about it… It is very obvious that it [the implementation project] doesn't success through Miina [manager of healthcare kitchens]. It is us from the development services who go to the end user meetings to talk about the system. When I have something to say, I'll go directly there."	NUUHQ team had to constantly train the end users regarding how to use the system. There was some user resistance. NUUHQ team felt that they lacked the support from the top management.	• Information gathering from operational understanding • Convincing end users (based on operational understanding)	• Downwards • Integrative • Operational • Internal
Jorma: "you cannot sell the system to the employees with euro benefits... They are interested in how their work is getting easier to do."	Jorma had to sell the project to the end users by telling how much their work would become simpler with the system.	• Information gathering from operational understanding • Convincing end users (based on operational understanding)	• Downwards • Integrative • Operational • Internal

Table 1.   Examples of open and axial coding of the data.

Relations of actions in the three stages are presented in Figure 2. The relations were calculated based on frequency counts of codes in the data. The first blue bar, for example, should be read so that in Stage 1 MMs' actions were directed 31% towards end users and 69% towards top management. Similarly, the last blue bar should be read so that in Stage 1 MMs' data sources were 92% company internal and 8 % external. From the relations in the graph it can be seen that the three stages are distinct in terms of the selected axial codes.
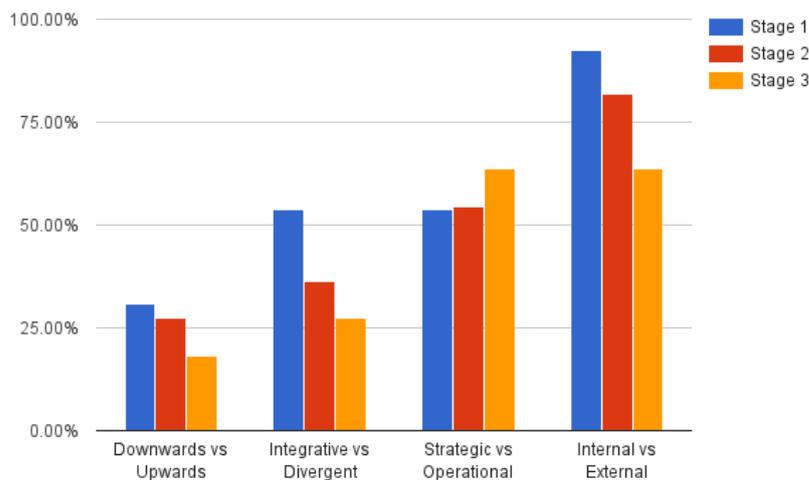
Figure 2.   *Relations of middle manager actions in three stages.*

4.2   Middle manager role in digital transformation

Based on our analysis, different actions of the MMs can be visualised along the identified modular digital transformation stages. Figure 3 summarises the MMs' actions in the stages and how they evolved from one stage to another. It shows that MMs tended to do about the same amount of strategic and operational actions, except in stage three where their actions were more strategic. Most of the communication of MMs is company internal, but a change is apparent when the digital transformation matures. Also, MMs tend to conduct activities and take actions geared towards influencing top management more than towards the end users in all stages. In the following sub-sections, the three stages are further analysed and the activities MMs do are presented.
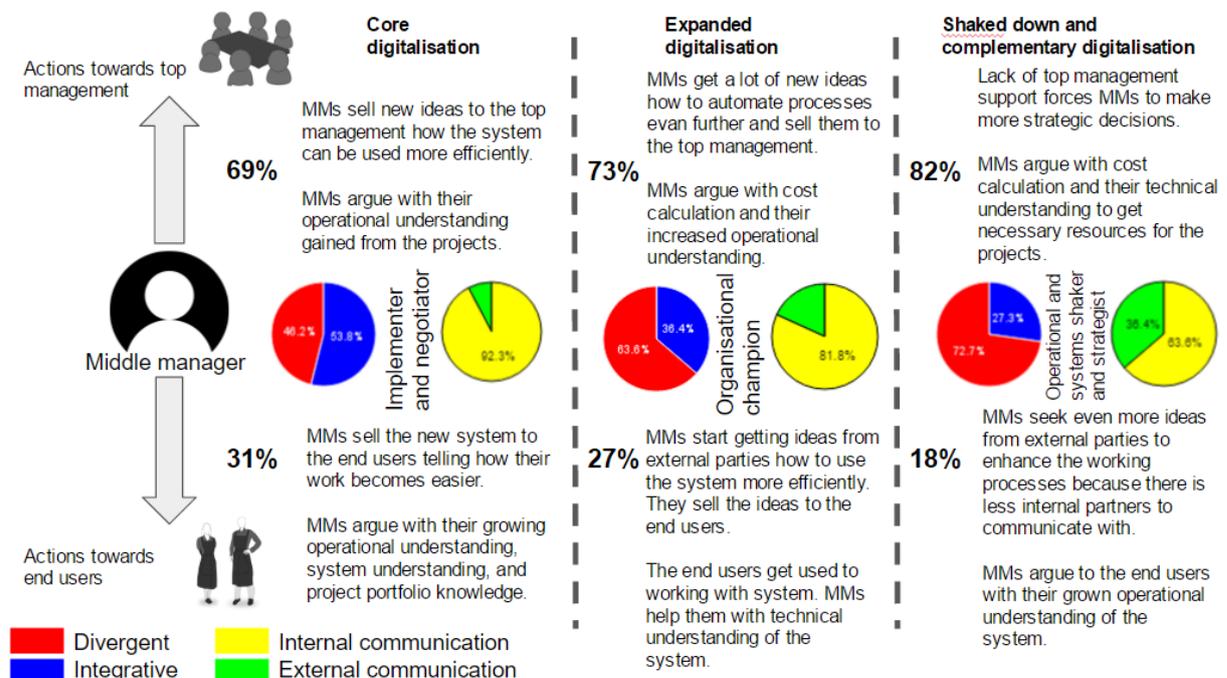

Figure 3.   *Middle managers' actions and behaviour change towards top management and end users.*

Stage 1: Core digitalisation (2006-2009)

The modular digital transformation of SERVU started by acquiring a core production module, implemented initially in a main business unit (PAQLA) then extended to smaller units and departments and was finally expanded to cover newly merged business units. The role of the MMs during this core modularisation was to act as implementers and negotiators. Hence, their actions were mainly geared to influence the end user organisations as they had to invest effort in promoting the digitalisation of core business processes and new ways of working to the end user organisation. Hence, the MMs' actions focused the least in all stages towards top managers in this stage, which indicates that they had to sell the new ideas to the end users. This requires operational understanding and system knowledge. The behaviour of MMs was noticeably the most integrative in this stage, which indicates that MMs were collecting information about the processes and the usage of the tools and based their actions towards digital transformation on that. MMs were focusing on developing and maintaining their internal network in the end user departments. They promoted their ideas based on this technical and organisational knowledge to top management. As project managers, they are more acquainted to the ongoing projects, which helped them to approach and convince both top management and the end users. At this stage, the digital transformation of the company had just started through projects automating existing manual processes. This included training the end users to do their jobs with the new digital tools and reporting on the progress of the projects to the top management. In this stage, the actions of MMs were mostly implementing deliberate strategy (towards the end users) and synthesizing information for top management (Floyd and Wooldridge, 1992).

Stage 2: Expanded digitalisation (2010-2011)

As MMs learnt how the digitalisation of core business production actually worked from an operational point of view, they began to see what should be done differently and how it could be expanded. At this stage, the digitalisation effort expanded to cover the significant business unit of healthcare, provide integration of different systems and business processes across the entire organisation and provide centralised streamlined processes across the organisation. In this stage, MMs played a role of organisational champions. They championed the search for and adoption of new digital services and the associated organisational change. In this stage, MMs moved their focus more on top management and their behaviour changed more towards divergent alternative presentation and strategic action. They began to see the possible further benefits of the information systems and sold their ideas to the top management basing their arguments on cost reductions, operational enhancement ideas and technical understanding of the information systems. They expanded their network to external sources such as suppliers, staff of other organisations and different industry news and communications. They were seeking new ideas, collecting information about new technology and learning from other organisations' experience. MMs advocated the necessary changes to both top management and the end user organisations utilising their newly acquired knowledge about available technology and different organisations' experience. The most frequent actions by MMs contributing to the digital transformation in Stage 2 are presented in Figure 3. Here, the actions of MMs towards top management were about championing alternatives and the actions towards end users could be characterized as facilitating adaptability (Floyd and Wooldridge, 1992). At this stage both the company and the MMs had learnt to work with the new digital tools and started to look for opportunities to do things more efficiently by digitizing processes even further.

Stage 3: Shaked down and complementary digitalisation (2012-2015)

The previous stage of expanded digitalisation had to go through a "shake-out" stage where operational misfits, errors, users' frustration had to be investigated and resolved. This breaking and mending stage is inevitable in large digitalisation efforts (Gattiker and Goodhue, 2005; Ross and Vitale, 2000). The role of the MMs at this stage was a mix of operational and systems shaker and strategist. As top management support typically lacked during the shaking down stage, MMs started taking their place as decision makers to solve operational and technical problems. MMs also started to adopt divergent strategic thinking and made new strategic propositions to adopt complementary technologies such as

scanners for meal ordering, electronic purchasing of meal ingredients, ingredient forecast integration and electronic menus to achieve full digitalisation of the business. The actions of MMs towards the top management versus towards the end users rose because MMs had to invest more time explaining and convincing top management of the root causes of the rising issues and challenges and get the necessary resources to fix them. MMs based their arguments to the top management on operational ideas, technical understanding and cost calculation. They also had to convince end users of the viability of the digitalisation effort made in stage 2 and the possibilities of providing technical fixes and solutions to rising problems. Hence, their ideas to the end users were mostly based on operational understanding gained from their own experiences or from the external parties such as vendors or other companies using the system. The most frequent actions by MMs contributing to the digital transformation in Stage 3 are presented in Figure 3. At this stage, the role of the MMs as organizational champions providing ideas for top management was further emphasized and their actions towards end users can be seen as facilitating adaptability as in stage two (Floyd and Wooldridge, 1992). A distinct characteristic in this stage was that the MMs had to push their ideas forward very strongly because of the lack of stability in the top management, to be able to get the resources for the projects. The lack of stability in the top management increased the importance of MMs in driving the digitalization in the case company.

5   Discussion and Conclusions

The role of middle managers in digital transformation has rarely received the attention of IS research (Jeyaraj et al., 2006). This is despite the reported importance of the role in organisational studies literature (Conway and Monks, 2011; Wooldridge et al., 2008). This paper questioned how do MMs contribute to and influence digital business transformation? It examined a longitudinal case study of a meal production company in Finland. Data were collected from a 10 years' program of digital transformation based on the adoption and combining of separate modular systems into what became a large modular information system in the company. The study suggests that digital transformation passes through stages and identifies three stages namely; core digitalisation, expanded digitalisation and shaking down and complementary digitalisation. The focus was to understand the activities MMs do towards both top management and users groups. Based on our analysis, we developed a model of the MM behaviour in the identified three distinct stages of digital transformation.

IT-related organisational change is traditionally perceived to be radical, punctuated or evolutionary (Orlikowski, 1996). In this paper, we add to the discussion on the types of IT-related organisational change by identifying an additional type of change: modularised digital transformation. Modularisation stems from the need to have a new breed of technology that has components that are loosely coupled and self-sufficient on their own right, which allows organisations to acquire and implement the modules at different times and stages. Recent calls for research in the IS field have invited the exploration of this new technological phenomenon (Yoo, 2013; Yoo et al., 2010). Our study shows that modular change differs from other types of change as it is more tuned to the business needs and is geared to satisfying operational and strategic needs within every component. This type of change, we argue, requires a strong MM community to act not only as a hub through which strategic information flows as Floyd and Lane (2000) suggests, but to generate, execute and enhance the organisational benefits of digital transformation through each module.

The contribution of MMs in digital transformation has rarely received mention in information systems research. IS research typically either focuses on top management or users. This paper suggests that MMs play a key role in digital transformation and shows that this role is not constant over the entire duration of the digitalisation effort. Indeed, the paper shows that MMs' role changes based on the stages of digital transformation. The key roles of MMs were implementers, champions, shakers and strategists depending on the transformational stage (core digitalisation, expanded digitalisation, and shaking down and complementary digitalisation) the company was going through. This study contributes to the Information Systems literature by providing a complementary perspective based on

MM roles. It reveals that MMs are acting as the organisational glue during digital transformation where they communicate to both top managers and users and actively bring in ideas from internal and external sources. We go beyond organisational studies literature and in particular Floyd and Wooldridge (1992) generic model to provide a more detailed understanding of the MM action in the context of digital transformation. Our model adds to the existing literature by showing how MMs' behaviour changes in the different phases of digital transformation.

The case study presented also clearly shows that MM action had a major influence on the course and development of the company's digital transformation over the years. This study also contributes to practise by providing an understanding of how MMs influence the end users and the top management in different situations. Practitioners can reflect on their own behaviour against the model presented in this paper as well as identify the stage of digital transformation in their own company.

This research also has some limitations. The model presented is developed based on one case study and it is likely that not all companies go through a similar digital transformation process. Moreover, the case company was a daughter company of a bigger organisation and faced many external triggers for digital transformation coming from the mother company. The contextual factors were relevant particularly in the last stage of the digital transformation process. The focus of the study was on the positive outcomes of MMs' actions towards the digital transformation. However, it was noticed, although it was not the focus of the present study, that different personalities or ways of working of MMs may also have a negative impact on digital transformation. The contextual factors and the role of individual MMs could be further studied. Finally, the authors also recognize the difficulty of capturing longitudinal behaviour with a limited number of interviews. However, this issue was alleviated by using additional data (such as project documents) and by the first author's first-hand experience of the projects.

IS research has previously focused on the role of organizational actors in transformational change and provided an understanding of the role of change agents and organizational champions in IT projects. Organizational champions have also been studied in IS literature in terms of their characteristics (Howell and Higgins, 1990; Heng et al., 1999) and the IS research on change agents has studied their different roles in organizational change (Markus and Benjamin, 1996). Moreover, top management has been recognized to be important for providing support and resources for the change project (Kilmann et al., 1988; Nutt, 1986). In this paper, we have made an effort to advance the understanding of the role of MMs in digital transformation. We hope that this exploratory study opens the way for further research to investigate the MM role in digital transformation.

There are several important implications for theory from this study that can guide future research. Firstly, it is clear that the MM influence was very important for digital transformation in every stage. There is a need for more research on the role of MMs in the different stages of digital transformation. Secondly, once the MMs learnt more about the technology they were able to really boost the digital transformation. The MMs may be one of the key actors in enabling ambidextrous organisations (Tushman and Reilly, 1996) that are able to both explore and exploit. Thirdly, digital transformation proceeded from internal processes to include processes with external partners. In the last stage, MMs started to acquire more knowledge from external sources. The way MMs utilize external knowledge sources and expand digitalization to include the supply chain partners could be another avenue for future research. Fourthly, there were many external influences that affected the digital transformation in our case. The effect of the external factors, such as vendor action or organizational restructuring, on MM actions could be another interesting area for further research.

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