TOWARDS OPERATIONAL EXCELLENCE DRIVEN IMPLEMENTATION OF THE APPLICATION MANAGEMENT FUNCTION IN THE BANKING AND INSURANCE SECTOR

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ABSTRACT

In a former published study (Versendaal et al., 2010) the authors identified process-related factors that influence the performance of application management in banks and insurance firms in terms of operational excellence. The identified factors were validated through a case study. In this extended version of the study we re-present our earlier research integrated with: 1) further validation of the results with IT management professionals from outside the initial case study company, 2) explicating and validating culture-related factors that influence application management performance. Our extended findings support the validity of the identified process *and* cultural factors and as such can be used to indicate directions for implementation of application management.

KEYWORDS

Application management, IT management, operational excellence, organizational culture, shared service center

1. INTRODUCTION

In Versendaal et al. (2010) we investigated the relation between process-related factors of application management and operational excellence in the banks and insurance sector. From that study the research triggers, research method, literature search, proposition definition and validation are re-presented in this paper, complemented with 1) further validation by IT management experts not related to the initial case study organization, 2) an investigation of the role of a separate shared service center, and 3) identification and validation of cultural factors. We have integrated these additions in the original text of Versendaal et al. (2010).

Traditionally the domain of Information Systems (ISs) had an emphasis on development aspects, and less on maintenance and management which seems odd, given the observation that most of the costs associated with a single application occur during maintenance rather than during development (see e.g., Brooks (1995), Sommerville (2001), and Lapkin (2009)). Gradually more attention was paid to IT management. It was Looijen (1998) who provided a major scientific landmark by constructing a framework for organizational IT management. His framework addresses management and control of ISs, distinguishing three aspects in IT management: *functional*, *application* and *technical* management. Generic structured approaches for IT management have been developed and implemented, most notably Information Technology Infrastructure Library (ITIL), see e.g. Barafort et al. (2002). ITIL specifically addresses *technical* IT management. Application Service Library (ASL) addresses *application* management (Pols, 2006), while Business Information Services Library (BiSL) covers *functional* management (Pols et al., 2005).

Yet, increased standardization, attention and effort do not necessarily lead to increased IT management performance. Berghout and Nijland (2002) labeled the increase of perturbations, long lead-time with change requests, and other problems with IT management as the 'IT management paradox'. According to Berghout and Nijland, reasons for the occurrence of the paradox are related to the tangibility of *developed* software applications (in contrast to the intangibility of applications still *in development*: users do not yet know what the real information system will look like), and IT management resources not keeping pace with increase functionality that needs to be maintained as new applications are implemented.

Shared Service Centers (SSCs) can be associated with IT management (cf. Janssen and Joha, 2006; Strikwerda, 2003; 2006): the task of IT-management can be and is often delegated to a shared service center, in line with the "separation of concerns" adage as introduced by Dijkstra (1976) and Parnas (1972). Janssen and Joha (2006) indicate various motives for organizations to use a SSC, ranging from strategic/organizational to technical, political and economical. Many of the motives refer to operational excellence (e.g. 'increase productivity', 'lower control and maintenance costs', and 'better performance of local ICT staff'), yet the authors indicate that installing a SSC does not automatically ensure that all concerns of stakeholders are met.

As successful IT management in general – and application management specifically – is hard to ensure, even in a context of an SSC, in this paper we will search for factors that contribute to effective application management. We will associate effectiveness in terms of operational excellence, one of the value disciplines for business strategy identified by Treacy and Wiersema (1993).

A well-known adage in technology consulting is that "it's always a people problem". In the context of our research, this implies that we will look specifically into the cultural aspect.

We will investigate the dependence of IT management from organizational culture factors. Treacy and Wiersema (1993) argue that a firm could strive for optimization of its operation model towards a so-called value discipline (e.g. operational excellence). The operation model includes a firm's culture, next to its business processes, management systems and computer platforms.

We position our research in the context of strategic management as approached by Henderson and Venkatraman (1993). See figure 1.
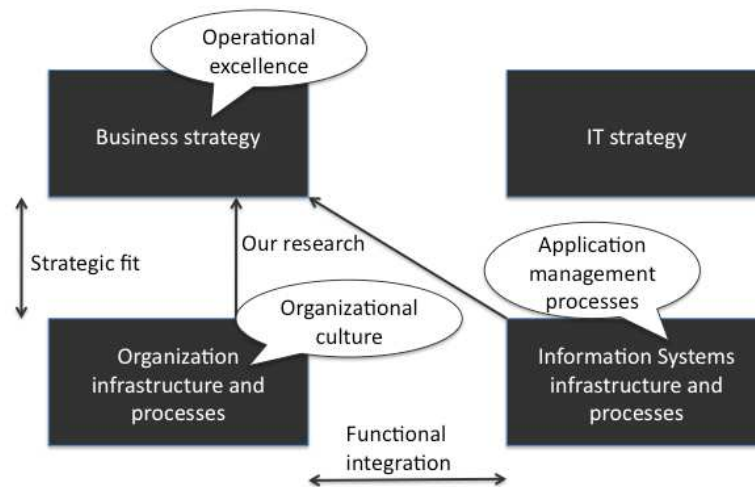

Figure 1. Positioning of our research in the context of strategic management of Henderson and Venkatraman (1993)

Henderson and Venkatraman identify business/IT-alignment as the degree to which there is functional integration between the business and IT dimension, and the degree to which there is a strategic fit between the strategy and operations dimension. In our research we operationalize this functional integration and strategic fit by searching for process and cultural factors from the 'Information Systems infrastructure and processes' and 'Organization infrastructure and processes' domains that relate to success in the 'Business strategy' domain in terms of operational excellence. In this context, we describe our research question as follows: *Which process-related and organizational culture-related factors can help in determining a strategy for an effective (in terms of operational excellence) application management function in firms of the banking and insurance sector?*

We approach the research question by first identifying the potentially important *process* related factors of application management from literature, notably by among others analyzing ASL (Pols, 2001; 2006; Pols and Backer, 2006); secondly, we search for *cultural* factors from Smit et al. (2008). Subsequently, from literature we will operationalize the value discipline 'operational excellence'. Fourthly, through further analysis we will define propositions that refer to relations between the process and culture related factors on the one hand and the characteristics of operational excellence on the other hand. These propositions will be validated through expert interviews in the banking and insurance sector. Firms in the banking and insurance sector often apply application management in an SSC setting. We finally end this paper with conclusions and future research.

In our earlier study in the banking and insurance sector (Versendaal et al., 2010) we concluded that achieving operational excellence goals is not (solely) a *process* problem that can be solved by redesigning and implementation and that we should look further into especially the *cultural* aspect. In this study we therefore explicitly introduce cultural aspects notably from the X model on organizational culture (Smit et al., 2008) and make propositions identifying relations. These propositions are again validated by the survey among IT management experts.

2. PROCESS FACTORS OF APPLICATION MANAGEMENT

Although not extensively, SSCs have been subject of earlier scientific and practical studies. Janssen and Joha (2004) for example indicate the need to address relationships within the organization when trying to reach the anticipated benefits of settling an SSC. Based on experiences in Business Process Redesign projects, Ulbrich (2006) identifies three problem areas when implementing an SSC: business relations, interfaces (including adequate definition and documentation of processes) and the location of the SSC. Note that these three areas relate to Janssen and Joha's (2004) relationship management.

A KPMG study (Koorn et al., 2007) reveals that when embarking on an SSC implementation there are four phases to go through in which a number of success factors have to be met. The phases are 'decision making', 'design', 'implementation' and 'exploitation'. Some of the success factors are 'develop a need of urgency for implementing an SSC' (decision making phase), 'redesign of company processes aiming for standardization' (design phase). Strikwerda (2006) discusses three aspects that have not received much attention until now: change management with SSC introduction, governance issues with respect to SSCs, and implications for corporate strategy.

None of the mentioned authors however discusses the domain of IT management or application management explicitly. Though we assume that a number of the aspects and issues raised will apply for IT and application management, we think that specific requirements hold for our domain. Schultz et al. (2009a) and Schultz et al. (2009b) do focus on IT and application management, and identify three types of SSCs: 1) disguised central department, 2) preferred provider, and 3) competitive SSCs, with a unique set of characteristics, ranging from legal form to service charges (pricing). Yet, they do not further present the implications of the identification in terms of process factors. Further, Meijer and Meijers (2002) write in detail about the need for interaction and tuning between functional, technical and application management of Looijen's (1998) IT management framework.

We found two practical resources that explicitly address our domain and which inherit process factors for application management. Those are the original ASL documentation as provided by Pols (2001, 2006), and Pols and Backer (2006). We take these sources as a starting point and derive factors from them. The resulting process factors will be validated by checking whether they comply with the authors' papers that we mentioned earlier in this section, and by applying them later on in a case study. ASL is an open standard used for the configuration and execution of application management, based on best practices, yet it has not been thoroughly validated. The ASL-framework consists of six clusters of processes, among which the *maintenance processes* cluster directly relates to the execution of application management. Pols and Backer (2006) define *maintenance processes* as supporting the optimal

usage of software applications, supporting the business efficiently and limiting operations disturbances.

In order to successfully execute the maintenance processes, Pols (2001, p.18) identifies four generic aspects:

1. Quality management: application management is quality driven
2. Service team thinking: a team responsible for both application management and technical management that thinks, acts and is organized as a single service provider
3. Service level agreement with the internal customer
4. Pro-active innovation and services

Those aspects help in reaching the goals associated with application management: clarity, controllability, hereditary, flexibility, reliability and uniformity (Pols, 2001, p.17). With this we are able to derive seven process factors, see table 1.

Table 1. Process related factors for application management

Factor ID	Factor description	Aspect (from Pols, 2001; 2006; Pols and Backer, 2006) / Other sources
POLS1	quality in running and controlling processes	quality management / Ulbrich (2006)
POLS2	processes supporting teamwork within the service organization, including one single entrance process for internal customers	service team thinking / Janssen and Joha (2006), Ulbrich (2006)
POLS3	there is execution on clear service level agreements between application management and the internal customer; this includes agreements on (internal) pricing	service level agreement / Schulz et al. (2009a, 2009b), Ulbrich (2006)
POLS4	collaboration and alignment processes between functional, technical and application management	quality management, service team thinking / Meijer and Meijers (2002), Henderson and Venkatraman (1993)
POLS5	proper execution of the five governance processes	quality management / Strikwerda (2006)
POLS6	proper execution of the four management processes	quality management / Looijen (1998)
POLS7	sufficient alignment of primary processes and management processes	quality management / Henderson and Venkatraman (1993), Strikwerda (2006)

After deriving the factors from Pols (2006) and Pols et al. (2006) we were able to support the identification of these factors with 1) other literature on SSCs (e.g. Janssen and Joha, 2004), 2) other literature on IT management (e.g. Schulz et al., 2009a), and 3) more generic literature (not directly SSC, or IT management related: Henderson and Venkatraman, 1993).

3. CULTURAL FACTORS OF APPLICATION MANAGEMENT

Although organizational culture is studied in many scientific fields, there seems to be no consensus about a definition. According to Narayanan and Nath (1993, p446-447) the field of organizational culture grew out of anthropology and psychoanalysis. They emphasize five elements of culture: 1) culture is learned, 2) culture is shared among a collectivity, 3) culture influences behavior, 4) cultural symbols and meanings are interrelated and 5) culture incorporates instrumental and expressive elements. Culture is defined by Narayanan and Nath as the pattern of artifacts, beliefs, norms, values and premises held by an organization (p448).

A recent study by Smit et al. (2008) integrated many aspects of various models on organizational culture. After an in-depth literature survey they identified five major culture categories in a model: Leadership, Adaptability, Coordination, Relationships, and Strategy. The resulting model is called the *X model of organizational culture*. A subsequent and related study from Silvius et al. (2010) successfully applied the X model in the context of business/IT-alignment, making the X model a promising candidate for our IT management study.

With the X model Smit et al (2008) describe each of these elements and identified sub-elements:

Leadership is the degree to which leaders are able to influence the culture of the organization in order to ensure optimal service delivery/results delivery. Sub-elements are Energy Demonstration, Energy Transference, Vision, Integrity, Candor, Action and Style.

Strategy is the degree to which the organization is clear about its strategic direction so as to ensure optimal service delivery. Sub-elements are Direction Creation, Objective Setting, Engagement, Communicating Meaning and Alignment.

Adaptability is the degree to which the organization is in contact with and responds to change so as to improve service delivery. Sub-elements are Client Focus, Creating change, Organizational Learning, Innovation and creativity and Flexibility

Coordination is the degree to which the internal system is horizontally and vertically aligned for optimal service delivery. Sub-elements are Organizational Structure, Processes & Systems, Positional power (Rank & Role), Performance Management (Results), Communication Management

Relationships is the degree to which people in the organization work together to form strong working relationships that will ensure optimal service delivery. Sub-elements are Team Orientation, Co-operation (between teams & organizational units & levels), Diversity, Talent Management, Values

In the X model *Leadership* is placed in the middle of the model with the other four elements diagonally surrounding this aspect. The four lines originating from Leadership form the letter X and give the model its name (Smit et al., 2008). For our study table 2 summarizes the origin of the sub-elements of the X model with associated authors.

Table 2. Cultural factors in organizations

Factor ID	Factor description / element	sub-elements and other sources (as described by Smit at al. 2008)
SMIT1	Leadership	Energy Demonstration (Krames, 2005), Energy Transference (Krames, 2005), Vision (Koestenbaum, 1996), Integrity (Koestenbaum, 1996; Kouzes & Postner, 2002), Candour: (Koestenbaum, 1996), Action: (Koestenbaum, 1996), Style (Hersey & Blanchard, 1982).
SMIT2	Strategy	Direction Creation (Kotter, 1995; Denison, 2000), Objective Setting (Denison, 2000), Engagement (Denison, 2000), Communicating Meaning (Bennis, 1989), Alignment (Denison, 2000).
SMIT3	Adaptability	Client Focus (Kotter & Heskett, 1992; Saunders's 1995), Creating change (Kotter, 1995; Senge, 1999)), Organizational Learning (Handy 1995; Krames, 2005), Innovation and creativity (Denison, 2000), Flexibility (Baden-Fuller & Stopford, 1992; Chaharbaghi et al., 2005).
SMIT4	Coordination	Organizational Structure (Burke et al., 1996), Processes & Systems (Burke et al., 1996), Positional power (Rank & Role) (Lopez et al., 2004; Gittell, 2003), Performance Management (Results) (Burke et al., 1996; Lopez et al., 2004), Communication Management (Frank & Fahrbach, 1999; Larkin & Larkin, 1994).
SMIT5	Relations	Team Orientation (within teams) (Denison, 2000; Wallace et al,1999), Co-operation (between teams & organisational units & levels) (Hofstede, 1980), Diversity (Schein, 1991;Wilson, 2001), Talent Management (Clinton et al, 2004), Values (Denison, 2000; Kouzes & Postner, 2002).

4. INDICATORS OF OPERATIONAL EXCELLENCE

Operational excellence is a widely used term. It originated from the field of strategic management (e.g. Porter (1980)) and has subsequently been adapted and extended by others (e.g. Treacy and Wiersema (1993)). Treacy and Wiersema propose that, for firms to develop an internally consistent business system, they should avoid a 'mix and match' approach to strategy and follow one of three *value disciplines*:

1. Operational excellence – strive to meet the buyers' need for a reliable, low cost product offering
2. Product leadership – meet the buyers' need for special features and advanced product performance
3. Customer intimacy – meet the buyers' need for a tailored solution to their particular problem

Even though these value disciplines (frequently dubbed *generic strategies*) are well known and taught at business schools world-wide, several authors have argued that there is no such thing as a generic strategy. Firms should, in order to survive, develop a unique position (which may be comprised of two of the generic strategies mentioned above). A recent and prominent example of such an approach is described by Kim and Mauborgne (2005).

When adopting the value disciplines categorization for firms to application management, following Treacy and Wiersema (1995), we identify the following aspects that determine success in terms of operational excellence strategies:

1. Process optimization
2. Formalized organization structure (i.e. "Taylorism")

3. Management driven by (performance) metrics
4. Culture focused on achieving operational excellence

With this we are able to derive a number of indicators of Operational Excellence, see table 3.

Table 3. Indicators of Operational Excellence

Factor ID	Description	Aspect (Treacy and Wiersema, 1995)
TW1	The time to complete processes and deliver products should be minimized	Process optimization, Culture focused on OE
TW2	Costs should be considered from customer perspective and should be minimized	Process optimization, Culture focused on OE
TW3	A zero-defects strategy should be adopted for the production process	Process optimization, Culture focused on OE
TW4	Avoid all variation in the production process	Formalized organization, Culture focused on OE
TW5	Management should focus on measuring performance and continuous process improvement	Management by metrics, Culture focused on OE

5. APPLICATION MANAGEMENT PROPOSITIONS

5.1 Process Related Propositions

Based on Pols (2001), Pols (2006) and Meijer and Meijers (2002) we identify the following process related propositions as shown in table 4. If specific pages support the propositions, we mention them explicitly in the table. The particular page numbers mentioned refer to Pols (2001), unless otherwise indicated. In the table the following coding and associated meaning is used to identify the proposition between process factor POLSx and Operational Excellence indicator TWy:

- '=': There is no specific relation found between POLSx and TWy, or the effect is perceived minimal
- '+p40': POLSx contributes positively to TWy as can be derived from Pols (2001, p. 40)
- '++p43': POLSx contributes strongly to TWy as can be derived from Pols (2001, p. 43)

Table 4. Literature-based propositions with respect to successful application management

	POLS1	POLS2	POLS3	POLS4	POLS5	POLS6	POLS7
TW1	+p118-119	+	++p123-124	++Meijer and Meijers (2002,p6-9)	++p31	+p104	++p38
TW2	+p118-119	+	++p123	+Meijer and Meijers (2002,p6)	++p31	+p104	++p39,48
TW3	++p35,120	+p185-186	+p127	+Meijer and Meijers (2002,p6)	++p31	+p104	++p35,38, 120
TW4	+p118-120	+	=	=	=	=	=
TW5	=	++p187	+p128	+Meijer and Meijers (2002,p12)	++p38	++p38	++p38

Based on table 4, explicitly TW1 and TW5 (short lead-time, and continuous improvement) have the strongest relation with the process factors; TW4 has a weak relation with the process factors. POLS7 (alignment of primary and management processes) provides the strongest contribution to operational excellence.

5.2 Culture Related Propositions

In their book, Treacy and Wiersema (1995) identified explicating (organizational culture related) factors for operational excellence. Based on Treacy and Wiersema (1995) we identify the following propositions as shown in table 5. If specific pages support the relations making up the proposition, we mention them explicitly in the table. The particular page numbers mentioned refer to Treacy and Wiersema (1995). We take the rounded average of the identified relations between the sub-elements and operational excellence, assuming that the culture related sub-elements of Smit et al (2008) are of equal importance.

Note that we used the Dutch version of Treacy and Wiersema's book in order to easily verify the identified propositions in the expert interviews which were also held in Dutch. In the table the following coding and associated meaning is used to identify the proposition between cultural factor SMITx and operational excellence:

- 'Energy Demonstration=': There is no specific relation found between the sub-element 'Energy Demonstration' of SMITx, or the effect is perceived minimal;
- 'Energy Transference+p41': the sub-element 'Energy Transference' of SMITx contributes positively to operational excellence as can be derived from Treacy and Wiersema (1995, p. 41);
- 'Client Focus++p.28,50': the sub-element 'Client Focus' of SMITx contributes strongly to Operational Excellence as can be derived from Treacy and Wiersema (1995, p. 28 and p.50);
- Average proposition equals '=': Overall, there does not seem to be a specific relation between the cultural factor SMITx and operational excellence;
- Average proposition equals '+': Overall, there seems to be a positive contribution from the cultural factor SMITx to operational excellence;

Table 5. Literature-based propositions with respect to operational excellence

Factor/Element	Sub-elements and relation	Average proposition
SMIT1 Leadership	Energy Demonstration=; Energy Transference +p41; Vision ++p28,p41,p52; Integrity=; Candor ++p28,p64; Action+p41; Style++p41,p64;	+
SMIT2 Strategy	Direction Creation++p41,p50,p64; Objective Setting++p64; Engagement-p41; Communicating Meaning=; Alignment++p64;	+
SMIT3 Adaptability	Client Focus++p.28,50 ; Creating change++p59 ; Organizational Learning+p59 ; Innovation and creativity-p37 ;Flexibility-p37;	+
SMIT4 Coordination	Organizational Structure++p53; Processes & Systems++p36,58; Positional power++p53; Performance Management (Results)+p53; Communication Management =;	+
SMIT5 Relationships	Team Orientation++p53; Co-operation +p41; Diversity--p53; Talent Management-p54 ;Values+41.	=

From table 5 we conclude that, overall, culture is considered an important independent variable in reaching operational excellence, but that per element and sub-element differences can be identified.

6. VALIDATION OF PROPOSITIONS

6.1 Process Related Propositions

The propositions as identified in the previous section 5.1 should provide ways to help in the successful exploitation of (SSC-based) application management. We performed a validation at a particular insurance firm having just implemented application management (hence *internal* validation), as well as an *external* validation with IT management consultants from an IT consultancy firm.

The insurance firm is based in the Netherlands and is one of the largest on the Dutch market; it has about 16,000 employees. The firm provides business and private insurance services and products. The firm consists of six business units: social security, pensions, health care, banking distribution, direct distribution and intermediate distribution. The firm had just installed IT management (following Looijen (1998) and Pols (2001)) in a new SSC to obtain efficiency in IT-operations. Each of the business units has its own Information Management (IM) department which interfaces to the SSC; at the same time within the SSC there is a separate department (identified as a business solution department) for each of the business units. Application services is responsible for all hosting of applications, and manages internal and external IT service providers. For this internal validation six people were interviewed by means of the survey: 1) a department head of the SSC; 2 and 3) two quality managers, who are part of the SSC; 4) a functional manager of Information Management (IM); 5) a department head of Information Management (IM) for life insurances; and 6) the company-wide IT problem process manager. All interviewees were familiar with the situation before the transition to the SSC, as well as after the transition, so they were able to judge the new (SSC) situation 'in relation to the old situation, before the transition'.

For the external validation two people were interviewed by means of the survey: an IT management consultant, and a principal management consultants both from an IT consultancy firm specialized in IT management.

The surveys in both validations followed a structured approach in the sense that subsequently planned topics were addressed. Each respondent was introduced and guided through the topics by:
1. Showing a high level process diagram of the IT management function in the SSC
2. Presenting the identification of the process factors and operational excellence indicators by presenting table 1 and table 2.

All interviewees both from the internal and external validation recognized the identified process factors and operational excellence indicators. Subsequently:
3. Showing an empty table 3, and asking them to value their opinion and experience on each of the cells within table 3; as such the propositions were addressed.

After the completion of the surveys, they were analyzed per respondent, interpreted and grades were assigned for each of the cells ('--', '-', '=', '+', '++'); in addition to the agenda of

table 4 '--' indicates strong negative, and '-' indicates a negative relation between process factor and operational excellence indicator. Means were taken for all interviewees, and we consequently indicated a resulting value ('=', '+', and '++') for each of the propositions. The results are depicted in table 6 (internal validation) and 8 (external validation). Values different from table 5 are marked in superscript (the value is higher than indicated in table 4) or in subscript (the value is lower than indicated in table 4). In table 7 (internal validation) and 9 (external validation) the lowest value of a respondent, and the highest value of a respondent is depicted as well, in order to determine the consensus and identify possible outliers.

Table 6. Internal validation of propositions with respect to successful application management (mean values, n=6)

	POLS1	POLS2	POLS3	POLS4	POLS5	POLS6	POLS7
TW1	$=$	$^{++}$	$_{+}$	++	$_{+}$	+	++
TW2	+	+	$_{=}$	+	+	+	$_{+}$
TW3	++	+	$_{=}$	$^{++}$	+	+	$_{+}$
TW4	+	+	$_{+}$	+	$_{+}$	$_{+}$	$_{+}$
TW5	$^{++}$	$_{+}$	+	+	$_{+}$	$_{+}$	$_{+}$

Table 7. Minimum and maximum values in internal validation (n=6)

	POLS1	POLS2	POLS3	POLS4	POLS5	POLS6	POLS7
TW1	- and +	+ and ++	= and ++	+ and ++	+ and ++	= and +	+ and ++
TW2	= and +	= and +	= and +	= and ++	+ and ++	= and ++	= and +
TW3	= and ++	= and ++	- and =	+ and ++	+ and ++	= and +	= and ++
TW4	= and ++	- and ++	= and +	= and +	= and ++	= and ++	= and ++
TW5	= and ++	= and +	= and ++	= and ++	= and ++	= and ++	= and ++

In line with our literature findings the internal respondents confirm that the process factors contribute to operational excellence. There are some differences on proposition level though, mostly concerning the degree to which the individual propositions seem to hold: some propositions are considered to be stronger, others weaker.

Nineteen of the 35 identified propositions are differently weighted: eight are valued stronger, eleven are valued weaker. Two specific propositions differ more than one measure (e.g. '++' instead of '=') from our literature findings: POLS1/TW5 and POLS3/TW2. Obviously these two propositions need further investigation. As for the first proposition, it is noteworthy that the minimum value as identified in table 5 differs two measures from the mean, indicating a potential outlier score.

The internal respondents value POLS4 (collaboration and alignment between the three types of IT management) as highest contributor to operational excellence, whereas table 4 identifies POLS7 (alignment of primary and management processes) as highest contributor. Furthermore, in the validation, POLS 3 is considered the lowest contributor, only confirming contribution to TW1, TW4 and TW5.

It is further noteworthy that TW4 (avoiding process variation) has a higher relation with process factors than before. The other noteworthy findings on the survey results are listed below, with an indication for directions for further research if applicable:

- POLS1/TW3 has a high means value, yet also a minimum value of '=' (see table 7). This may identify an outlier value;

- POLS1/TW1, POLS2/TW4 and POLS3/TW3 have a negative minimum value (table 7), although the means identify a neutral or even positive effect (table 4). Obviously these propositions need to be further elaborated;
- For some respondents POLS5 has a strong positive relation to each of the operation excellence indicators.

Table 8. External validation of propositions with respect to successful application management (mean values, n=2)

	POLS1	POLS2	POLS3	POLS4	POLS5	POLS6	POLS7
TW1	+	++	-	-	-	++	-
TW2	+	=	-	+	=	+	=
TW3	++	+	-	+	+	+	+
TW4	++	-	++	+	+	+	+
TW5	+	=	+	=	+	++	+

Table 9. Minimum and maximum values in external validation (n=2)

	POLS1	POLS2	POLS3	POLS4	POLS5	POLS6	POLS7
TW1	= and +	+ and ++	- and =	-- and +	- and =	+ and ++	- and =
TW2	= and +	- and +	-- and =	- and ++	= and =	+ and +	- and +
TW3	++ and ++	= and ++	-- and =	+ and +	= and +	= and +	+ and +
TW4	+ and ++	-- and =	+ and ++	= and ++	= and +	= and +	= and +
TW5	+ and +	- and +	= and +	= and =	= and +	++ and ++	= and +

Interestingly enough the external respondents seem to be more critical as for the the propositions than the internal respondents: 17 propositions have a lower score than suggested in table 4; only 7 seem to be supported with increase. As there are only two external respondents, firm conclusions cannot be drawn.

6.2 Culture Related Propositions

For the internal validation on culture related propositions three respondents in the insurance firm were interviewed: two process managers and a test manager; for the external validation three respondents were interviewed: an IT management consultant and two principal management consultants. For the validation the survey was extended with culture related questions that referred to the propositions of table 5, but made specific within the context of application management. In general the same process was performed as during the process related interviews. As for step 3, propositions were validated on 'elements'-level, not on 'sub-elements'-level. E.g. as for 'Adaptability' the following statement was posed: "The application management department should be adaptive to changes".

Table 10 shows the consolidated results of the validation of our culture related propositions.

Table 10. Validation of culture related propositions (n=6; both internal and external respondents)

Factor/Element	proposition	minimal value in validation	maximal value in validation	rounded average value
SMIT1 Leadership	+	+	++	++
SMIT2 Strategy	+	=	++	+
SMIT3 Adaptability	+	-	++	+
SMIT4 Coordination	+	=	++	++
SMIT5 Relationships	=	=	++	+

In table 10 a relation between each of Smit et al.'s (2008) elements and operation excellence is identified, and are even perceived stronger than our first suggested propositions (as for SMIT1, SMIT4 and SMIT5). An explanation for this could be that with the identification of culture related propositions (table 5), application management was not taken as the focus; whereas during validation, the propositions were specifically presented on the application management domain.

7. CONCLUSION

In our study we operationalized *functional integration* and *strategic fit* of Henderson and Venkatraman (1993; see figure 1) as for application management in SSCs of the banking and insurance sector. We created a measure for 'Information Systems Infrastructure and Processes' and 'Organization infrastructure and processes' on the one hand, and a measure for 'Business Strategy' on the other, with relations between those, in the domain of application management. Our study confirms that making application management a responsibility of a shared service center (in the banking and insurance sector), taking into account essential processes as identified in table 1 and cultural aspects as identified in table 2, indeed should help in striving for operational excellence. Our findings are based on literature study and validated through a survey with respondents from within a specific insurance firm and by IT management experts from an IT consultancy firm specialized in IT management.

For process related factors, more validation is needed, especially as our validation does confirm the relation between process factors and operational excellence indicators, but it also identifies some difference in the degree to which the individual propositions hold.

Also for cultural related factors, further research is needed as well. For this study we have only considered propositions that identifies relations between Smit et al.'s (2008) five 'elements' and operational excellence in general, not drilling down into TW1 to TW5. Doing so could provide more insight into the specific relations.

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