

INTER ORGANIZATIONAL EVALUATION OF SISP; WHAT NEW CRITERIA ARE NEEDED?

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Abstract

During the three decades of research and practice, the image of Strategic Information Systems Planning has changed considerably. Flexibility, creativity, strategic thinking, and sharing of knowledge are seen as the new ways to both formulate and realize strategy. IT governance has provided a more flexible concept to discuss managerial efforts to align IT with business. But maybe the most important change has been left unattended, that is the introduction of information strategy in networks. Still, many organizations continue to use planning as a way to support their decision-making internally without co-operating with their business partners.

Also the view of evaluating SISP effectiveness has matured. A recent research concluded six dimensions for evaluating the planning process and four criteria for evaluating its effectiveness. These studies are mainly quantitative and this paper qualitatively validates the same dimensions in a case study. Two inter organizational studies from literature add five new factors: competitive pressure, trading partner readiness, contractual level, financial agreements and certainty of implementation.

This study used the internal dimensions and criteria as basis for conducting a qualitative evaluation of SISP in two case studies, one single organization case and one inter organizational case. The results of the first case confirm that these criteria provide a good basis for overall evaluation of SISP internally. In addition to the internal theory based evaluation, also an interorganizational exploration was done to explore the differences and the new evaluation criteria needed. The result is a conceptual interview framework to be tested in practice.

Keywords: Inter organizational, SISP, Evaluation, IT governance

1 INTRODUCTION

The image of strategic IS planning (SISP) has changed over years. Early research on SISP focused primarily on the formal study that led to a formal SISP plan. SISP is, however, part of a wider planning system and thus only one way to support decision making in organizations. Empirical research on SISP in different decades has shown that companies also adopt different approaches to strategic IS planning and plans ((McLean & Soden, 1977) (Pyburn, 1983) (Earl, 1993) (Segars & Grover, 1998)).

The fact that plans are not necessarily implemented has led many researchers, and practitioners, to question to the need for planning. Both researchers and practitioners have adopted a new concept, IT governance, to discuss the alignment of IT and business (Broadbent et al., 1996). Still, avoiding

planning altogether is difficult. Managers rarely make individual decisions on a fully ad hoc basis. They discuss alternative plans with other key managers, and often make special investigations to support these discussions. They also prepare a written document to communicate their plans. This plan guides future decision making, not only within IT but also within the business functions. Strategic IS planning is not an end in itself – but it does constitute a central capability of the IT governance in most companies.

Methods for evaluating a SISP study are fairly well documented. The conceptual framework presented by King (1988) provides a good basis for evaluating SISP. Survey instruments have been developed that researchers can use in measuring planning success according to predefined criteria (Segars & Grover, 1999). This research adopts these frameworks to evaluate the effectiveness of strategic IS planning in two organizations. In addition to this theory based evaluation, the paper also makes a more situational evaluation of SISP. The differences between these two evaluations are then discussed. While supporting the prior evaluation methods, the paper suggests that also a contextual evaluation can provide interesting insights and promote learning.

Lin (2006) and Salmela and Spil (2006) are the first to deal with evaluation of Inter organizational SISP. The first comes up with three organizational criteria based upon Segars and Grover (1999) and two inter organizational criteria based on Premkumar and Ramamurthy (1995). The latter base their organizational criteria also on Segars and Grover but explore corporate strategy (Ring & Ven, 1992) and network theory (Castells, 1996) and come up with three complimentary Inter organizational criteria. Both studies do not seem complete yet. This paper tests the organizational criteria in a qualitative case study and explores the Inter organizational criteria in a case study with multiple organizations involved. First some definitions are given, and then the organizational criteria are described. In section five these criteria are qualitatively tested. Third, the inter organizational criteria are theorized in section four and explored in section six. Conclusions and discussion follows.

2 DEFINITIONS

Traditionally, SISP was defined as a process that defines a portfolio of IS applications that supports the organisation's business plans and goals (Lederer & Sethi, 1988). The definition of SISP as a process doesn't restrict SISP to a formal study. But the idea of planning resulting to a portfolio of IS applications is very narrow – plans can and do contain a large number of other aspects. Furthermore, while business plans and goals are important criteria, there are others. Because of the differences in the ways how organisations make strategic IS decisions it is difficult to narrow down the content of decisions, or criteria to be used.

It is also interesting to compare the definition of SISP to the definitions given to IT governance. IT governance has been defined as “an integral part of enterprise governance and consists of the leadership and organizational structures and processes that ensure that the organization's IT sustains and extends the organization's strategies and objectives” (IT Governance Institute, 2007, Chin, 2004). He noted, that the underlying theme in IT governance is a “focus on the relationship between corporate governance and IT governance, the alignment of IT strategy with the organization's strategy”.

The concept IT governance has enabled research to avoid some of the pitfalls related to the SISP concept. Whereas the concept of SISP concentrates on a single planning process, IT governance gives more freedom in analyzing organizational arrangements that ensure alignment. The ability to make effective plans is a highly significant capability in IT governance. But there should be a growing recognition that SISP is part of a larger IT governance context. E-governance could then be defined as: *an integral part of network governance and consists of the multiple leaderships and organizational structures and processes that ensure that the network's ICT sustains and extends the network's strategies and objectives.* Instead of E-governance we rather use the term Inter Organizational SISP (IOSISP).

3 EVALUATING SISP

The first comprehensive model for evaluating strategic IS planning was provided by King (1988). The model prescribes an operational approach for making a comprehensive evaluation of an organisation's process for strategic IS planning. It describes an IS planning system that is driven by three varieties of inputs and which, in turn, produces outputs. The three inputs identified in the model are the informational inputs, the resource inputs, and the IS planning goals. The outputs are depicted as ultimately influencing business performance.

This model has provided a basis for large quantitative studies (Premkumar & King, 1994; Raghunathan & Raghunathan, 1991). The general theme in these studies was to validate King's model, i.e. to show that better inputs lead to better strategic IS planning system, which in turn lead to better outcomes.

Qualitative studies (e.g. (McLean & Soden, 1977; Pyburn, 1983; Earl, 1993)) have identified different planning approaches, and also discussed their effectiveness. Here the criteria used for evaluating the process and effectiveness were different. More emphasis was placed on contextual factors, such as business planning style, governance environmental turbulence.

A recent research combined the results of previous qualitative and quantitative studies (Segars & Grover, 1999; Grover & Segars, 2005). The evaluation of strategic IS planning process was based on six dimensions, many of which had emerged in the qualitative studies: comprehensiveness, formalization; flow; focus; participation; consistency. Table 1 gives an overview of these dimensions.

Table 1 Evaluation of strategic IS planning process

Comprehensiveness	The extent to which an organization attempts to be exhaustive or inclusive in making and integrating strategic decisions.	Non-comprehensive vs. Comprehensive
Formalization	Existence of structures, techniques, written procedures, and policies that guide the planning process.	Informal vs. formal.
Focus	Balance between creativity and control orientations inherent within the process structure.	Creativity Focus vs. Control Focus
Flow	Locus of authority or devolution of responsibilities for planning.	Bottom - Up flow vs. Top - Down Flow
Participation	The breadth of involvement in planning; e.g. number of planners involved, representation from various functional areas.	Narrow Participation vs. Broad Participation
Consistency	The frequency of planning activities or cycles as well as the frequency of evaluation/revision of strategic choices.	Inconsistent vs. Consistent

The evaluation of strategic IS planning effectiveness, on the other hand, is based on the evaluation of four dimensions: alignment, analysis, cooperation, and improvement in capabilities. Even these can be seen as combining ideas from both quantitative and qualitative studies.

Table 2 Evaluation of strategic IS planning effectiveness

Alignment	Linkage of the IS strategy and business strategy.	Low Alignment – High Alignment
Analysis	Understanding of processes, use of information, power bases, and existing technologies.	Low Analysis – High Analysis
Cooperation	General agreement concerning development priorities, implementation schedules, and managerial responsibilities.	Low Cooperation – High Cooperation
Improvement in Capabilities	Improvement in planning capabilities over time.	Low Improvement – High Improvement

The dimensions in Table 1 and the criteria in Table 2 probably represent the current view of evaluating planning processes and planning effectiveness. In some sense, the study appears to solve the basic research problem within SISP: how to make effective strategic IS planning. In essence, it identifies a learning/organizational approach to strategic IS planning that is superior to other approaches in all effectiveness criteria. The result is confirmed by both the quantitative and qualitative analyses conducted for the study (Grover & Segars, 2005; Segars & Grover, 1999).

Simultaneously, it seems to have reached the limits of traditional SISP research. By concentrating on the planning process only, it simply assumes that same objectives are relevant in all contexts and that the context doesn't restrict the choice of a planning profile. This assumption enabled a very rigorous study design. Simultaneously, however, the relevant question of how the wider IT governance context influences both the planning process and its effectiveness remains unquestioned.

4 EXPLORING INTERORGANIZATIONAL EVALUATION

Lin (2006) concludes that “very limited empirical research has been performed to evaluate the factors that influence Internet-based Inter organizational systems planning”. She conducts a study on more than 200 CIO's in Taiwan to make a first quantitative exploration. IOS effectiveness was measured with three dimensions:

1. planning alignment (Segars & Grover, 1999)
2. planning capability (idem)
3. planning objectives (Lederer et al., 2001)

Lin uses Wang and Tai (2003) to derive the relationships between these three dimensions. She does not make clear why analysis and co-operation are left out in the model. Especially the latter dimension seems very important in an inter organizational setting. This is confirmed by a recent Finnish study (Ojasalo, 2004). We expect analysis to be more complex in an inter organizational context but think that effectiveness can be measured in a sort-like way as Segars and Grover propose. Leaving it out

seems to be no option. We therefore have to explore how planning effectiveness variables change in an inter organizational setting.

Top management participation (Basu et al., 2002; Schmidt et al., 2001) is a very important determinant of IOSISP success as it is for SISP represented by Segars and Grover as participation in general. Lin introduces three organizational variables:

1. Top Management participation (Basu et al, 2002)
2. Organizational Centralization (King & Sabherwal, 1992)
3. Technology competence (Zhu & Kraemer, 2002)

Organizational centralization seems to address the same as the flow variable of Segars and Grover where the locus of authority is measured. Technology competence is important on lower level but on IOSISP level should be replaced by capability of the partners already in the model. We explore if comprehensiveness, formalization, focus and consistency also play a role in IOSISP.

Chwelos, Benbassat and Dexter (Chwelos et al., 2001) introduce trading readiness as a main factor in EDI adoption. Lin (2006) transforms this into one of two inter organizational variables next to competitive pressure (Premkumar & Ramamurthy, 1995). Salmela and Spil (2006) derive three other variables from Ring and Ven (1992): Level of contractual thinking, financial agreements and certainty of implementation.

Summarizing we observe overlap and lack of completeness in the Lin (2006), Wang & Tai (2003) and Salmela & Spil (2006) models. For our qualitative design we will go back to Segars and Grover (1999) for the internal context and explore which changes are observed in the inter organizational context for the process dimensions co-operation, alignment, analysis and improvement of capabilities. For positioning the IOSISP processes we use the six Segars & Grover (1999) dimensions with five additional variables:

1. Competitive pressure (Premkumar & Ramamurthy, 1995)
2. Trading readiness (Chwelos et al., 2001)
3. Contractual level (Salmela & Spil, 2006 Ring & Ven, 1992)
4. Financial agreements (idem)
5. Certainty (idem)

5 STUDY DESIGN

The objective in this study is to investigate evaluation of IOSISP. This is done through evaluation of SISP and IOSISP in two case studies:

- A university;
- A network of fifteen healthcare organizations.

The theory based evaluation relies on the Segars and Grover (1999) framework. Evaluation of SISP process and effectiveness are made according to predefined criteria.

The contextual evaluation is based on a view that SISP is not an end in itself, but it is only one of the processes within the overall IT governance. Evaluation looks at the situational objectives for SISP, the way IT governance context shaped the planning process, and the outcomes that were achieved. The contextual analysis in case 1 is done with the process dimensions of Segars and Grover (1998), in the second case study five additional dimensions are explored.

In both cases, authors were involved to get first hand data. Collection of evaluation data was done with multiple methods. For the first case study all department heads of the different services offered by the Facility Department (FD) were interviewed as well as all top managers. This made sure that all key informants were interviewed (Earl, 1993). Nearly all SISP activities were observed and described and a thorough document analysis of all documents involved was done.

For the second case another research method was needed due to the explorative character of the study. There was no interview model available, just a set of quantitative questions and five inter organizational criteria. One of the authors observed all activities and all documents were studied. The objective was to create an interview model to be tested later in a large IOSISP study in both the Netherlands and in Finland. The new interview framework is derived from the analysis in table 3.

6 EVALUATION OF SINGLE ORGANISATION

6.1 Introduction

To achieve insight in the information systems (IS) strategies in an organisation in the Netherlands, the Facility Department of a Dutch University was studied. The Facility Department (FD) is a service department of the University. The FD offers a wide range of products and services which facilitate working and studying at the University as much as possible. The mission of the FD is: *'To create the optimal workplace, working conditions and facilities for students and employees of the University.'* The FD is aware of the necessity of development of the Information Technology (IT) services, at the moment further professionalizing of the organisation and the provision of services is taking place.

The evaluation of SISP process shows that the planning process looked as design school/business led. (non-comprehensive, informal, creative, top-down, broad participation, high consistency) in the first stage of the planning. In the second stage a more comprehensive approach was used. They also showed some achievements in all four effectiveness criteria – alignment, analysis, cooperation and improvement.

6.2 Effectiveness of SISP at University

Co-operation

In the first stage a workshop was held with all management members to get all the systems and projects into perspective. As a result there was a decision from top management to lower the amount of projects and to integrate a lot of the existing systems. Such a decision is not easy but the implementation is much more difficult in the second stage of the SISP process all projects were prioritised. These aggregated projects were discussed in a board meeting; this resulted in a new grouping and priority setting of the projects. A decision was made to form a new project organisation. The principal is the director of the FD. The steering committee will be made up of members of the FD and the central IS department of the University; to achieve broader decision-making and a wider basis. The main tasks of the steering committee are: overall policy and its decisions, to guard the common progress of the project, to provide means for financing the projects. The principal project group will exist of one member of the FD and one member of the central department. The goal of this group is to structure communication of the different project groups to the steering committee. A project group will be formed per project and can contain several work groups.

Alignment

At the start of the project a corporate strategy was available. In this plan the mission; place in the hierarchical relations with the university; services; structure; strategic personnel plan and budget are outlined. Top management participated in the process; results were discussed and decisions were made by the management team. As a result, it was decided to form a new project organisation for ICT.

In the first stage alignment was done in a workshop by investigating all core competences. The role of information was studied and found essential to perform the services of the FD, for this reason information can be considered to have a strategic role. Information is used to outline and determine the future path and activities of the FD. On the other hand, information also has an operational role in the activities of the FD; e.g. for planning of maintenance.

In the second stage, internal and external information sources have been indexed for use in the process. Guided by the strategy plan of the FD, some implications for IS objectives were revealed. Also a list of new future acts was made. In the automation plan a list of all new project ideas of interviewed members of the FD were included. These ideas were aggregated and remoulded into projects, which were prioritized by the management team. This way an IS plan with project priorities was established. Senior management participation is integrated into the process by the new project organisation.

Analysis

In the first stage of the SISP process only a global analysis was done of main corporate processes. With the use of workshop themes, the most important issues were derived to analyse later. The investigation of all existing systems in the second stage was a time intensive process. Because the different departments all had their own specific applications; it was chosen to investigate by means of interviews. After all interviews it became clear that 34 different systems were used, far too many. All participants were gladly involved in the process; because they were aware of the importance for the future and saw opportunities to be heard and stress their own interests.

As a result of the interviews an overview of all used systems was created. This overview was combined with knowledge of what each system was used for and by whom. Also the shortcomings and wishes per system were gathered. This resulted in a list of needs and wishes for the future IS infrastructure.

Improvement of capabilities

The automation plan was reviewed by the management team and approved by the director. The director appointed employees for the leading roles in the new project organisation. At this point the automation plan is to be used as a guideline for further research and detailed planning of the projects. It contains first drafts of project proposals, which now have to be defined in detail.

When looking at the evaluation of previous planning results, it can be seen that a list of current and planned projects was made. Also a scope is defined in the form of priorities given to the projects. In selecting participants and adjusting the planning approach, a new project organisation was established. The main employees to be involved are known. Also a planning horizon for the next five years was established.

6.3 Process dimensions of SISP at University

An organisation can choose to use a comprehensive or more incremental IS planning process. To determine whether the IS Planning process used by the FD was more comprehensive or more incremental five planning characteristics can be compared. The first characteristic is 'Plan comprehensiveness'; looking at the FD it can be seen that first a strategy was formed, on which the rest of the planning process was based. In the comprehensive process, the plans are complicated and highly integrated with the strategy; in the incremental process, plans are simple and loosely integrated. On this scale the FD will move slightly towards the comprehensive practice. The second characteristic is 'Approach to analysis'; at the FD all department heads were interviewed to derive experiences and opinions to form projects. These interviews were held with use of a predetermined interview model, this formal process is part of the comprehensive process. The use of personal experiences and judgement are signs of an incremental process. On this characteristic the FD has parts of both processes. The third characteristic is the 'Planning organisation'; planning at the FD was done by the board meeting of the FD and a few members of the ITBE. This shifts towards the comprehensive practice. The fourth characteristic 'Basis for Decisions'; implies that the FD used a formal decision process, executed by the board. This is also a feature of the comprehensive process. The last characteristic 'Plan control'; concerns the fact whether plans are periodically (comprehensive) or continuously (incremental) reviewed and adapted to changing circumstances. The different projects at the FD have to be formed and adjusted continuously to adapt to the changing circumstances; this is more an incremental process trait. Concluding it can be said that viewing all characteristics the IS Planning process used by the FD is a comprehensive process with several incremental traits.

7 EXPLORATION OF AN INTER ORGANIZATIONAL CASE

7.1 Introduction

There is little empirical evidence that describe inter-organizational SISP processes. In this section we describe the processes of fifteen healthcare partners and four knowledge institutes to create a new information strategy for the whole region over a period of six years. This case is derived from a careful document analysis and longitudinal observations of one of the authors. The objective is to get a better view on IOSISP and to derive a research model for further empirical study both in Finland and the Netherlands. Table 3 summarises the variables observed in the case observations.

7.2 The effectiveness of IOSISP of Healthcare organizations

Co-operation

The project started out in 1999 and called itself ICT connection of the region. The partners had different sizes and different interests. In strategic group sessions every participant introduced themselves in a presentation and many ideas were generated. Every partner was sure of the necessity of the collaboration. After four rather broad sessions, a small group continued to prepare a funding proposal for the ministry. The major control mechanism at this stage was relational. The meetings were very informal and participation was voluntary and participation varied. After the funding proposal was declined there was a difficult time in holding the partners together but big involvement of top management of two large partners kept the connection going.

Analysis

In the second process an e-health architecture was build on a global level. A radical performance improvement is proposed in a next generation scenario. The participation in this process was mainly from CIO's and not from CEO's. The final outcome was a rather futuristic architecture laid down in a funding proposal. As a result of the authorization cycle a new analysis cycle was started with two project plans that covered infrastructure and application service providing.

Analysis did happen but more in an organizational context than in an inter organizational context. Interoperability and communication were main overall issues but difficult to address.

Alignment

Creating a shared vision was one of the most important results of this strategy process. At first all parties involved presented themselves and many ideas were generated. In a later stadium the main actors did a strategic session at a consultancy firm. The main objectives and the overall roadmap was derived from this session. From that point the alignment was more directed to stating objectives for the seven projects generated whit little attention to the overall goals.

Alignment seemed to be more dynamic than the other effectiveness dimensions. In that way many ideas could be generated but little attention was given to implementing those ideas. Improving the planning capabilities can therefore been seen as a big problem in this case.

Improvement in capabilities

After staying a long time in the previous three processes without getting funding and without plans for funding ICT themselves there was new initiative called innovation care in the region that set up a sort of programme management. The regional ministry donated money to create seven project plans and so the strategy process came into a contractual control situations where explicit business models were build.

7.3 Process dimensions of IOSISP at Healthcare organizations.

Competitive pressures might not seem interesting to measure within 15 healthcare organizations but although the partners are not direct competitors, each stakeholder has its own interests and "market pressures" have an important impact on the IOSISP process. The market pressures could be better

asked with Porter (Porter, 1980) in mind then Premkumar and Ramamurthy (1995) since they specifically mean an internet based system. We have to ask strategic market pressures (necessity, willingness).

Trading readiness we would translate into co-operation readiness. Not every partner has the same level of co-operation as handled in the effectiveness dimension. As described by Lin (2006) and Chwelos (et al, 2001) we think it is too much technology oriented.

Contractual agreements were a problem in the IOSISP process, especially in the first period until 2004. The Project Initiation Documents in the later stage can be seen as a form of contractual behaviour but no real obligations were made. In the last available document (2006), the report from a strategic session, finally one project mentions the initiation of a legal body and the financial arrangements in a contract form. We consider this the first step up toward a more transactional approach. Another measurement related to the contractual agreements could be legal agreements.

Financial agreements are not easy to observe, neither available on the documents. A critical appraisal of costs and benefits from the start could have made the process much clearer but it is doubtful if such clear statements could be made in the first period since there was no shared vision at that point in time. All seven Project Initiation documents have business models and many financial statements but the real money flow has to be asked in interviews in future research.

The certainty of implementation is very low also caused by the financial agreements. Some small parts of projects were implemented like the health chain of the hip and knee care process. Other projects were linked to national projects. In this way the healthcare institutes in Twente were ahead of all other health institutes. The Innovation in Care organization won an award for innovation.

The fit between the comprehensiveness of the partners themselves and the IOSISP comprehensiveness could influence the co-operation of the partner in the network. In this case we see that the planning comprehensiveness changes over time. The IOSISP process of the fifteen healthcare organizations was not a linear learning process as shown in recent literature (Grover & Segars, 2005). The picture would show more ups and downs. In general there was too much reliance on relational coordination mechanisms in the first period. Also the funding problems caused hick ups in the continuity of the process.

The planning process in this network is very informal. It seems that the planning processes within the organizations are much more formal. The focus is clearly on creativity and just a little bit on control. Where normally a top down approach would be normal on ICT matters, in this case a bottom up approach was the only possibility by lack of hierarchy.

Top management participation plays an important role in the IOSISP planning process. Some organizations only involve the CIO, others send the CEO and the CIO. Some CEO's have the leading role, some a supportive role. In this external context, top management is necessary for the continuity of the process but since these management positions change over time and the planning process has a very long scope, different top managers take different positions in this case. Top management participation seems more important than the previous process dimensions. The study of Lin (2006) confirms this while Top management support has a significant relation with both alignment and capability (.32 and .27).

In general all internal process dimensions shift to a more relational type of network planning. The consistency is no exception because the frequency of planning processes gets less in an external context and there are many changes as described before. Future research has to elaborate on these IOSISP dimensions to possible interview questions.

Table 3 – Conceptual interview framework for the evaluation of IOSISP.

	Internal	External
Process	Comprehensiveness Formalization Focus Flow Participation Consistency	Market pressure (IO contingency) Contractual agreements (IO agreements) Financial agreements (IO agreements) IO Certainty IO Comprehensiveness IO Formalization IO Focus Organizational centralization (IO flow) (Top Management) IO Participation IO Consistency
Effectiveness	Co-operation Alignment Analysis Capability	IO Alignment IO Capability IO Co-operation IO Analysis

8 CONCLUSIONS

IOSISP effectiveness

The IOSISP effectiveness in the inter organizational exploration was more influenced by the co-operation dimension and therefore it does not seem good to leave this dimension out as was proposed by Lin (2006) A measurement is needed to determine the level of co-operation. Within the process dimensions two agreement dimensions (financial and contractual) are introduced that might be turned into one IO agreements. Furthermore we can argue that IO agreements could be part of the IO co-operation effectiveness dimension. Although analysis was mainly done within the partner organizations, a next generation scenario for the whole network suggests a certain amount of analysis for the whole network. It might be the least important dimension for IOSISP effectiveness but still visible in practice.

IO processes

Where the overall IOSISP effectiveness seems to be a redesign of the existing dimensions, the process dimensions clearly change in a network context. For top management participation, the significant influence is confirmed in this study. In literature the relation with capability and alignment is shown but in this study also a close relationship with co-operation is visible. This might ask for a more complete evaluation model. The other process dimensions seem less important than top management participation. Only market pressure seems important in industry as the Taiwan study shows but because this case is in healthcare it is not that recognizable. Within SISP literature the market pressure would be closest to the context or contingency dimension (e.g. turbulence, IT maturity, technical

complexity, consensus, significance of IT). We argue therefore to study a dimension IO contingency in stead of market pressure.

Future research

Future research has to validate some of the results shown in this study. As the underlying organizational dimensions are thoroughly grounded and validated, only the additional external dimensions have to be proven and completed. This study only showed that they are not yet complete and not on the same level for comparison for this case study.

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