Understanding the ITIL implementation project
Conceptualization and Measurements

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Abstract - the purpose of this research is to contribute to the theorizing of ITIL. The paper provides a model that conceptualizes the scope and content of an ITIL implementation project, and it tests and validates measurements based on a literature study and data from a survey of 446 Nordic ITIL experts.

Keywords - ITIL; implementation; project; theory development

I. INTRODUCTION

Information Technology Infrastructure Library (ITIL) is an approach to IT operations which places emphasis on IT services, customers, service level agreements, and the handling of the daily activities of the IT department through processes, and is counted as a de facto standard for IT service management worldwide. ITIL version 3, which was released in 2007, consists of five books that detail 25 IT processes. Together, these processes describe how an IT service moves through its life cycle: how the IT service should be planned for and built, how the IT service and related changes should be validated, tested, and deployed, how events and requests regarding the IT services should be handled, how the basic configuration supporting the IT service should be controlled, and how operational problems should be solved [1].

Research on ITIL is increasing, and research has especially paid attention to the ITIL implementation project, its benefits and success factors [2]. Despite the growth in the ITIL literature, a theory or a model that conceptualizes the scope and content of an ITIL implementation project is lacking. Little empirical evidence exists on how to conduct an ITIL implementation project, and how to measure the success of such an initiative. The purpose of this research is thus to conceptualize, test and validate measurements for the ITIL implementation project. A validated model with validated measures will benefit both practitioners and researchers. Practitioners may address the model and its dimensions when planning and evaluating their ITIL initiatives. In research, academics may use this validated model as basis for further studies in the area.

The paper proceeds as follows. First, it develops the theoretical dimensions and related operational measures based on existing theory and previous empirical work. Then, an empirical study in terms of a survey is presented. Next, evidence of content validity and construct validity based on empirical validation of the survey data, is presented and discussed. The article concludes by suggesting paths for further research.

II. THEORY

A. The ITIL implementation project model

Based on a literature review, a research model for the ITIL implementation project has been developed and grouped into two parts: ITIL-context and ITIL-project. The model includes thirteen dimensions: senior management involvement, organizational commitment, group efficacy, implementation, benefits, process management, satisfaction, expectations, size, sector, time, business condition and budget. See Figure 1. The indicators of each of the dimensions are described below.

Figure 1. The ITIL implementation project model

B. The ITIL-project

Senior management involvement as a factor for organization development success has been highlighted by many. McDonough [3] suggests that top managers help projects by a variety of means, such as demonstrating commitment, helping the project to surmount obstacles, making things happen, and providing encouragement to the team. Within ITIL, senior management involvement means that top executives commit themselves and provide strong support to the project from its initiation to its end [4]. However, as identified by Iden & Langeland [2], managers at all levels must have an ownership to it, although it is normal that one senior manager champions the ITIL implementation project. A
premise is that managers acquire knowledge about and an understanding of what process orientation means [2].

**Organizational commitment** has been repeatedly identified as an important variable in understanding the behavior of employees in organizations [5]. Within ITIL, organizational commitment means broad company support for the ITIL implementation project. Such commitment is indicated by the presence of sufficient resources [6], organization-wide involvement [7], and market campaigns for creating acceptance and understanding of what ITIL entails [8]. It also means involving key people in the process design and improvement activities, and let them stay on the project from its start to finish in order maintaining continuity [2]. It means that the need for organizational improvement is strongly recognized by the employees, and that the project members are trying their hardest to implement ITIL in order to succeed [7].

**Group efficacy** is the project team’s belief in its ability to perform effectively [9]. The major consequence of a strong self-efficacy perception is enhanced task performance [10]. With respect to ITIL, group efficacy means that project members are sufficiently trained, and that they possess sufficient knowledge about ITSM, ITIL and process thinking [2, 8]. It also means that they have the skills necessary to identify, analyze and improve processes by the use of a well defined method for process development, including process modeling [7].

**Implementation.** The central part of the ITIL reference model is the best practice processes that describe how work in IT operations could be carried out. This means that ITIL focuses on the flow of activities that cross organizational units, both within and beyond IT operations. ITIL defines process as a structured set of activities designed to accomplish a specific objective, and includes roles, responsibilities, tools and management control required to reliably deliver the outputs [1]. Implementing ITIL is first of all about implementing these best practice processes in the IT department.

**Benefits.** According to research, implementing ITIL may lead to several benefits, both at a strategic and at an operational level. For example, a study in Australia, United Kingdom, and New Zealand found that the ITIL benefits realized included improved service orientation, more predictable infrastructure, improved consultation with IT groups within the organization, smoother negotiation of service level agreements, and seamless end-to-end service [11]. Overall, research finds ITIL to provide many benefits, including expected improvements in customer satisfaction, focus on IT services, reduced IT costs, etc. [12, 13].

**Process management.** Since implementing ITIL is about identifying, mapping, analyzing and redesigning internal processes based on the best practice recommendations, an ITIL implementation should consequently lead to process management. Without process management, ITIL will not be a success beyond its initial implementation. Process management is described as the executive, administrative and supervisory control over a firm’s processes to ensure that they remain compliant with business objectives for the delight of customers [14]. The literature offers various models for process management [15], but seven dimensions are representative: process standardization, process documentation, process ownership, process goals, process monitoring, process improvement, and process certification.

**Satisfaction.** Since the organizational context contains organizational resources and related motives, ambitions and expectations in the ITIL implementation project, it will also influence the degree of satisfaction with the outcome of the initiative. Satisfaction reflects the degree of ambitions surrounding the project in its specific context, which serve as a reference for evaluating the benefits.

C. **The ITIL- context**

Contextual influence describes the potential impact on the ITIL-project that is a result of internal organizational and external market characteristics [16-18]. The organizational resources are operationalized here as the experience and knowledge gained as a result of the time passed since the implementation project started, its size reflecting its amount of staff, IT employees, and turnover, and the budget allocated to the ITIL-project. External factors are operationalized as two different types of reflective indicators: the firm’s business condition at the time of implementation reflecting the level of organizational stability during the ITIL-project, and the sector the firm belongs to in terms of whether it is a private (1) or government-owned (2) company. Time is measured with one reflective indicator: the number of years passed since the ITIL-project was initialized. Size is measured with three reflective indicators: the firm’s number of IT employees, its staff in total and economic turnover. Budget was measured as one indicator asking for the amount of economic resources made available for the ITIL-project.

Furthermore, context might also influence the motives behind the ITIL-project as the ambitions and prospects adopted by the organizations. Expectations describe these ambitions and were operationalized through seven formative indicators describing the motivations behind the ITIL-project, including expected improvements in customer satisfaction, user satisfaction, focus on IT services, reduced IT costs, etc.

The appendix provides an overview of the references behind the constructs and their indicators, and lists the operationalizations used in the survey reported here.

III. **VALIDATING THE MODEL**

A. **Data collection**

A questionnaire was designed based on our research model with statements for all indicators. The questionnaire was pretested and improved prior to the survey. A sample was drawn from the population of members of the Nordic itSMF chapters. 446 responses were received: 46 from Finland, 150 from Sweden, 55 from Denmark, and 193 from Norway. The firms represent a variety in sectors and sizes, but with a slight
dominance of large firms and large IT departments. IT sector firms represent more than 35% of all firms in the sample. Those who responded represent different roles in their ITIL projects, with project manager, project member, and process owner as the most frequently named roles. Around 60% of the respondents possess ITIL training and certification at the ITIL Foundation level, whereas 20% have gained the ITIL Intermediate and the ITIL expert levels. About 65% of the respondents have worked with ITIL four years or more. All this indicate that the respondents are qualified to answer the survey.

B. Content validity and Construct validity

Due to the lack of previously tested theory in this setting, and the complexity of our theoretical model, we divided the validation into two sub models. Model one had implementation and process management as the dependent variables, whereas model two had benefits and satisfaction from ITIL as dependent variables and included expectations as an additional independent variable. The other explanatory variables were identical in the models and included senior management involvement, organizational commitment, group efficacy and the contextual variables described above. Due to the lack of previous studies on ITIL implementation project using these constructs, there was not clear as to whether formative or reflective measurement models were the most accurate conceptualization for senior management involvement, organizational commitment and process management. It was not possible to state without doubts that indicators were correlated or not and hence should be measured as belonging to a formative or reflective construct. As a result, these constructs were treated differently in model one and model two, and will provide complementary perspectives for validating the constructs and their indicators. We chose partial least squares (PLS) as the method of analysis due to its ability to handle both formative and reflective measurements. The tool chosen was XLSTAT-PLSPM (www.xlstat.com). In validating our constructs and their indicators we start with content validity and continue with construct validity with separate procedures for formative and reflective indicators, as suggested by Götz et al. [19], Gefen and Straub [20], and Straub et al. [21].

Content validity is present if the indicators capture the full domain and scope of the construct, and was addressed by selecting indicators based on a combination of previously published work and subsequent qualitative assessment through interviews, expert statements, etc. as suggested by Götz et al. [19]. The indicators of Implementation were adapted to our context from Cater-Steel et al. and Iden et al. [22, 23], who used and refined them through qualitative feedback in successive surveys and produced consistent results over several years [12]. The indicators were updated to cover the processes in ITIL version 3. Six of the seven indicators of Process management were adopted from Eikebrokk et al. [24] who found evidence of construct validity through a two-step procedure from exploratory factor analysis to convergent validity of each dimension through coefficient alpha. The last indicator targets whether the IT department is certified, and represents a new indicator that has not yet been tested for psychometric properties in this context.

The indicators of Senior management involvement and Organizational commitment were adopted from Basu et al. [25] where confirmatory factor analyses found sufficient measurement quality of convergent and discriminant validity. The indicators of Group efficacy were adopted from Bandura [26] and adjusted to the context based on the work of Gibson et al. [9, 27] who found support for the construct validity of the indicators.

Benefits had indicators adopted from Cater-Steel et al. [12], and adjusted to cover ITIL benefits following Marrone and Kolbe [13] and Iden [7]. These indicators have been validated through factor analysis. Expectations and Satisfaction had indicators adopted from Iden [7, 23] and Cater-Steel et al. [12]. These constructs were developed through interviews in the context to elicit forces from the context itself that could influence the success of ITIL. The indicators were adopted from the list of most relevant drivers identified, and were quantitatively validated through factor analysis.

To sum up, the procedures chosen for selecting indicators for operationalizing constructs have contributed to achieving content validity. The basis for content validity is shown in the Appendix.

Construct validity was addressed as discriminant and convergent validity. Multicollinearity between formative indicators is a serious threat to discriminant validity since the variance of their latent variables are formed through regression analysis [28, 29]. Table 2a and 2b in the Appendix (provided online) show the cross-loadings between indicators and latent variables in study 1 and 2 respectively. The tables show that the formative indicators are substantially more related to their own latent variables than to other variables, thus indicating no serious problems with multicollinearity. In validating constructs with reflective indicators we investigated their discriminant validity expressed through a higher value for their average variance extracted (AVE) than squared cross-loadings. Convergent validity was investigated through Cronbach’s alpha. Table 3a and 3b in the Appendix (provided online) sum up these tests and show that all AVEs are higher than the squared cross-loadings. The convergent validity for each construct is above or very close to the recommended level of 0.7. The reliability for each indicator is also included and expressed by their standardized loadings. Table 4a and 4b in the Appendix (provided online) show these values and their significance. All indicators are significant but some are below the recommended general level of 0.7. The standardized loadings are within the recommended levels for research in early stages of theory development as in this area of research [30].

Both models were able to predict their dependent variables. Model one was able to predict 26% of Implementation with all factors being significant except for organizational commitment, business condition and budget, and 44% of Process management. Model two predicted 35% of Benefits with all factors being significant except for
business condition, size and sector. Size and sector were indirectly related to benefits through expectations. Model two also predicted 46% of Satisfaction. Except for these indications of predictive validity, it is outside of the scope and space of this paper to report on the significant weights of the formative indicators involved in these models, or details of the structural models.

IV. CONCLUSIONS

The proposed model of the ITIL implementation project has been operationalized and validated through analyses of content validity and construct validity. The results show that the proposed operational measures represent constructs and indicators with sufficient psychometric properties. Still, our analyses are not conclusive whether formative or reflective measurement models are best suited for further analyses involving process management, senior management involvement and organizational commitment. Our analyses find support for using either ways of measurement. Through the analyses of the formative constructs we could identify the dimensions that significantly contributed to the explanatory power of the structural model described in figure 1. These dimensions highlight the most relevant explanations and include the customer and the staff, process documentation, monitoring of goal achievement, certification and standardization, amongst others.

New research should investigate this further. This work represents research in an early stage of theory development as is the situation for theorizing within the ITIL area. The validation presented here provides evidence of content and construct validity as well as predictive validity that could help further theorizing and validity testing in this field.

REFERENCES


APPENDIX

TABLE 1. CONSTRUCTS, THEORETICAL AND EMPIRICAL BASIS, PREVIOUS VALIDATION

<table>
<thead>
<tr>
<th>Constructs</th>
<th>References</th>
<th>Previously validated</th>
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<tr>
<td>ITIL-Project</td>
<td>Senior management involvement</td>
<td>Basu et al., 2002; Locke et al., 1984; Iden &amp; Langeland, 2010</td>
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<tr>
<td>Organizational commitment</td>
<td>Basu et al., 2002; Locke et al., 1984; Iden &amp; Langeland, 2010</td>
<td>Factor analysis; Quantitative validation; Interviews; Qualitative validation</td>
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<tr>
<td>Group efficacy</td>
<td>Gibson, 1999; Locke et al., 1984; Gibson et al., 2000; Basu et al., 2002; Iden &amp; Langeland, 2010</td>
<td>Construct validity; Interviews; Quantitative validation; Qualitative validation</td>
</tr>
<tr>
<td>Implementation</td>
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<td>Quantitative validation</td>
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<tr>
<td>Benefits</td>
<td>Cater-Steel &amp; Tan, 2005a; Iden et al., 2007; Marrone &amp; Kolbe, 2010</td>
<td>Factor analysis; Quantitative validation</td>
</tr>
<tr>
<td>Process management</td>
<td>Hammer, 2007; Rosemann et al, 2006; Eikebrokk et al., 2008; Iden 2010; Marrone &amp; Kolbe, 2010</td>
<td>Interviews; Quantitative validation, factor analysis; Qualitative validation</td>
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<tr>
<td>Satisfaction</td>
<td>Iden, 2009; Bryde 2008</td>
<td>Interviews; Quantitative validation, factor analysis,</td>
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<td>Budget</td>
<td>Cater-Steel et al., 2005, 2007, 2009; Iden et al., 2007; Iden, 2010</td>
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<td>Time</td>
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<td>Interview; Qualitative validation</td>
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<tr>
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<td>National statistics (<a href="http://www.ssb.no">www.ssb.no</a>)</td>
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<td>Business condition</td>
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<td>Expectations</td>
<td></td>
<td>Cater-Steel et al., 2007; Iden et al., 2007; DiMaggio &amp; Powell, 1983; Davis, 1989</td>
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<tr>
<td>Size</td>
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<td>Factor analyses; Quantitative validation</td>
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The following tables are available online at http://nibor.rente.nhh.no/s1631/appendix.pdf
- Table 2A and 2B: Cross-loadings of formative indicators (study 1 and 2)
- Table 3A and 3B: Discriminant and convergent validity, squared correlations vs. AVE, and Cronbach’s alpha for reflective indicators (study 1 and 2)
- Table 4 A and 4B: Standardized loadings and significance for reflective indicators (study 1 and 2)
- Table 5: The survey instrument