

THE ADOPTION OF IT SERVICE MANAGEMENT IN THE NORDIC COUNTRIES: EXPLORING REGIONAL DIFFERENCES

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Abstract

This paper responds to a call for exploring regional differences of how IT Service Management (ITSM) is adopted. We do so by examining the adoption of the ITSM processes as defined in the IT Infrastructure Library (ITIL). The adoption levels of the individual ITIL processes are compared, and the contributions of country, organization size and industry sector are assessed. The analyses are based on 836 responses from three consecutive surveys over a five-year period conducted in collaboration with the four Nordic itSMF chapters: Sweden, Denmark, Finland and Norway. We also compare and analyze these results with findings from three studies in other regions. We found that significant differences exist in the adoption levels of ITIL between the Nordic countries, between companies of different size, and that the adoption levels of public and private sector firms differ over the years. Furthermore, compared to cross-national studies from other regions, our findings showed that the Nordic countries had lower overall adoption levels of the ITIL processes. Implications for practice and for further research are discussed.

Keywords: *IT Service Management; Information Technology Infrastructure Library; ITSM, ITIL; Cross-national study*

1 INTRODUCTION

Over the past two decades, researchers and practitioners have stressed the importance of IT Service Management (ITSM). Today, ITSM and the IT Infrastructure Library (ITIL) are highly popular among IT managers. ITIL is referred to as a framework for best practice processes (Peppard, 2016), and IT organizations are applying ITIL to improve their practices and activities (Iden & Eikebrokk, 2013). Although it is difficult to find accurate data on its global spread and the exact number of organisations adopting ITIL, the interest and activity documented at ITIL's official website (<https://www.axelos.com/best-practice-solutions/itil>) provide evidence of its popularity. This is confirmed by a visit to the website of itSMF (www.itsmfi.org), a worldwide independent organization and network concerned with promoting ITIL and best practice in IT service management. itSMF has around 6000 member companies globally, and more than 40,000 individual members spread over at least 50 national chapters. Professionals from more than 150 countries have passed the various ITIL exams that are translated to more than 20 languages. As a further documentation of activity, the website reports a large number of local meetings, workshops, and web seminars.

Given their topicality, ITSM and ITIL are issues that would benefit from academic exposure. The earliest academic study on ITIL adoption, as identified by a 2013 systematic literature review (Iden & Eikebrokk, 2013) is a conference article published in 2005 (Hochstein, Tamm, & Brenner, 2005). The first journal article, identified by the same literature review, was published in 2006 (Kashanchi & Toland, 2006). After these, the status of ITIL adoption has become one of the most popular research topics in ITSM research (Iden & Eikebrokk, 2013). In particular, it has been posited that ITSM has the potential to positively influence the effects of IT in business (Marrone & Kolbe, 2010). For example, researchers have documented associations between IT service management and service quality and customer

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satisfaction (Eikebrokk & Iden, 2016; Iden & Eikebrokk, 2013). As a management concept, ITSM places emphasis on IT services, customers and service level agreements (Marrone & Kolbe, 2011). Various process reference models for ITSM exist (ITIL Information technology Infrastructure Library, IBM Service Management Reference Model, HP ITSM Reference Model, Microsoft Operations Framework, ISO/IEC 2000), among which research reports ITIL as the dominant framework in use (Marrone, Gacenga, Cater-Steel, & Kolbe, 2014). ITIL version 1 was developed during the 1980s by a British public body called the Central Computer and Telecommunications Agency (CCTA), having grown from a collection of best practices observed in the industry. ITIL was not used on a large scale until ITIL version 2 was released between 2000 and 2002. The present version, ITIL V3, published in 2007 and revised in 2011, explains in five volumes the set of processes that an IT department must perform in order to design, build and deliver IT services that meet business needs and requirements (Taylor, 2007).

Based on the development described above, many studies have investigated how companies adopt ITSM and the ITIL library. Few studies have investigated how companies manage the transition to service management over time, or whether there are differences between companies in different context. With the exception of Marrone et al. (2014) who compared ITIL adoption between countries, there is a lack of studies and thus a gap in the literature on how companies work over time to change their IT services based on ITIL. As a result, the purpose of this paper is to explore in more detail the development taking place over time in the Nordic region. To do this, we raise four research questions, and collect and analyze data from three consecutive surveys involving four countries in the Nordic chapters of the itSMF – it Service Management Forums. Our work includes four research questions:

RQ1: When did ITIL become popular in the Nordic countries?

RQ2: What are the adoption levels of the individual ITIL processes in the Nordic countries?

RQ3: To what extent are there adoption differences between the Nordic countries and do they prioritize operation processes and tactical/strategic processes differently?

RQ4: To what extent do factors such as organization size and sector contribute to variation in the adoption of ITIL processes in the Nordic countries?

2 PREVAILING RESEARCH ON ITIL ADOPTION

ITIL adoption, defined here as the introduction and subsequent use of ITIL, is a typical example of how IT functions are actively approaching the challenge of creating strategic IT benefits (Eikebrokk & Iden, 2015). Following Galliers' framework for understanding IS strategizing (Galliers, 2011, p.331), ITIL adoption represents the intention to realize benefits through the adoption of reference processes that explain how IT should be exploited and delivered as IT services. These ITIL processes represent aggregated knowledge of best practice, developed through experience and shared in a community of IT practitioners working to servitize the IT function. As such, ITIL adoption can be seen as both an approach and a tool adopted by IT executives for realizing a service-oriented strategy. The phenomenon of ITIL—its reference processes, its adoption, and its community—is attractive to the strategic IT field for several reasons. First, ITIL and its adoption are rarely studied within the strategic IT field despite ITIL's popularity amongst practitioners: "There is still much potential for further advancing the knowledge base on phenomena related to IT-based services" (Fielt, Böhmman, Korthaus, Conger, & Gable, 2013, p.46). Second, and even more motivating, is the fact that research finds that ITIL adoption is influencing behavior in service production that strengthens the IT service climate directly as well as indirectly through process management practices (Eikebrokk & Iden, 2016). ITIL adoption can increase our understanding of the nature of strategizing in general and within IT service management in particular. Finally, the worldwide community of IT practitioners cooperating in this effort represents a network of practice that undoubtedly influences strategizing, and as such should receive increased interest from strategic IT researchers as an example of how collaboration can influence strategizing (Buhl, Fridgen, König, Röglinger, & Wagner, 2012). Overall, existing research have studied adoption status on three different levels of analysis (Iden & Eikebrokk, 2013): the national level (if and to what extent the population of IT functions in a country is adopting or planning to adopt ITIL); the firm and management

level (the overall motivation to adopt and the adoption status in firms); and the process level (the adoption status for each ITIL process in a firm).

From studies at the national level, we know that there is a vast interest in ITIL among U.S. firms. A 2009 survey (Winniford, Conger, & Erickson-Harris, 2009) with 364 responses from U.S. IT managers found that 45% of the participating companies were using ITIL, and that 15% were in the planning stage. A similar Brazilian survey with 186 responses, also published in 2009 (de Espindola, Luciano, & Audy, 2009), found that of the responding firms, 21% were using ITIL and a total of 51% were planning for adoption. Correspondingly, a European study with 215 responses, which compared ITSM adoption in developed and transition economies in Europe (Zajac & Soja, 2012), found that out of the firms in developed countries, 20% reported that they were using ITSM. Only 8% of the firms in transition countries were using ITSM.

As a 2008 Central European study reveals, there may be significant sector differences regarding adoption (Hoerbst, Hackl, Blomer, & Ammenwerth, 2011). In a study of 75 hospitals, the researchers found that only five hospitals (7%) had adopted parts of ITIL and eight hospitals (11%) were planning to adopt ITIL over the next two years. Two-thirds of the hospitals did not consider adopting ITIL. Research also investigates the adoption level of ITIL in organizations. A 2009 survey (Marrone & Kolbe, 2011), studying adoption maturity in firms by using a sample of 503 members of the UK and US itSMF chapters, found that more than half of those surveyed assessed their ITIL adoption level as either CMM level 2 (repeated, 31%) or level 3 (defined, 25%). Thirteen percent reported their status to be at level 1 (initiated) and 31% reported a status of either level 4 (managerial) or 5 (optimized).

On the process level, we know that IT functions prioritize the ITIL processes differently. There is a tendency for managers to select specific processes rather than adopting all the ITIL processes (Marrone, et al., 2014). A case study in a European food industry firm (Coelho & Rupino da Cunha, 2009) reported adoption progress to be higher for ITIL's *service support* processes than for the *service delivery* processes, with change management as the most mature process. A case study involving three Nicaraguan firms (Flores, Rusu, & Johanneson, 2010) found financial management, security management, service catalogue management, and capacity management overall to be the most mature processes in the three firms. As these processes are within ITIL's service delivery area, these Nicaraguan findings contrast the findings from the European case study.

There is a need for more research at the national level and for studies that tracks developments in ITIL adoption and related outcomes over time. To date, on the national level, most of the empirical studies of ITIL adoption progress are limited to a few regions and countries, which call for both more research as well as research in other national settings. There is also a need for international or cross-national studies that can compare the adoption profile and status in different global regions, and identify any regional differences. Marrone and colleagues (Marrone, et al., 2014) conducted a cross-national study of ITIL adoption using data from three surveys conducted in the UK, USA and DACH (German-speaking countries of Germany, Austria and Switzerland) and Australia. To investigate regional differences they asked two questions:

- Are operational level ITIL processes more widely adopted compared to tactical/strategic level ITIL processes?, and
- Do factors such as country, size and industry sector contribute to variation in adoption of ITIL processes?

Marrone and colleagues studied adoption profiles and found that the organizations in their study focused more on adopting the operational level ITIL processes rather than the tactical/strategic level processes. They also found that ITIL adoption levels varied depending on country and industry sector, and they proposed that environmental factors might play a role in the way ITIL is adopted. However, having only investigated ITIL adoption in two clusters of countries on similarities along cultural dimensions, Marrone and colleagues called for more research on ITIL adoption in other regions.

There is a need for more research in this area. To date, on the national level, most of the empirical studies of ITIL adoption progress are limited to a few regions and countries, which call for more research in other international settings. On the firm and process levels, more research is needed in order to assess whether firms adopt or plan to adopt the entire ITIL package, or if they choose a selection of the different processes.

2.1 Cross-national studies of ITIL Adoption

The only cross-national or international study of ITIL adoption we are aware of, is presented in a paper in the Communication of the Association for Information Systems written by Marrone, Gacenga, Cater-Steel and Kolbe (2014). In their study, they compare ITIL adoption by using data from three surveys conducted in the 1: United Kingdom (UK) and the United States of America (USA), 2: Germany, Austria and Switzerland (DACH) and 3: Australia. The data were collected between May and December 2009 using an online questionnaire. Members of the national itSMF chapters were invited to participate. They received 223 responses from UK, 146 responses from USA, and 58 responses from the three DACH-countries. The respondents were IT directors and managers, process owners, and heads of service management. Firms of various size and business sectors participated. Overall, the authors found that the adoption levels of the operational processes are higher than for the tactical/strategic processes; that ITIL adoption level varied depending on country, the DACH countries had the highest adoption level and; that organizations in the public and educational sectors had the lowest adoption level; and that SMEs (small and medium firms) and very large firms had equal levels of ITIL adoption that were higher than in large firms. Their study, as well as their findings, have motivated two of our research questions, and we will come back to more details from their findings in section four, when we compare the results from these studies.

3 RESEARCH METHODS

To answer our research questions and thus to shed more light on ITIL adoption over time and in different international and regional settings, we conducted a longitudinal, quantitative study that involved 836 responses from three consecutive surveys over five years (2010, 2012, and 2014) conducted in collaboration with the four Nordic itSMF chapters: Sweden, Denmark, Finland and Norway. Two of our research questions were motivated by the cross-national study by Marrone et al. (2014) and allow us to further explore the importance of national and regional differences by comparing ITIL adoption in the Nordic region with the ITIL adoption in those regions investigated in their study.

To identify potential respondents to our Nordic study, we contacted the itSMF chapters of Finland, Sweden, Denmark and Norway, and received their permission to involve their members in the survey. For each year's survey, the four chapters provided us with the e-mail to a contact person for each member company. The itSMF board considered these contacts to be the relevant audience for this research. We e-mailed each firm an invitation containing an introduction letter (in their native language and in English). In the letter, we explained the purpose of the survey, emphasizing that participation was anonymous, and motivated them to participate. The survey instrument collected background data on each company and the status regarding the progress of ITIL process adoption. The instrument was pretested on ITIL experts to verify wording and consistency, which led to only small textual adjustments.

In 2010 the final sample of participants counted 445 firms, in 2012 160 firms and in 2014 220 firms. One country, Denmark, did not participate in the 2014 study. The resulting sample represents a wide range of firms. A majority of large companies had more than 2,200 employees; more private than public firms participated, and the number of IT professionals ranged from 25 to more than 300.

The respondents represent different roles in their ITIL-projects: process managers, project members and process owners. More than 90 % of the respondents had ITIL training certificates, most of them at the ITIL Foundation level. About 70 % of the respondents had at least four years of experience with ITIL. Overall, our sample represents a variety of firms and ITIL project characteristics, and we found that the respondents were well qualified to answer the surveys. Sample sizes vary in the Nordic countries, and

not equally many companies are public or private. It is outside of the scope of this exploratory study to investigate and correct for potential sample bias relating to differences in sample sizes.

To answer RQ1 asking when ITIL became popular in the Nordic countries, we combined data from the survey in 2014 and 2012 reflecting in which year ITIL was adopted in each of the Nordic countries and the number of years the companies had been working with ITIL. These data provided the most updated information regarding the time of ITIL adoption in the Nordic region, except for Denmark who did not take part in the 2014 survey. Denmark provided information about ITIL initiation in the 2012 survey, and time passed since 2012 (2 years) were added to the 2012 data for Denmark and used as input for 2014. The results are presented in Fig. 1 and 2. RQ2 ask what are the adoption levels of individual ITIL processes in the Nordic countries. We analyzed this by compiling the data of adoption levels from the years surveyed. This compilation revealed the developments in adoption levels for each country as well as for individual ITIL processes as shown in Tables 1 and 2.

To answer RQ3 asking to what extent there are cross-national differences in a) adoption levels, and b) prioritization of operation processes and tactical/strategic processes, we first calculated and compared the mean adoption levels of each country. Then, we checked whether observed differences between countries were significant both as a whole with all countries included, and more detailed through pairwise comparisons to reveal where the significant differences occurred. In choosing the appropriate analyses techniques to identify differences we first explored whether the distributions were normally distributed. This was not the case, and we chose the non-parametric technique of a Kruskal-Wallis test to compare means. The results regarding cross-country adoption levels and statistical differences are presented in Tables 3 to 5. RQ4 questions whether adoption levels are related to company size and sector, and to answer this we followed similar procedures as for RQ2 and RQ3 in combining data sets, calculating mean adoption levels, and checking for statistical differences across countries using the non-parametric Kruskal-Wallis test. The results are presented in Tables 6 and 7.

4 FINDINGS

In this section, the results from the Nordic surveys are presented, analysed, and compared with the findings of Marrone et al. (Marrone, et al., 2014).

4.1 When did ITIL become popular in the Nordic countries

We asked our respondents when they initiated their ITIL-projects. Our motive was to identify when ITIL became popular in the Nordic region, and consequently, what experience firms in the Nordic countries have with ITIL. Figure 1 shows the distribution of when the ITIL projects were initiated in the Nordic countries. We see that the highest frequency of firms initiated their ITIL-project between 2006 and 2011. Interestingly, only a few firms adopted ITIL before 2000, supporting the view that it was not until the release of ITIL V2 that ITIL gained momentum and became the *de facto* standard for ITSM in the Nordic region.

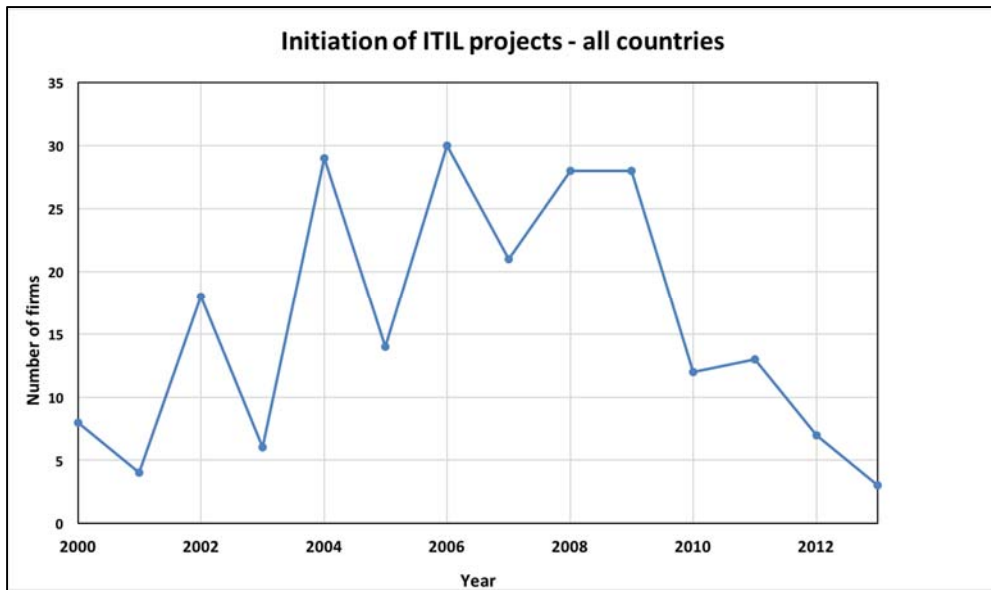


Figure 1 Initiation of ITIL-projects in the Nordic region (n=221). Based on data from the 2012 and 2014 surveys

If we examine the four countries individually, we can observe when companies in each sample initiated ITIL for the first time. We see from Figure 2 that Denmark has the highest share of companies in their sample that started ITIL projects between year 2000 and 2002, followed by Norway and Sweden. Finland was relatively slow to initiate ITIL, but had together with Denmark, the highest share of adopters in 2004. Moreover, in 2008 and 2009 Norway had the largest number of firms initiating ITIL projects. After 2009, all countries have a reduction in the share of companies initiating ITIL projects.

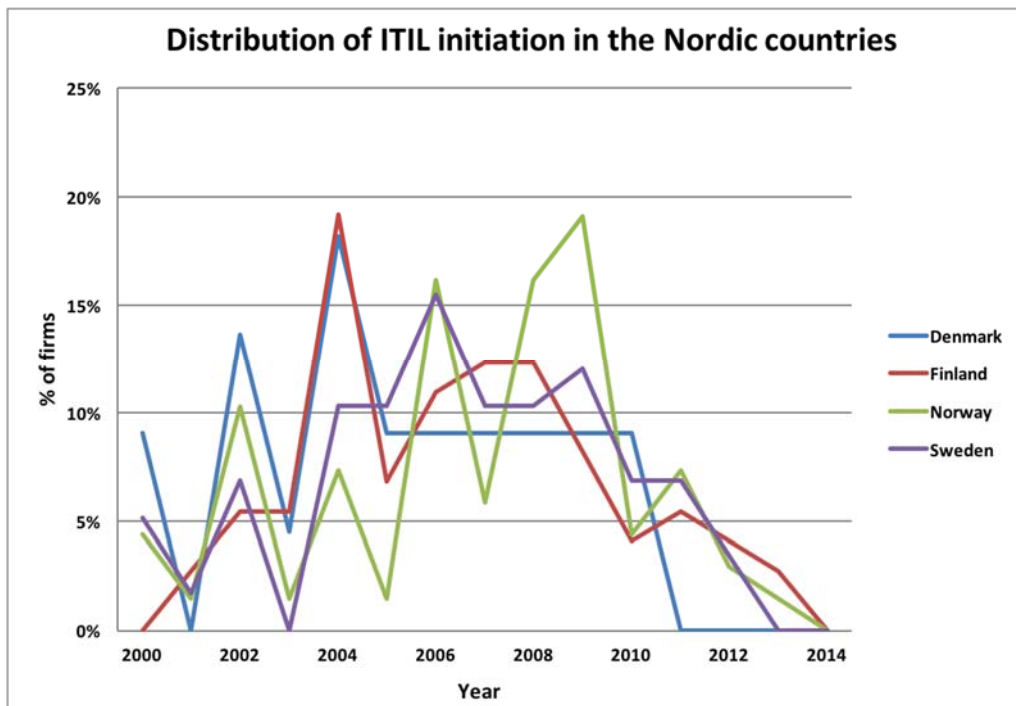


Figure 2 Distribution of ITIL initiations in the Nordic countries (n=221). Based on data from the 2012 and 2014 surveys

4.2 The adoption levels of the individual ITIL processes

Marrone and colleagues (Marrone, et al., 2014) investigated the adoption level of each of the individual ITIL-processes. They found that, combining the results from the three 2009 surveys in UK/USA, DACH and Australia, that the adoption levels were highest for Incident Management (95%), followed by Change Management (88%), Problem Management (71%), and Service Level Management (58%). The other processes obtained less than 50% adoption levels. From our Nordic surveys, we have data on adoption levels from 2010, 2012 and 2014 consecutive. Mean adoption levels of ITIL processes in the Nordic countries for each year surveyed are shown in Table 1 and contrasted to the mean adoption levels for Marrone et al.'s 2009 survey in the second column. The result relate well with the findings from the Marrone et al. study; the highest prioritized processes found in Marrone et al. study were also found in the Nordic study.

Table 1: Mean adoption levels of ITIL processes								
	Marrone et al. 2009	Nordic Countries						Total N
		Adoption Mean %			Std. Dev.			
		2010	2012	2014	2010	2012	2014	
Service Catalogue Management	23,6	38,6	40,3	42,1	25,6	25,6	25,5	736
Service Level Management	58,0	48,9	48,2	51,7	26,0	26,6	27,4	738
Capacity Management	31,1	23,9	27,2	30,2	24,2	24,5	23,6	708
Availability Management	33,7	25,8	32,2	36,0	25,5	26,0	27,3	707
IT Service Continuity Management	39,7	32,9	34,0	40,7	26,9	26,9	26,2	717
Information Security Management	21,8	33,1	40,4	46,9	28,4	28,5	28,3	719
Supplier Management	15,9	26,1	35,7	42,1	26,1	25,6	27,3	709
Transition Planning and Support	14,9	31,5	38,2	42,6	28,2	27,4	30,1	706
Change Management	88,0	58,7	62,3	66,3	27,9	27,4	24,8	738
Service Asset and Configuration Management	47,9	36,3	39,9	48,1	25,1	27,3	26,2	720
Release and Deployment Management	46,6	38,8	46,4	47,4	27,3	28,7	29,2	723
Service Validation and Testing	15,9	29,4	39,1	41,5	27,1	25,7	26,9	705
Evaluation	11,9	20,8	30,3	29,3	23,3	24,0	26,1	682
Knowledge Management	16,7	24,4	29,0	31,3	24,6	24,0	23,8	704
Event Management	21,2	37,0	42,3	52,9	31,6	27,3	30,2	708
Incident Management	94,9	73,6	77,6	84,4	23,5	21,4	18,5	740
Problem Management	71,1	52,4	51,2	56,4	28,8	27,5	28,8	736
Request Fulfillment	27,1	44,2	58,7	65,3	30,0	29,3	29,8	726
Access Management	21,0	34,4	47,6	53,2	29,8	29,6	31,2	704
Service Desk	-	74,1	77,7	84,2	24,7	22,6	22,5	738

Table 1 The adoption levels of the individual ITIL-processes for each year surveyed. Scale: 0%= not adopted, to 100% = adoption completed

If we compare Marrone et al.'s 2009 study with data from our 2010 study, we see substantial differences in the adoption levels. As table 2 shows, the values in the Marrone et al. study are considerably higher for some processes and lower for other processes, than those in the Nordic countries. It is, however, difficult to interpret this observation, as the actual processes belong to different phases in the IT Service Lifecycle.

Table 2: Cross-country comparisons of ITIL process adoption levels			
ITIL Process	ITIL Volume	Marrone et al. 2009 data	Nordic 2010 data
Incident Management	Service Operation	94,9	73,6
Change Management	Service Transition	88,0	58,7
Problem Management	Service Operation	71,1	52,4
Service Level Management	Service Design	58,0	48,9
Request Fulfillment	Service Operation	27,1	44,2
Service Catalogue Management	Service Design	23,6	38,6
Information Security Management	Service Design	21,8	33,1
Transition Planning and Support	Service Transition	14,9	31,5

Table 2 Comparing the adoption level of Marrone et al.'s 2009 data with Nordic 2010 data for some specific ITIL-processes (highest scores in bold)

4.3 Cross-national analysis of ITIL adoption in the Nordic region

Non-parametric Kruskal-Wallis tests revealed that the mean adoption levels of ITIL processes as a whole were significantly different between the Nordic countries. This was evident for all three years combined ($p=.009$), marginally for 2010 ($p=.06$), evident for 2012 ($p=0.01$), but not for 2014 ($p=0.34$). To further explore the pairwise differences between the Nordic countries and to identify which ITIL processes that were differently adopted between the countries, we conducted a detailed analysis of the 2012 data using a Mann-Whitney U test which is similar to the Kruskal-Wallis test but limited to pairwise comparisons. Table 3 shows the results of pairwise cross-country comparisons identifying where significant international differences exist in the levels of process adoption in the Nordic region. As Table 3 shows, there are no significant differences between the level of adoption in Norway and Sweden. When comparing Denmark to Finland, only the adoption of the Evaluation process differs significantly. Many processes are significantly different when comparing Denmark to Sweden, and Finland to Norway and Sweden.

We then analyzed differences in mean process adoption levels for each ITIL process to further explore these process adoption differences. Table 4 shows that the highest adoption levels overall can be observed in Denmark and Finland (bold values).

Table 3: Significance of process adoption differences* (2012)						
Nordic Countries	Dk vs Fi	Dk vs No	Dk vs Swe	Fi vs No	Fi vs Swe	Swe vs No
ITIL processes						
Service Catalogue Management	-	-	-	.01	.01	-
Service Level Management	-	-	-	-	-	-
Capacity Management	-	-	-	.01	.01	-
Availability Management	-	.01	-	.00	.01	-
IT Service Continuity Management	-	-	-	.02	.05	-
Information Security Management	-	.01	.01	.01	.02	-
Supplier Management	-	.03	-	.00	.00	-
Transition Planning and Support	-	.03	.04	.01	.01	-
Change Management	-	-	.02	.03	.01	-
Service Asset and Configuration Management	-	.01	.01	.00	.00	-
Release and Deployment Management	-	.02	.04	-	-	-
Service Validation and Testing	-	.00	.01	.04	.04	-
Evaluation	.02	.00	.01	-	-	-
Knowledge Management	-	.00	.01	-	-	-
Event Management	-	-	.02	-	-	-
Incident Management	-	-	-	-	-	-
Problem Management	-	-	-	-	-	-
Request Fulfillment	-	-	-	.01	.00	-
Access Management	-	.00	.01	.00	.00	-
Service Desk	-	-	-	-	-	-

*Based on Mann-Whitney U Test, significance level 0.05

Table 3 Pairwise differences in levels of ITIL process adoption between the Nordic countries

Table 4: Mean ITIL process adoption in the Nordic countries (2012)				
Nordic Countries	DK %	FI %	NO %	SWE %
ITIL processes				
Service Catalogue Management	38.0	53.6	36.6	38.7
Service Level Management	49.4	55.1	46.1	46.7
Capacity Management	28.6	36.6	22.5	26.5
Availability Management	36.3	41.3	26.9	31.1
IT Service Continuity Management	37.4	44.1	28.7	32.7
Information Security Management	49.6	47.6	37.3	36.3
Supplier Management	41.0	49.1	32.9	30.4
Transition Planning and Support	46.2	44.6	31.8	37.5
Change Management	69.9	71.3	61.2	56.8
Service Asset and Configuration Management	49.4	54.5	31.3	37.2
Release and Deployment Management	54.8	46.6	42.9	45.9
Service Validation and Testing	46.7	43.8	35.8	36.9
Evaluation	36.3	30.0	25.2	32.1
Knowledge Management	39.4	34.0	22.0	28.3
Event Management	50.1	46.9	41.5	38.2
Incident Management	80.8	82.5	77.3	74.6
Problem Management	55.0	56.9	50.2	48.2
Request Fulfillment	60.6	66.0	56.3	56.9
Access Management	53.9	56.8	45.3	43.3
Service Desk	84.2	81.8	76.0	74.9
Mean ITIL adoption level	50.4	52.1	41.4	42.7

Table 4 The highest adoption level in the Nordic countries for each ITIL process (in bold), based on 2012 data

In general, Norway and Sweden score lower on the mean ITIL adoption level, and no single ITIL process has its highest adoption level in Norway or Sweden. Furthermore, we can analyze variations in adoption priorities by looking at how operational and tactical/strategic processes are prioritized. The operational processes are those described in the Service Transition and Service Operation books, while the tactical/strategic processes are described in the Service Strategy and Service Design books. Table 5 shows these differences. Overall, Denmark and Finland have adopted more in general than Norway and Sweden. Of the operational processes, Denmark scores highest followed by Finland. Norway and Sweden score substantially lower than Denmark and Finland. Same holds for the tactical/strategic processes where Denmark scores highest in 2010, and Finland substantially higher than the other Nordic countries in 2012 and 2014. Norway and Sweden scores consistently lower than Denmark and Finland. For all countries, we observed that operational level processes are prioritized above tactical/strategic level processes.

Country	Operational Process Level Adoptions			Tactical/Strategic Process Level Adoptions		
	2010	2012	2014	2010	2012	2014
Denmark	48.3	55.9	-	38.8	40.0	-
Finland	44.1	55.0	57.5	38.5	46.8	49.0
Norway	40.9	45.9	56.0	30.3	33.0	41.4
Sweden	42.7	47.0	47.7	31.7	34.6	37.5
All	42.7	49.3	54.3	32.7	36.8	43.7

Table 5 Variation in process adoption priorities in the Nordic countries

An overall analysis for all years combined revealed that these differences were significant for both operational level processes (Kruskal-Wallis test, $p=.00$) and tactical/strategic level processes (Kruskal-Wallis test, $p=.00$). More detailed analysis between countries revealed no significant differences between Denmark and Finland in 2010. Denmark prioritized significantly different on tactical/strategic processes in 2010 than both Norway (38.8 vs 30.3; $p=.02$) and Sweden (38.3 vs. 31.7; $p=.03$), whereas no significant differences were found between Finland, Norway and Sweden.

In the next year surveyed, 2012, no significant differences were found between Denmark and Finland. Denmark had significantly higher levels of operational process adoption than Norway (55.9 vs. 45.9; $p=.00$) and Sweden (55.9 vs. 47.0; $p=.00$), whereas Finland showed significantly different adoption priorities on both operational and tactical/strategic processes when compared to Norway (55.0 vs. 45.9; $p=.00$ for operational; and 46.8 vs. 33.0; $p=.00$ for tactical) and Sweden (55.0 vs. 47.0; $p=.00$; and 46.8 vs. 34.6; $p=.00$ for tactical). No differences were found between Norway and Sweden. The last year surveyed, 2014, did not include Denmark. Results showed no differences between Finland and Norway. Compared to Sweden, Norway had significantly higher adoption levels for operational processes (56.0 vs. 47.7; $p=.00$) and tactical/strategic processes (41.4 vs. 37.5; $p=.01$). Contrasted to Sweden, Finland showed significantly higher levels of both operational processes (57.5 vs. 47.7; $p=.00$) and tactical/strategic level processes (49.0 vs. 37.5; $p=.00$).

Marrone et al. (Marrone, et al., 2014) identified similar national differences in their study of Anglo-American (UK, US, AUS) and German speaking countries (D, A, CH), where the latter were found to have substantially higher adoption levels of both operational and tactical/strategic processes. Both groups of countries prioritized operational level processes higher than tactical/strategic level processes.

4.4 ITIL adoption by organization size

We analyzed the data from the three consecutive surveys (2010, 2012, 2014) in order to investigate whether and how organization size and country relate to variations in the adoption level of ITIL processes in firms in the Nordic region. The results are presented in table 6. The responding companies are categorized into three groups, small and medium sized, large and very large, following the categorization of Marrone et al. When looking at the "Total" row for the Nordic countries, we find that

there are only minor differences. Organization size does not seem related to the adoption level; there are no differences between small firms and very large firms when it comes to ITIL adoption level. This contrasts the results of the Marrone et al. study, where the highest adoption rates were reported from the smallest and the largest organizations, although the differences are only modest. See the “Total” row for the UK, USA, DACH and Australia countries.

Table 6 : ITIL adoption by organization size and country (2010)									
Size	Size ≤ 500 (SME)			Size 501-2000 (Large)			Size > 2000 (Very Large)		
Country	N	Mean	St.dev.	N	Mean	St.dev.	N	Mean	St.dev.
NO	63	36.3	19.2	36	33.3	17.2	74	40.2	14.0
SWE	37	43.1	20.5	23	39.1	18.9	74	37.2	18.0
FI	11	37.6	23.1	8	46.9	17.6	22	42.7	14.2
DK	9	39.2	20.7	9	36.9	13.1	32	48.9	17.3
Total	120	38.8	20.1	76	36.9	17.6	202	40.8	16.5
Size	Size ≤ 500 (SME)			Size 500-10000 (Large)			Size > 10000 (Very Large)		
UK	26	51.5	29.4	99	47.6	25.9	98	59.0	26.3
USA	20	40.0	24.3	65	34.7	20.8	61	44.0	26.6
DACH	12	74.7	24.2	31	74.3	24.3	15	77.6	23.2
Australia	14	36.0	22.3	148	39.9	23.9	34	47.7	26.1
Total	72	49.1	28.8	343	44.2	26.1	208	54.1	27.6

Table 6 ITIL adoption by organization size in different countries

To further explore differences between process adoption in the different size groups, we first conducted a non-parametric analysis of variance for all the surveyed years combined. A Kruskal-Wallis test revealed that there are significant differences between small, large and very large companies ($p=.04$) for all years combined. More specifically, large companies scored significantly lower on mean ITIL adoption (38.3; $p=.01$) than very large companies (43.5), whereas no significant differences were found between small and large companies, or between small and very large companies. When looking into each of the years surveyed, we found no significant differences in mean ITIL adoption in 2010. Significant differences occurred in 2012 when very large companies scored significantly higher on mean ITIL adoption (47.8) than both small (43.1; $p=.02$) and large companies (37.4; $p=.00$). No significant difference was found between small and large companies. In 2014, no significant difference was found between large and very large companies, but small companies scored significantly higher on mean ITIL adoption than large companies (52.7 vs. 46.6; $p=.01$) and very large companies (49.9; $p=.01$).

4.5 Variation by sector

As part of our study of ITIL adoption, we collected data from both private and public sector companies. Analysis of differences in process adoptions between sectors showed almost no differences in 2012, where Supplier Management was the only process that differed significantly between sectors. The remaining two years, 2010 and 2014, showed significant differences on most ITIL processes, as evident from Table 7. To further explore these differences we included and compared the mean process adoption levels for public and private sectors for 2014 in the table. Here, we can see in more detail how companies from different sectors are different, for example that the mean adoption level of Service Catalogue Management in private sector is substantially higher than in the public sector (26.4 vs. 21.9; $p=.01$). The opposite is observed for example for Incident Management (20.2 vs. 16.8; $p=.02$).

Table 7: Differences in ITIL process adoption between sectors					
ITIL processes	Significant Differences			Sector Mean 2014	
	2010	2012	2014	Private	Public
Service Catalogue Management	-	-	.01	26.4	21.9
Service Level Management	.00	-	.00	26.7	24.1
Capacity Management	.01	-	.00	22.4	23.2
Availability Management	.00	-	.00	26.3	28.4
IT Service Continuity Management	.00	-	.00	25.4	25.8
Information Security Management	.00	-	-	27.2	31.3
Supplier Management	.02	.01	.01	28.0	24.3
Transition Planning and Support	.01	-	-	29.2	30.8
Change Management	-	-	-	24.1	25.7
Service Asset and Configuration Management	-	-	.02	24.8	26.4
Release and Deployment Management	-	-	-	28.7	30.9
Service Validation and Testing	.00	-	-	25.1	30.1
Evaluation	.04	-	.03	25.7	26.6
Knowledge Management	.00	-	.01	23.9	22.6
Event Management	.01	-	.00	27.2	30.1
Incident Management	-	-	.02	16.8	20.2
Problem Management	-	-	.00	28.1	27.7
Request Fulfillment	.01	-	.01	27.2	30.5
Access Management	.01	-	.00	29.2	30.9
Service Desk	-	-	-	20.9	22.1

Table 7 Differences in ITIL process adoption between sectors

To further explore how process adoption differs between sectors, we analyzed the mean ITIL adoption levels. For 2010 and 2014 we found that the mean adoption levels were significantly higher in private sector companies than in public sector companies (2010: 42.2 vs. 35.0; $p=.00$. 2014: 54.9 vs. 42.2; $p=.01$). No significant difference was found between private and public sectors for 2012.

5 DISCUSSION

To examine the adoption of ITIL in the Nordic countries, four research questions were raised: RQ1: When did ITIL become popular in the Nordic countries? RQ2: What are the adoption levels of the individual ITIL processes in the Nordic countries? RQ3: To what extent are there adoption differences between the Nordic countries, and do they prioritize operational level processes and tactical/strategic level processes differently? And finally, RQ4: To what extent do factors such as organization size and sector relate to variations in the adoption of ITIL processes in the Nordic countries?

Although ITIL has been available since 1990, we find that it was first in the decennium from 2000 that IT managers in the Nordic countries set ITIL on their agendas. How can this be explained? One perspective is offered by DiMaggio and Powell (1991) who present both cognitive and cultural explanations of how an organizational phenomenon, like ITIL adoption, and the underlying motives by which this phenomenon are introduced and developed. They use the term isomorphism to understand why the processes and structure of one organization are similar to those of another. DiMaggio and Powell (1983) present three types of isomorphic pressure: coercive, normative, and mimetic. The Nordic chapters of itSMF were established in the early 2000-ies. The Norwegian itSMF chapter, for example, was established in 2003 in connection with the first annual Norwegian itSMF conference. These annual conferences gained enormous popularity, the Norwegian conference quickly attracted an audience of 500 attendees. The early conferences had a convincing agenda: motivate for ITSM and the adoption of ITIL. ITIL authors were invited to explain and promote the ITIL framework, and early adopters were presenting their experiences and benefits gained. In addition, a whole industry emerged at this time with

ITIL consultants, ITIL courses and certification schemes, and specialized ITIL software. These initiatives may collectively explain the high peak of ITIL projects initiated in the Nordic countries between 2006 and 2010. Using DiMaggio and Powel's institutional theory as a theoretical lens, it becomes evident that Nordic IT managers, in the early part of the 2000 decennium, experienced normative pressure from the various itSMF chapters, the numerous ITIL seminars and conferences, and from ITIL training and certification bodies, as well as from software vendors. Mimetic pressure was also evident, as IT managers in firms of various sizes and sectors want to imitate the industry leaders: the early adopters.

Our cross-national analyses of the adoption levels in the Nordic countries revealed significant differences between the Nordic countries. We found, when combining the data from all three surveys, that the highest adoption rates were observed in Denmark and Finland. There may be several explanations. First, it may be that there is a stronger focus on services and service management in Denmark and Finland compared to Norway and Sweden. A possibly more competitive IT market, together with a higher service climate and a more customer focused culture, may also explain why these countries have a higher ITIL adoption level than Norway and Sweden. These are issues for further research. However, when analyzing our data, a pattern emerge. The distribution of public and private sector firms varies between the two national groups. Denmark and Finland have a significantly lower percentage of respondents from public IT functions than Norway and Sweden: Denmark (23%), Finland (15%), Norway (40%), and Sweden (33%). If the distribution of public firms influences on the national adoption results, then we may interpret that public firms in the Nordic countries have a lower adoption level than private firms. Our data on sector variances supports this interpretation. Although our analysis of 2012 data showed no significant differences between sectors, the differences were significant on most processes in 2010 and 2014. Marrone et al.'s cross national analyses did also reveal a variation in adoption levels between the countries. The DACH countries were the most advanced. A venue for further research is to investigate if there are cultural similarities between the DACH countries and Denmark and Finland, and between UK/US/Australia and Norway and Sweden. At the more general level, further research should explore potential other reasons behind the national differences documented here as well as in previous studies (e.g. Marrone et al., 2014). One avenue could be to analyze adoption levels between specific industries that could indicate whether adoption differences are related to market condition, industry culture, service climate, use of IT, or other industry related factors.

Earlier case studies have revealed differences in how firms prioritize between the operational processes versus the more tactical/strategic level processes (Coelho & Rupino da Cunha, 2009; Flores, et al., 2010). Marrone et al. (2014) found that all countries in their study prioritized the operational processes highest. The difference was significant. Three operational processes exhibited adoption rates in excess of 50 percent, compared to only one tactical/strategic process. Although the actual adoption levels differ between the Nordic region and the regions studied by Marrone et al., the results from the Nordic study verify the situation: firms prioritize the operational processes. Marrone et al. interpret this as firms attempt to achieve "quick wins" by focusing on the operational, which they view as internal processes, first, and later concentrate on the tactical/strategic processes, which Marrone et al. view as more externally focused. The external processes, Marrone et al. argue, requires more coordination with customers and other business divisions. We view and interpret this differently. In our view, the Nordic countries' prioritization is customer-oriented. The processes with the highest adoption levels in their Nordic study, Incident Management, Change Management, Request Management, Problem Management, Access Management, Event Management and Service Level Management, all exhibited adoption rates in excess of 50 percent, are handling issues in the interface between the IT service provider and the customer/user. We interpret this as Nordic IT managers set the customer first. IT managers are using ITIL as an instrument to improve customer satisfaction and servitizing the IT operation. A recent study found ITIL adoption to positively influence IT service climate directly (Eikebrokk & Iden, 2016).

6 CONCLUSIONS

The IT Infrastructure Library (ITIL) was initially developed for government agencies in the UK in the eighties. Results from this research show that the framework has been widely adopted by both private and public firms in the Nordic countries. In fact, more private than public firms have participated in our research (459/211), this may indicate that private firms are more positive to utilizing best practice processes and initiate process-based transformations than public firms. Of course, there may be other explanations to the distribution.

Our research has identified interesting patterns in the adoption of ITIL in these four countries in the Nordic region. It seems that Norwegian and Swedish firms were the first adopters, while the mean values of adoption levels indicate that Danish and Finish firms quickly have followed up with higher adoption levels; a finding that may be explained by cultural differences or by the distribution of public and private firms in our data. Private firms have, overall, a higher adoption level than public firms. We also find that the operational processes are been prioritized, indicating that firms are addressing the challenges they face in managing the interface between themselves and the customer and user. The user-oriented processes, Incident Management, Change Management, Request Management, Problem Management, Access Management, Event Management and Service Level Management, have the highest adoption levels. On the other hand, it is somewhat alarming that important processes, for example the processes related to IT security (CIA: Confidentiality, Integrity, Availability), Availability Management, Capacity Management, Information Security Management, and IT Service Continuity Management, have somewhat low adoption levels. Considering the importance of stable and reliable IT services, we gently recommend that Nordic firms prioritize these processes in the years to come.

The results from this research help us better understand the regional influences when introducing process-oriented transformation into the IT function in firms. Country, sector and organization size influence the adoption on ITIL, and IT managers need to be aware of this. Especially those managing IT functions in international organizations.

This study has several weaknesses. First, our samples vary in size between countries and sectors and we deemed it outside of the scope of this exploratory paper to identify and potentially correct for sample biases. Our data is also longitudinal at an aggregated level only as an expression of the status in each of the Nordic countries as a whole. We regarded it as important for participation that we maintained anonymity and, as a result, we could not identify how the response of each individual company changed over time. Thus, it was not possible with our data to analyze within-company changes. Details on within-company changes in different contexts (e.g. country, size, sector and industry) are highly interesting as they could diagnose developments in barriers as well as enablers to adoption and outcomes within each specific company and potentially also explain cross-country differences. We suggest that to enable such detailed studies, both ITSMF chapters and academic institutions should consider cooperating in establishing panels of participating companies that could make such studies possible. Second, our data were not normally distributed and thus did not allow for parametric data analyses that have the best power to detect differences in the empirical observations. We chose a non-parametric approach here in response to the nature of our data. Further research should consider other responses to this problem, including using techniques that transform non-normal data allowing more powerful, parametric tests.

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