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THE SUCCESS OF SELECTIVE AND TOTAL OUTSOURCING OF FIRM-WIDE IT-INFRASTRUCTURE: AN EMPIRICAL EVALUATION

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Abstract

In literature, Information Technology outsourcing is often investigated as a generic phenomenon. In practice, outsourcing transactions and services are varying. Hence IT services can be outsourced selectively or as a whole. We investigate the outsourcing of firm-wide IT infrastructure, and evaluate empirically if the successes of selective and total outsourcing differ, as a whole and in technology and application related services. We utilize a new instrument to measure IT-outsourcing success. Not surprisingly, total outsourcers have more ambitious objectives than selective outsourcers, whereas there are no significant differences in outsourcing success for either service type. Our results imply that there is little connection between the targets and the success of outsourcing, since perceptions of success are similar despite different targets. Our results also indicate that evaluations of total outsourcing success dominate evaluations of individual success items. To practitioners we suggest that in order to achieve the objectives set for outsourcing, they must prioritize objectives clearly and measure their achievement repeatedly throughout the entire life-cycle of an outsourcing transaction.

Keywords: firm-wide IT infrastructure, IT-outsourcing objectives, IT- outsourcing success.

1 INTRODUCTION

Outsourcing, IT-outsourcing included, is one of the means by which enterprises attempt to improve the effectiveness and efficiency of their performance. IT-outsourcing has been investigated from many perspectives; why and how outsourcing decisions are made (e.g. Williamson, 1975; Porter, 1980; Lacity and Hirschheim, 1993), what type of relationships the outsourcing parties have (e.g. McFarlan and Nolan, 1995; Grover et al., 1996; Pinnington and Woolcock, 1997), what types of contracts are used (e.g. Walden, 2002; Beaumont and Costa, 2002; Lacity and Willcocks, 1998), or what the success factors of outsourcing are (e.g. Lacity and Willcocks, 1998; Hirschheim and Lacity, 2000; Barthélemy, 2001).

Many studies treat IT (outsourcing) as a generic phenomenon. In practice however, IT-outsourcing transactions address specific IT services, such as firm-wide IT infrastructure services – the focus of our study. Further, firm-wide IT infrastructure services may include dozens of different IT services (Weill and Broadbent, 1998), such as facilities management or application management services. It is logical to reason that outsourcing transactions may have different objectives and success factors depending on the width and depth of IT-outsourcing, that is, which services are outsourced, and for how long.

Firm-wide IT infrastructure excludes business-specific applications and other non-firm-wide IT services, and establishes the functional basis for business need fulfilment by providing necessary services internally or by outsourcing. A significant and growing part of IT investments is allocated to IT infrastructure (Broadbent and Weill, 1997). Enterprises must invest in IT infrastructure sufficiently to guarantee that other IT investments are not bottlenecked. The invisible firm-wide IT infrastructure often has a huge impact on a firm's working practices, and thus has to be in balance with the firm's strategies (Weill and Broadbent, 1998). In spite of its importance, IT-infrastructure is increasingly seen to add little value to business and to be most suitable for outsourcing (Cross et al., 1997).

The options and arrangements for IT-outsourcing transactions vary in many ways, as described by Hirschheim and Dibbern (2002). Selective versus total outsourcing is one of these alternatives. The study of Lacity and Willcocks (1998) for example, indicates that selective outsourcing has higher success rates than total IT-outsourcing. One may thus ask: Will selective outsourcing result in more successful firm-wide IT infrastructure outsourcing than total outsourcing?

The objective of our study is to answer this question by examining how the targets and successes of selective and total outsourcing of firm-wide IT infrastructure services differ. In the analysis, we apply a conceptually validated instrument developed to measure IT-outsourcing success, recently proposed by Dahlberg and Nyrhinen (2006). Our study contributes to existing knowledge by empirically exploring differences in outsourcing success evaluations, related both to targets and realized outcomes, by further validating the new instrument for measuring IT-outsourcing success, and by investigating the success of outsourcing firm-wide IT infrastructure services rather than IT services in general (or irrelative to the characteristics of outsourced IT services). An increased understanding of the success of firm-wide IT infrastructure outsourcing also has practical value, since the firm-wide infrastructure as a whole forms the necessary basis for the other IT investments of an enterprise.

Prior to presenting the results of the empirical analysis, we will describe IT infrastructure, IT-outsourcing, and outsourcing success in section two, and the methodology applied in conducting the research and in collecting data in section three. The results of statistical analysis and other findings are presented in section four, followed by a discussion of the importance and limitations of our findings.

2 FIRM-WIDE IT INFRASTRUCTURE, IT-OUTSOURCING, AND IT-OUTSOURCING SUCCESS

Firm-wide IT infrastructure is the base of budgeted-for IT capability, both human and technical, shared in the form of reliable services, and usually managed by an Information Systems (IS) unit (Broadbent et al., 1996). Figure 1 shows the layers of firm-wide IT infrastructure based on McKay and Brockway (1989) as elaborated by Weill and Broadbent (1998).

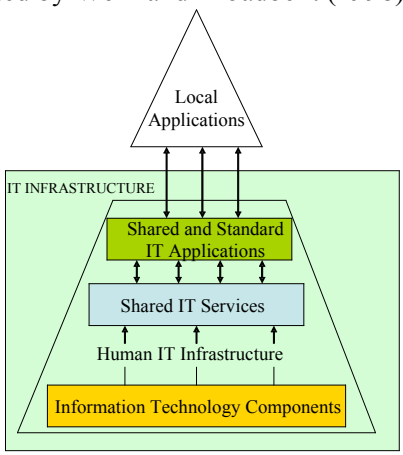

Figure 1: The components of IT infrastructure (Adapted from Weill and Broadbent, 1998, p.86)

The bottom, or first, layer, *information technology components*, consists of readily available off-the-shelf commodities, such as computers, printers, routers, database software and operating systems. The second layer, *human IT technology*, includes knowledge, skills, policies, standards and experience required for binding technology components to services consumed by layer 3. This third layer, *shared information technology services,* contains IT services which remain stable over time, such as the management of shared customer databases. The fourth layer, *shared and standard application,* addition made by Weill and Broadbent, consists of shared and standard firm-wide applications, which remain unchangeable for long periods. It is easy to understand why firm-wide IT infrastructure often establishes the basis for other IT services.

The (potential) number of information technology components and services in each layer has increased and continues to increase. The reason is the ever growing use of terminals, office systems, mobile technologies, telecommunication services, the Internet, digitalization of information, and new emerging IT technologies, as well as the increased need to manage IT risks and vulnerabilities. Especially due to the changed nature of IT risk management – such as protection against viruses and service attacks – the temporal stability of many IT infrastructure services has shortened dramatically. The meaning of firm-wide also migrates, as IT infrastructure services are used more and more by customers, vendors, employees and other stakeholders outside the premises of an enterprise.

According to Duncan (1995), data and software components are subsumed into IT infrastructure as they become "technically independent", that is, standardized, shareable, and reusable in a variety of present and future business implementations. Technical independence is at the same time relative. For this reason individual enterprises may include different components in IT infrastructure. For example, in some enterprises accounting IS could be a part of IT infrastructure, while in others not.

The factors described above – the growing number of IT infrastructure components and services, the changes in IT services stability, the migrating meaning of firm-wide, and differences in what data and software components are included in IT infrastructure - have several consequences. As an example at the practical level, every enterprise must from time to time define what is included, what could be included and what it is reasonable to include in their IT infrastructure. Weill and Broadbent (1998) listed 25 core and additional firm-wide IT infrastructure services nearly ten years ago. These services were used at varying frequencies by enterprises (from 100 to 16 %). A few years later, Weill and Vitale (2002) identified 70 services. For researchers who investigate the outsourcing of firm-wide IT infrastructure, the main consequence is the need to understand and control what is being outsourced in each specific case.

IT-outsourcing started in the 1960s as timesharing services. Since then IT-outsourcing has undergone several transformations and developed into a major and continuously growing IT services industry. This history can also be seen in how definitions of IT-outsourcing have developed (see e.g. Dahlberg and Nyrhinen, 2006). We define IT-outsourcing as a conscious decision to delegate by contract to an external service provider IT activities, processes and/or related services necessary to the operation of the organization. Outsourcing has specified objectives, and the goal of the outsourcing relationship is to impact their achievement positively.

Instead of IT-outsourcing in general, we focus on selective versus total IT-outsourcing. There are several theories (see e.g. Gottschalk and Solli-Sæther, 2005) which can be used to determine what to outsource and to which degree. For example, according to the resource-based view (RBV) of strategy, those resources which help an enterprise to increase its competitive advantage are decisive (Barney, 1991). Similarly, transaction cost theory (Williamson, 1985) suggests that decisions be based on production economies in services production. Determining the advisable degree of outsourcing is, however, beyond the scope of our study.

We follow the idea of Lacity and Willcocks (1998) for selective and total IT-outsourcing. *Selective outsourcing* means that the proportion of outsourced services is 20-80 % of the IT budget. *Total outsourcing* means that the proportion of outsourced services is over 80 % of the IT budget.

Similarly to firm-wide IT infrastructure and IT-outsourcing, the concept of **IT-outsourcing success** requires attention. In generic terms, IT-outsourcing success means that both the outsourcer and the vendor achieve their objectives, as defined by Misra (2004). This definition of IT-outsourcing success follows the goal-attainment based success model originally proposed by Venkatraman and Ramanujam (1987), and applied in several fields of study (e.g. by Sääksjärvi and Santonen, 2002).

Obviously the actions, characteristics, and relationships of various stakeholders have a significant impact on the success of outsourcing transactions (see e.g. Levina and Ross, 2003). Our study, however, contemplates IT-outsourcing success solely from the outsourcer's perspective, in accordance with the research tradition started by Grover et al., (1996). The multi-item instrument proposed by Grover et al. is probably the most widely used instrument for measuring IT-outsourcing success. Yet Grover et al. measures the absolute realized benefits, whereas our definition defines success as the difference between objectives and their achievement. For that reason, we have adopted the conceptually validated multi-item instrument proposed recently by Dahlberg and Nyrhinen (2006), which meets this definition of success and makes it possible to evaluate success both as absolute, realized benefits, and relatively, as the difference between objectives and results.

3 METHODOLOGY

3.1 Research Framework and Research Questions

The generic research framework of this study is to compare the success of selective and total outsourcing in firm-wide IT infrastructure-outsourcing transactions. Success is evaluated empirically with a 15-item survey instrument, which measures both target values and realized values for each of these 15 items. The generic research framework is refined concerning the following two issues: the grouping of IT infrastructure services, and the impact of selective outsourcing.

As section two showed, IT infrastructure is often difficult to specify. IT infrastructure was divided into four layers following the classification of Weill and Broadbent (1998). Presumably, another good way is to specify IT infrastructure as services, also proposed by Weill and Broadbent (1998). When doing so, outsourcing service users resemble consumers. They buy services based on an evaluation of the prices and other properties of services, such as reach, range (Keen, 1991), and quality. The possibility of evaluating the price and other properties of services provides a good basis for comparing outsourcing as an option to internal service production. Services can be further grouped into service clusters, as is done by Weill and Broadbent (1998). We apply the service and service group ideas in our study. The generic research framework is refined to include a comparison between different services, that is, between application and technology (hardware) related services.

Selective outsourcing has proved to be more successful than total outsourcing, as measured by cost savings (Apte et al., 1997; Lacity and Willcocks, 1998), and as overall success (Collins and Millen, 1995; Willcocks and Choi, 1995). What factors could explain this finding? Firstly, ability to select the most suitable services for outsourcing (Grover et al., 1996). In total outsourcing such selective choices cannot be made, because over 80% of IT services are outsourced. Secondly, ability to select the right vendor(s) (Lacity et al., 1995). Usually a total outsourcing transaction has one main vendor. The outsourcer might become totally dependent on the vendor, and the vendor may start to dominate the relationship (Kern, 1997; Pinnington and Woolcock, 1997). Thirdly, success starts from the objectives of outsourcing. It is necessary to prioritize objectives, to include the prioritized objectives in the legal outsourcing contract(s), and also in the so called "psychological contract(s)" (Koh, 2004). The psychological contract means the need to communicate individual beliefs and perceptions concerning such obligations to the counterpart. Total outsourcing transactions are often alluded to as a strategic partnership (Willcocks and Choi, 1995). The concepts of partnership or strategic alliance may hide the need to prioritize objectives. Does this evidence also indicate that selective outsourcing results in more successful firm-wide IT infrastructure outsourcing than total outsourcing?

Based on the discussion above, we have formulated the following research questions:

RQ1: Does the selective outsourcing of firm-wide IT infrastructure lead to better success than total outsourcing, as measured by relative success measures (difference between objectives and outcomes)

RQ1a Does the selective outsourcing of firm-wide IT infrastructure lead to better success than total outsourcing in information services of the technology components layer

RQ1b Does the selective outsourcing of firm-wide IT infrastructure lead to better success than total outsourcing in services of the shared and standard application layer

RQ1c Does the selective outsourcing of firm-wide IT infrastructure lead to better success than total outsourcing as a whole

RQ2: Does the selective outsourcing of firm-wide IT infrastructure lead to better success than total outsourcing as measured by absolute success measures (objective and outcome measures)

RQ2a Does the selective outsourcing of firm-wide IT infrastructure lead to better success than total outsourcing in services of the information technology components layer

RQ2b Does the selective outsourcing of firm-wide IT infrastructure lead to better success than total outsourcing in services of the shared and standard application layer

RQ2c Does the selective outsourcing of firm-wide IT infrastructure lead to better success than total outsourcing as a whole

3.2 Measurement of Key Variables

The instrument adopted to measure IT-outsourcing success is shown partially in Appendix 1. As the conceptual validation of the instrument is covered in Dahlberg and Nyrhinen (2006), we here review how the outsourcing success measures were constructed and used in this study. The fifteen-item survey instrument asked respondents to indicate how important each of the items was as an IT-outsourcing objective, and how well each particular objective was achieved. Both the importance and the achievement measures were evaluated with a 7-point fully agree/disagree Likert scale. From the 15 pairs of objective and outcome measures we constructed fifteen relative success measures, by calculating the difference between the importance of the each objective and the achievement of that objective. As noted earlier, this approach is grounded in the goals-attainment based success model proposed by Venkatraman and Ramanujam (1987).

In order to affiliate outsourcing measures with definitions of firm-wide IT infrastructure (McKay and Brockway, 1989; Weill and Broadbent, 1998), and still keep the questionnaire simple and clear, the outsourcing evaluations described above were divided into two parallel sets to capture differences between services. With two sets of questions we asked respondents to evaluate the importance of objectives, and the achievement of objectives for *information technology components,* and for *shared and standard IT applications* -related services. To make sure that the respondents understood these two IT infrastructure layers in the same way, brief descriptions and practical examples of *technology* and *application* -related services were given. Technology-related services with relevant support and training include telecommunications management, and hardware and facilities planning, monitoring and control. Applications-related services with relevant support and training include applications production, management and support services. Both layers also include necessary services in the following areas; data management, security, channel management, IT-research and development, training and education in the use of IT. The description and examples of technology-related services were thus matched with the definition for the information technology components layer of the IT infrastructure provided in section 2. Similarly, the description and examples of application-related services were matched with the definition for the shared and standard IT applications layer. Shared IT services were implicitly included in both layers.

The following success measures were constructed for statistical analysis. First, the *relative technology success* variable was formed as the average value of the fifteen individual success measures. This measure evaluates the relative IT-outsourcing success of the services in the information technology components layer. Similarly, the *relative application success* variable was formed to evaluate services in the shared and standard IT applications layer. Finally, the average value of the combined relative technology and application success measures was formed as the *overall outsourcing success* variable. Variables measuring absolute objective levels and absolute success levels were constructed similarly.

The degree of outsourcing was measured as the proportion of firm-wide IT-infrastructure services produced, developed and administrated by outside vendor(s). Both technology and application -related services were addressed. As explained earlier, we applied the classification idea of Lacity and Willcocks (1998) although we did not use IT budget as the measure of outsourcing. Instead of IT budget we used the degree of outsourcing indicated by the respondents as the measure. Note that this is a perception measure. An observation was included in the *total outsourcing group* if 80 percent or more of technology and application -related IT infrastructure service charges were assigned to outside vendor(s). An observation was included in the *selective outsourcing group* if the proportion of outside vendor(s) was 20 percent or more but less than 80 percent. For additional statistical analysis, we split the selective outsourcers into two groups; 12 companies had outsourced 20 percent or more but less than 50 percent of their firm-wide IT infrastructure services, and 26 companies 50 percent or more but less than 80 percent.

We also collected demographic background information about the respondents and the enterprises. Financial background information was received from the Balance Consulting financial statement database (www.balanceconsulting.fi).

3.3 Data Collection and Responses

Empirical IT-outsourcing studies often suffer from low response rates (Barthélemy and Geyer, 2005). To ensure an adequate amount of data for statistical testing, our pre-tested mail survey questionnaire was sent to the 1000 biggest Finnish companies in the spring of 2005. The TOP 1000 ranking was taken from the Balance Consulting financial statement database, which covers approximately 85% of Finnish business volume as measured by annual turnover. The mail survey questionnaire was addressed to the CIO or person responsible for IT-outsourcing. These IT executives were deemed to have the best knowledge concerning the outsourcing of firm-wide IT infrastructure.

After two months, which included an additional mailing and a reminder phone call round, we had received responses from 190 companies, indicating a 19% response rate. We had to omit nearly half of the responses for two main reasons: companies had not outsourced IT infrastructure, or they did not have firm-wide IT infrastructure. This left 94 usable responses. Of these 94 companies, 38 were classified as selective outsourcers (i.e. the degree of outsourcing for both technology and application -related services met the criteria of selective). Following the same principle, 22 companies were classified as total outsourcers. This very strict classification was carried out in order to enhance and amplify possible success differences between these two groups. Based on the demographic profiles of respondents (table omitted) and companies (table omitted) shown, we became convinced that our data is adequate for the evaluation of success differences between selective and total firm-wide IT infrastructure outsourcing.

4 RESULTS

4.1 The Unidimensionality of IT Infrastructure-Outsourcing Success Measures

Since the outsourcing success instrument used by us had only been conceptually validated, we deemed it necessary to empirically validate the unidimensionality of our outsourcing measures. In order to

create reliable combined relative and absolute success measures, as described above in the Measurement of Key Variables section, all sets of fifteen objectives and the realized benefit measures had to achieve unidimensionality. The level of internal consistency of the chosen outsourcing measures was evaluated using Cronbach's alpha test (Cronbach and Meehl, 1955)

Cronbach's alpha tests showed that evaluations for both the importance of the objective, and the absolute achievement of objectives for technology and application -related services reached acceptable internal consistency. All reliability coefficients were above the suggested cut limit value of 0.700 (O'Rourke et al., 2005; Nunnally, 1978). Based on these results, we became assured that our combined relative success measures are logically solid and unidimensional.

Table 1 provides descriptive statistics concerning the averages and distribution of all combined measures. Table 1 shows that total outsourcers have more ambitious targets for outsourcing than selective outsourcers, especially for technology-related services. The mean values of the absolute level objectives and achieved results are fairly close in all groups, although selective outsourcers seem to have succeeded relatively slightly better, especially if only 20 to 50 % of services have been outsourced. Differences are also more visible in technology-related services.

	Total outsourcers (N=22) (≥80 %)		**Selective outsourcers all (N=38) (≥20% - 80%≤)**		**Selective outsourcers low (N=12) (≥20% - 50%≤)**	
Variable	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Objectives						
Technology-related	5,452	0, 726	5,050	0, 801	4,792	0,948
Applications-related	5,321	0,717	5,075	0,773	4,835	0,849
Total objectives	5,386	0,696	5,063	0,759	4,814	0,860
Absolute success						
Technology-related	5,258	0,754	5,184	0,860	5,222	0,841
Applications-related	5,131	0,809	4,988	0,833	4,871	0,766
Total objectives	5,195	0,776	5,086	0,780	5,047	0,760
Relative success						
Technology-related	-0,193	0,919	0,134	1,156	0,430	0,989
Applications-related	-0,190	1,017	-0,087	1,113	0,036	0,924
Total objectives	-0,192	0,941	0,023	1,091	0,233	0,927

Table 1. Comparison of the absolute and relative success measures between total outsourcers (N=22), all selective outsourcers (N=38), and 20-50 % outsourcers (N=12)

4.2 Comparison of Relative Outsourcing Success

The independent samples t-test procedure was conducted to test the significance of the mean difference between the outsourcing success of the total and the selective groups. The t-test was run for all the three success measures defined in the chapter Measurement of Key Variables. The results of this test are presented in Table 2.

	Levene's test for equality of variances		T-test for equality of means.				
Variable name **Relative success of**	**F**	**Sig.**	**t.**	**df**	**Sig. (2-tailed).**	**Mean Diff.**	**Std. Error Diff.**
Technology-related services	0,917	0,342	1,137	58	0,260	-0,328	0,288
Application-related services	0,243	0,624	0,356	58	0,723	-0,103	0,289
Total for all services	0,306	0,582	0,773	58	0,443	-0,215	0,278

Table 2. Comparison of the relative success between total outsourcers (N=22) and selective outsourcers (N=38)

The Levene test clearly indicated that the variances of the total and selective outsourcer groups were equal for all success measures (i.e. significance is higher than 0.05). Thus, contrary to our assumptions, we were unable to identify significant mean differences between the total and the selective outsourcer groups in firm-wide IT-outsourcing success, even though relative success was slightly higher for selective outsourcers.

To investigate further possible success differences between total and selective outsourcers, we next compared the relative success measures of total outsourcers and those selective outsourcers who had outsourced between 20 and 50 %. The results of this more polarized t-test are shown in Table 3.

	Levene's test for equality of variances		T-test for equality of means.				
Variable name **Relative success of**	**F**	**Sig.**	**t.**	**df**	**Sig. (2-tailed).**	**Mean Diff.**	**Std. Error Diff.**
Technology-related services	0,014	0,906	1,841	32	0,075	-0,623	0,339
Application-related services	0,027	0,871	0,638	32	0,528	-0,226	0,354
Total for all services	0,032	0,860	1,264	32	0,215	-0,425	0,336

Table 3. Comparison of the relative success of total outsourcers (N=22) and those selective outsourcers who have outsourced 20-50 % (N=12)

Again the Levene test indicated that the variances of the two groups were equal. Interestingly however, it appeared that the mean difference for technology-related services was nearly significant (significance level 0,075) in favour of the selective outsourcers, who had outsourced between 20-50 % of their firm-wide IT infrastructure.

This observation encouraged us to compare the success measures of these two groups at a more detailed level. Two possible scenarios were created. *Either* the level of set objectives (scenario one) *or* the level of absolute success (scenario two) might differ significantly between the groups. The third round of t-tests compared the mean values of the combined objectives measures and the combined realized absolute benefits between total outsourcers and selective outsourcers. Table 4 shows the results of this comparison of total outsourcers, and selective outsourcers who had outsourced 20 to 50% of their firm-wide IT infrastructure.

	Levene's test for equality of variances		T-test for equality of means.				
Variable name **Evaluated combined objective level of**	**F**	**Sig.**	**t.**	**df**	**Sig. (2-tailed).**	**Mean Diff.**	**Std. Error Diff.**
Technology-related services	0,620	0,437	-2,270	32	0,030*	-0,659	0,290
Application-related services	0,679	0,416	-1,771	32	0,086	-0,486	0,274
Total for all services	0,982	0,329	-2,109	32	0,043*	-0,573	0,271
Evaluated combined absolute success level of							
Technology-related services	0,111	0,741	-0,127	32	0,899	-0,036	0,282
Application-related services	0,175	0,678	-0,912	32	0,368	-0,260	0,285
Total for all services	0,107	0,746	-0,535	32	0,596	-0,148	0,277
Note: Description of the variables (*) denote two-tailed significance at 0.05 confidence level.							

Table 4. Comparing the set objectives and the absolute level of achievement of the set objectives of total outsourcers (N=22) and those selective outsourcers who have outsourced 20-50 % (N=12)

Once again the Levene test indicated that the variances of the goal and the absolute success measures were equal among total outsourcers, and selective outsourcers as a whole (N=38). The results of this test are not reported here, since no significant differences were found. However, our first scenario led us in the right direction. The level of set objectives for the outsourcing of technology-related services was significantly higher in the total outsourcer group. The difference between the means was 0,659 (significance level 0,030). Furthermore, the difference between the levels of set objectives for application-related services was nearly significant, which explains why also the levels of total goals differed significantly (significance level 0,043). In addition, it is useful to notice that the difference between the means of objective levels for technology-related services were nearly statistically significant (confidence level 0,058) for total outsourcers and selective outsourcers as a whole. Most interestingly, the absolute level of objective achievement did not differ significantly in either of the investigated IT infrastructure layer services (the results of statistical comparisons are not included as no statistically significant differences were discovered). This seems to indicate that there is little connection between objectives set and realized success. Additional correlation analysis (table omitted) confirmed this assumption.

As a result of the above tests, we are convinced that our data does not support the claim that selective outsourcing generates better success rates than total outsourcing when the target of outsourcing is firm-wide IT infrastructure. Instead we suggest that the level of set objectives – not the relative or absolute success - differs between total and selective outsourcers. Our results indicate that enterprises which have chosen the total outsourcing strategy expect and set higher benefit requirements for outsourcing than do enterprises with a selective outsourcing strategy, but they experience similar success levels – both relative and absolute – as enterprises with a selective outsourcing strategy.

5 DISCUSSION AND CONCLUSION

The common, practical rule-of-thumb is to outsource non-core activities. Firm-wide IT infrastructure is often perceived as being in this role. According to prior studies, selective IT-outsourcing provides better results than large-scale IT-outsourcing (Lacity and Willcocks, 1998). Prior studies have also investigated how separate IT functions are outsourced (e.g. Collins and Millen, 1995; Apte et al., 1997). However, these studies have not investigated the success of firm-wide IT infrastructure services outsourcing. Thus our study contributes to existing knowledge by evaluating the success of firm-wide IT infrastructure overall, and by comparing the success of selective and total outsourcing. We do this with the help of a new, conceptually validated instrument for measuring IT-outsourcing success, which applies the goals-attainment based success model. Finally, in our study IT infrastructure services are divided into technology and application -related services, and the selective versus total outsourcing comparison covers both service layers.

Contrary to the results of previous studies, we found no statistically significant differences between selective and total outsourcers in either layer of IT infrastructure services. These results guided us to examine differences in the objectives of outsourcing, and to divide selective outsourcers into two groups. We discovered that total outsourcers placed more ambitious objectives for firm-wide IT infrastructure outsourcing than did selective outsourcers, especially in technology-related services. We also noticed that those selective outsourcers who had outsourced over 50 % of their firm-wide IT infrastructure services made evaluations similar to those of total outsourcers. Taken together, these findings seem to indicate that there is no connection between the targets and the success of outsourcing, since in spite of different target levels the achieved success levels are similar. As no significant differences were detected in the measure of success, our results also seem to imply that enterprises can select either the selective or the total outsourcing strategy and still reach similar success levels, both relatively and absolutely, for technology and application -related services. The unidimensionality of the 15 success measures is also an interesting finding. This finding seems to indicate that the overall evaluation of outsourcing success dominates the evaluations of individual

success attributes, that is, if outsourcing is deemed successful, all measures receive high values and vice versa.

There are several possible explanations for these results Firstly, total outsourcers may find it difficult to prioritize objectives, and may thus fail to communicate their expectations clearly to vendors, especially concerning technology-related objectives. Secondly, our measures are ex post survey evaluations. As the time interval between the setting of objectives and results can be fairly long, it is possible that the instrument used has not captured true objectives. However, it can be reasoned that the difference between objectives and actual success measures is more likely to be wider than narrower as compared to our findings.

Our study is subject to several limitations. The statistically analyzed evaluations are momentary perceptions collected mainly from CIOs, rather than documented measures covering several periods. Actual documented objectives and repeated fact-based measures may produce different results, but are also difficult, if not impossible, to collect for statistical testing. Similarly, the collection of data from CIOs may produce biased results, e.g. as respondents may have evaluated their own actions. Relevant information may, however, be impossible to collect otherwise. The division of IT infrastructure services into technology and application -related services is also rather crude, and does not cover all layers or clusters of IT infrastructure services. Different results could perhaps be obtained by comparing maximally different IT infrastructure services. Again, collecting a sufficient amount of observations may prove very difficult. For example, we were not able to statistically investigate outsourcing of management-related IT infrastructure services, due to the limited number of responses. On the other hand, the limited number of responses endorses claims that management-related IT service should never be outsourced (Mata et al., 1995). The risks of IT-outsourcing were excluded from our study. This issue could be covered in future studies, for example by investigating whether selective outsourcing is less risky than total outsourcing. If there are no differences in success measures, possible differences in risk levels are significant. Finally, the amount of data which allowed the examination of selective and total outsourcers was relatively small.

In spite of these concerns, we conclude that our study has increased knowledge about the impact of firm-wide IT infrastructure outsourcing. Our main advice to practitioners is that they should pay more attention to the setting of objectives. If the aim is to achieve the objectives set for IT infrastructure outsourcing, the objectives must be very clearly prioritized, and their achievement measured repeatedly throughout the entire life-cycle of an outsourcing transaction. To researchers our study opens several venues for investigating how it might be prudent to outsource firm-wide IT infrastructure services.

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Appendix 1 – Questionnaire

E. The Success of IT-Infrastructure Outsourcing

For each question, circle the appropriate markings to indicate, from the viewpoint of the firm as a whole, how significant the objective mentioned was for the decision to outsource IT-infrastructure services, and how well that objective has been achieved (present situation). <u>*Respond for those services which have been outsourced.*</u>

E1_1. Our objective was ***to increase concentration on core business***.
E2_2. Our objective was to improve ***the capability of IT to support the needs of business operations.***
E3_1. Our objective was to improve ***the management of technology and human resources***.
E4_1. Our objective was ***to increase the number of IT-based innovations.***
E5_1. Our objective was ***to reduce the number of IT-staff***
E6_1. Our objective was to ***reduce IT-expenditure.***
E7_1. Our objective was to improve ***financial freedom and flexibility*** (releasing capital, flexibility in budgeting and investments).
E8_1. Our objective was to improve ***control over IT-expenditure.***
E9_1. Our objective was to ensure ***the availability of*** necessary or new ***technology***.
E10_1. Our objective was to ensure ***the availability of*** necessary or new ***IT-skills***.
E11_1. Our objective was a ***standardized IT-environment*** (hardware, software, processes).
E12_1. Our objective was a well ***functioning IT-environment***.
E13_1. Our objective was to improve the ***quality of services*** (a safe, reliable service corresponding to our needs, capable of adapting to individual requirements).
E14_1. Our objective was to improve ***the availability of services*** (e.g. more services, 7d/24h).
E15_1. Our objective was to improve ***user satisfaction***.

E *x*_2. We have achieved the objective very well.