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UNDERSTANDING THE RELATION BETWEEN INFORMATION TECHNOLOGY CAPABILITY AND ORGANIZATIONAL PERFORMANCE

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UNDERSTANDING THE RELATION BETWEEN INFORMATION TECHNOLOGY CAPABILITY AND ORGANIZATIONAL PERFORMANCE

Research in Progress

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Abstract

Influenced by the resource-based view (RBV), we examined the understudied relationship between IT capability and organizational performance for small Dutch Not-For-Profit organizations (NFPs). We conceptualized IT capability as four separate IT competencies: IT alignment, technical, relational and employee IT competence and used survey data collected from 112 respondents. Our results show that IT alignment, relational and employee IT competence impact organizational performance positively. On the contrary, technical IT competence has negative impact on organizational performance. Our study provides preliminary empirical evidence to better understand the relation between IT capability and organizational performance of NFPs.

Keywords: IT capability, Resourced-based view, IT capabilities, Not-for-profit

1 Introduction

The world of Not-For-Profit organizations (NFPs) is changing rapidly because of economic and technological challenges (Hackler & Saxton, 2007). Due to these economic and technological challenges, NFPs are not only increasingly in direct competition with for-profit organizations, they are also struggling to fill the gaps caused by financial cutbacks (Boateng, Akamavi, & Ndoro, 2016; Hackler & Saxton, 2007). At the same time, donors increase pressure on NFPs to demonstrate their impact on complex social problems and spur demand for greater oversight and accountability (Boateng, Akamavi, & Ndoro, 2016; Hackler & Saxton, 2007).

These challenges could be addressed, at least to some degree, by the use of IT (Burt & Taylor, 2000, 2003). However, actually implementing IT is a considerable undertaking, which NFPs have been slow in exploiting (Goldkind, 2015; Hackler & Saxton, 2007). Possible explanations of slow adoption are: limited IT budget (Dukler, 1989), limited top management support (Berlinger & Te'eni, 1999) and insufficient training of employees (Saidel & Cour, 2003).

Empirical research on the relation between IT and organizational performance for NFPs is scarce (Finn, Maher, & Forster, 2006; Lecy, Schmitz, & Swedlund, 2012; Umopathy & Connolly, 2017). Available empirical studies primarily assess the specific use of IT (e.g. use of social media), and they are fragmented along disciplinary lines (Lecy, Schmitz, & Swedlund, 2012). This demonstrates the need for further empirical research.

This study addresses the above-mentioned gaps by examining the relation between IT capability and organizational performance of NFPs. A notable study in this area is conducted by Hackler & Saxton (2007) as they examined the impact of IT capability on organizational performance based on a frequency analysis. Our study tests the relation between IT capability and organizational performance and we aim to answer the following research question: *How does IT capability enhance organizational performance for Not-For-Profit organizations (NFPs)?*

An organization’s capacity to leverage the potential of IT is referred to as IT capability (Bharadwaj, 2000). IT capability manifests itself through IT competencies, which in turn are antecedents for effective deployment of IT resources (Hackler & Saxton, 2007). We conceptualize IT capability as four distinct IT-competencies: IT alignment competence, employee IT competence, relational IT competence and technical IT competence. As recommended by Boateng, Akamavi, & Ngoro (2016), we conceptualize organizational performance as three distinct constructs: stakeholder management, managerial effectiveness and financial performance. Figure 1 presents our research model and depicts the relation between IT capability and organizational performance.

Using a survey, we collect data from 112 NFP-managers within The Netherlands. We perform exploratory and confirmatory factor analysis to determine the adequacy of our measurement instruments and use regression analysis to test our hypotheses. We find that employee IT competence positively impacts all three types of organizational performance. The impact of both IT alignment and employee IT competence is positive, but differs per performance construct. Technical IT competence only impacts organizational performance through management effectiveness, yet its relation is negative.

In the next section, we elaborate on our theoretical background, research model and present our hypotheses. The Section “Research method” discusses our survey development and measurements. The analysis and results are presented in Section “Results”. Finally, we discuss our results, limitations and present avenues for future research in the “Discussion” section.

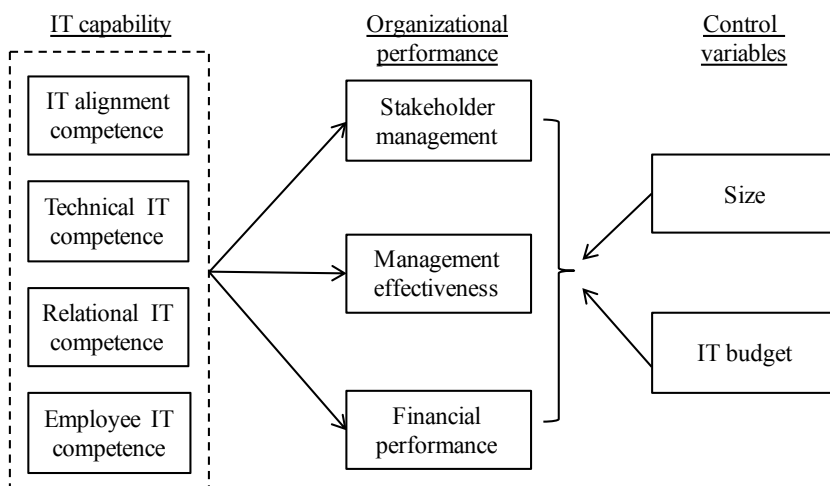


Figure 1. Research model

2 Theoretical Background

The resource-based view (RBV) of the firm is a framework that allows information systems scholars to think about the link between IT and organizational performance (Wade & Hulland, 2004). The RBV posits that management is responsible for allocating resources and developing competencies that enable their organization to achieve competitive advantage (Barney, 1991; Wade & Hulland, 2004). The difference between resources and capabilities is that resources can be exchanged (e.g. human resources) and capabilities are firm-specific processes that cannot readily be exchanged (e.g. software development culture) (Santhanam & Hartono, 2003).

Impact of the RBV and the link between IT and organizational performance have predominantly been studied in the for-profit (FP) sector (Melville et al. 2004; Wade & Hulland, 2004). However, differences between FP and NFP sector are fading. Rojas (2000) noted that NFPs were increasingly being challenged by FP organizations and, as a reaction to current pressures, NFPs implemented practices of the FP organizations. There are limited NFP studies available that empirically examine the relation between IT capability and organizational performance (Finn, Maher, & Forster, 2006; Lecy, Schmitz, & Swedlund, 2012). Therefore, we theorize the relation between IT capability and organizational performance based on for-profit studies.

2.1 Link between IT and organizational performance for NFPs

Studies that investigate the link between IT and organizational performance of NFPs often find mixed results (Goldkind, 2015; Herzlinger, 1977; Kobelsky, Larosiliere, & Plummer, 2014; Lee, Chen, & Zhang, 2001). Some studies find support for an enabling role of IT, where IT improves quality of service (Dukler, 1989), the ability to raise funding (Schneider, 2003) and communication with stakeholders (Guo & Saxton, 2014). By contrast, other studies find mixed results where NFPs are using the simplest form of IT (i.e. having a website) and fail to exploit their online presence (Geller, Abramson, & Leon, 2010).

2.2 Organizational Performance

Efficient and effective deployment of IT may influence the performance of NFPs. However, there is no consensus on a standardized set of performance measures to evaluate NFPs (Boateng, Akamavi, & Ndoro, 2016). In fact, some scholars argue that there are as many models for measuring organizational performance, as there are studies of the same topic (Sowa, Selden, & Sandfort, 2004). Boateng, Akamavi, & Ndoro (2016) recommend using a multitude of measures to evaluate the performance of NFPs, such as: financial measures, management effectiveness, stakeholder involvement, client satisfaction and benchmarking.

Building on work of Boateng, Akamavi, & Ndoro (2016), we identify three types of organizational performance: stakeholder management, management effectiveness and financial performance.

Stakeholder management refers to the ability of the organization to use IT in order to establish, sustain and improve relationships with stakeholders (Boateng, Akamavi, & Ndoro, 2016; Tallon, Kraemer, & Gurbaxani, 2000). *Management effectiveness* refers to the ability of the organization to plan, support, produce and market their services (Boateng, Akamavi, & Ndoro, 2016; Tallon, Kraemer, & Gurbaxani, 2000). *Financial performance* refers to the ability of the organization to improve financial performance by outperforming competition (Boateng, Akamavi, & Ndoro, 2016; Ravichandran & Lertwongsatien, 2005).

2.3 IT capability and hypothesis development

Extending the work of Hackler & Saxton (2007) and Bipat et al. (2015), we conceptualize four IT competencies that encompass previous conceptualizations: IT alignment competence, technical IT

competence, relational IT competence and employee IT competence. We define *IT alignment competence* as the degree of cooperation between IT employees and their business counterparts (Gerow, Grover, Thatcher, & Roth, 2014). *Technical IT competence* is defined as the deployment of technology such that information is exploited to drive execution and improvements (Wixom & Todd, 2005). *Relational IT competence* is defined as the co-creation of value by outsourcing and/or sharing organization-specific assets with a third party (Dyer & Singh, 1998). *Employee IT competence* is defined as the ability of IT employees to efficiently and effectively contribute to organizational objectives with the use of IT (Lepak & Snell, 2002).

Not-for-profit sector scholars emphasize that IT is an important facilitator for NFPs to achieve their mission (Schneider, 2003). IT has the potential to ease administrative work, to share information and to change the way relationships are established and maintained (Seth, Maher, & Forster, 2006). IT can also create risk, such as organizational dependence on technology. For example, it is both technically challenging as well as expensive to limit the risk of information security breaches (Zhang, Gutierrez, Mathieson, & Wei, 2010). Nevertheless, similar to Hackler & Saxton (2007), we expect that close interaction between IT employees and their business counterparts is required for successful IT implementations. Hence, we hypothesize:

H1: IT alignment competence is positively associated with organizational performance.

Every organization needs a basic technical infrastructure to use IT (e.g. for administrative purposes). To deploy IT for strategic initiatives requires a combination of competencies (Melville, Kraemer, & Gurbaxani, 2004). Effective use of IT enables NFPs to meet stakeholders' expectations regarding proposal quality of future funding (Schneider, 2003). Furthermore, effective use of IT may also level the playing field for small NFPs and enable them to better compete against larger NFPs (McNutt & Bolland, 1999). The use of social media technologies (e.g. Twitter and Facebook) enables NFPs to reach and mobilize stakeholders outside of their own network (Guo & Saxton, 2014). Hence, we hypothesize:

H2: Technical IT competence is positively associated with organizational performance.

NFPs need considerable outside assistance to help them with effective use of their IT (Hackler & Saxton, 2007). Existing literature on 'outside assistance' (e.g. leveraging knowledge of IT vendors) focuses on collaborative relationships (Dyer & Singh, 1998). Organizational leaders that appreciate the benefits of collaborative relations may increase the education of their own IT employees, which in turn may improve organizational performance (Hackler & Saxton, 2007). By doing so, NFPs are able to focus on core activities and could outsource non-core activities to reduce overhead. Hence, we set forth the following hypothesis:

H3: Relational IT competence is positively associated with organizational performance.

Organizations with skilled IT employees that understand the culture and routines of the organization, are more likely to deliver effective services (Bhatt & Grover, 2005). However, many NFPs struggle to find skilled IT employees that enable them to reshape their internal processes and redefine relationships with individual citizens (Geller, Abramson, & Leon, 2010; Goldkind, 2015). Similar to small for-profit organizations, NFPs executives perform many front and back offices functions themselves, leading to dissatisfied performance (Pope, Key, & Saigal, 2015). Furthermore, when IT employees are not trained properly to use the systems, it is likely that they will use the systems less efficiently and effectively. NFPs need to enhance the experience and educational levels of their IT employees to jump this hurdle (Hackler & Saxton, 2007). Hence, we hypothesize:

H4: Employee IT competence is positively associated with organizational performance.

In this study, two control variables are used: size of the organization in FTE and IT budget in Euros per year. Size controls for prior success of the organization. IT budget controls for the amount that can be spent to impact organizational performance.

3 Research method

3.1 Survey development

To test our hypotheses, we developed a survey based on validated measurement instruments derived from for-profit studies. To achieve an adequate fit between our survey and our respondents, terms such as *profit* and *client* were changed into *performance efficiency* and *stakeholder*, respectively. We pre-tested our survey using the three-step test-interview of Hak, Van der Veer, & Jansen (2004).

Since our respondents are Dutch, we translated our survey from English to Dutch. To preserve the meaning of the survey items, the survey was back-translated into English by one of the authors and two bilingual individuals (Brislin, 1970). All survey items were measured using multi-item Likert scales. To decrease the likelihood of the respondent for answering stylistically, we promised to compare their responses to the respondents' benchmark. This comparison motivates respondents to respond more accurately since they can gain greater self-understanding (Podsakoff, MacKenzie, & Podsakoff, 2012). Taken together, our respondent motivation, pretesting procedure and scale variation reduced the likelihood of common method bias in our dataset (Podsakoff, MacKenzie, & Podsakoff, 2012).

All survey items were based on existing measurement instruments. IT alignment competence was measured using items from Lu & Ramamurthy (2011), employee IT competence by using items from Lepak & Snell (2002), relational IT competence by used items from Ravichandran & Lertwongsatien (2005) and technical IT competence with items from Wixom & Todd (2005). Stakeholder management and Management effectiveness using items from Tallon et al. (2000) and financial performance using items from Ravichandran & Lertwongsatien (2005).

3.2 Data collection

With our survey, we aim to reach senior managers within small-sized NFPs. The sample of the study was drawn from a mailing list of a local philanthropic resource organization and the respondents were targeted via an online survey. From the 3.000+ organizations emailed, we received 112 responses.

We statistically checked for common method bias by running a one-factor test on all items, without rotation, constraining the number of factors to one and with factor extraction method principal axis factoring. Common method bias would pose an issue when one factor explains more than 50% of the overall variance (Podsakoff, MacKenzie, & Podsakoff, 2012). The factor explained 31.3% of the variance, which supports the absence of common method bias. Table 1 provides an overview of the respondent profile. Our sample contains 112 observations of 93 organizations. More than 80% of the respondents are either a member of the board of directors, or report to the board of directors. On average our respondents have 10 years of experience in their current job and 9 years of experience in their current organization. Furthermore, in our sample municipalities and health related organizations employ the most full-time equivalents (FTE) (Table 1).

Sector	Observations	Average FTE	Std. dev. of mean	Min. FTE	Max. FTE
Art and culture	9	8.0%	107	260	750
Church	11	9.8%	211	346	750
Education and research	5	4.5%	35	64	150
Government (Municipalities)	27	24.1%	317	258	750
Health	8	7.1%	331	365	750
International help	23	20.5%	58	117	350
Nature and environment	4	3.6%	24	17	38
Societal and social goals	25	22.3	58	150	750
<i>Total</i>	<i>112</i>	<i>100%</i>			

Table 1. Sample profile

3.3 Measurement validation - Exploratory factor analysis

To determine the adequacy of the factor structure that emerges from the data, all indicators were subjected to an exploratory factor analysis use in SPSS (version 24). We used principal components with promax rotation to estimate the factor analyses and extract all factor with eigenvalues greater than 1. Though not reported, a seven-factor structure with eigenvalues greater than one emerged. We also assessed the pattern matrix, cross loadings and the internal consistency. The item loadings differ at least 0.3 with other loadings on the same row and column within the pattern matrix, which affirmed convergent validity and unidimensionality of the constructs. We determined internal consistency reliability, using Cronbach's Alpha (CA). The values should exceed 0.7 (Kline, 2011). All constructs had CA values well above the threshold. In addition, we assessed the skewness, kurtosis and multicollinearity of all items. All skewness, kurtosis and multicollinearity values are within the accepted threshold of lower than 3.0, 8.0 and 5.0 respectively (Kline, 2011).

3.4 Measurement validation - Confirmatory factor analysis

To test construct validity, we also performed a confirmatory factor analysis (CFA) using SPSS AMOS (version 21). Table 2 reports the results of the results of the CFA using the default maximum likelihood estimation technique. To demonstrate the reliability, convergent validity and discriminant validity of the measurements we perform several checks.

Firstly, all factor loadings greater than 0.5 on their respective constructs. Secondly, the composite reliability for each construct is greater than 0.7. Finally, the square-root of the AVE – the bold-faced numbers – is greater than the correlation between the respective latent constructs (Fornell & Larcker, 1981). Taken together, our results provide evidence of reliability, convergent validity and discriminant validity of the measures.

In addition, we use six indices to evaluate model fit. Those fit indices are: Chi-square divided by the model degrees of freedom (CMIN/DF), the comparative fit index (CFI), the goodness of fit index (GFI), the root mean square error of approximation (RMSEA), Tucker Lewis Index (TLI) and standardized root mean squared (SRMR). A CMIN/DF ratio less than 5 (Wheaton, Muthen, Alwin, & Summers, 1977), a CFI, GFI and TLI close to 1 (Hu & Bentler, 1999; Kline, 2011) and a RMSEA and SRMR smaller than 0.08 (Hu & Bentler, 1999; Kline, 2011) indicate a good fit. Model fit indices: CMIN/DF = 1.459, CFI = .94, GFI = .83, RMSEA = .06, TLI = .92, and SRMR = 0.07. Our additional results provide evidence of model fit as all indices have values that are either higher or lower than the specified thresholds.

	ITAC	TITC	RITC	EITC	STM	MNE	FP
IT alignment competence (ITAC)	.716						
Technical IT competence (TITC)	.421	.855					
Relationship IT competence (RITC)	.271	.505	.886				
Employee IT competence (EITC)	.289	.294	.160	.838			
Stakeholder management (STM)	.512	.331	.296	.336	.751		
Management efficiency (MNE)	.479	.187	.244	.409	.555	.826	
Financial performance (FP)	.295	.317	.464	.257	.469	.468	.824
Average variance extracted	.745	.620	.784	.709	.636	.656	.680
Composite reliability	.897	.906	.879	.879	.836	.851	.806
Range of factor loadings	.81-.72	.90-.88	.93-.82	.92-.83	.87-.72	.93-.82	.94-.77

Table 2. Correlations and reliability

4 Results

To test our hypotheses, a multivariate regression analysis in SPSS (version 24) was performed to examine the effect of each individual IT competence on organizational performance. We mean centered the control variables size and IT budget to ensure easy interpretation of the coefficients.

As shown in Table 3, all models have significant F-values (p-value < 0.01), which indicates that models are better specified than an intercept-only model. Based on the adjusted R-squares we can infer that our models predict a moderate amount of variance ($\geq 30\%$) for organizational performance (Lipsey & Wilson, 2001).

Furthermore, Table 3 reveals that we can only accept hypothesis 4, the relation between employee IT competence (EITC) and organizational performance. EITC is consistently and positively significant with stakeholder management (STM), managerial efficiency (MNE) and financial performance (FP) with p-values < 0.05, 0.01 and 0.10, respectively. We partially accept both hypothesis 1 and 3. Hypothesis 2 has no positive impact on either STM, MNE or FP. Rather, TITC is *negatively significant* with MNE (p-value < 0.10). The control variable size has no significant effect, whereas IT budget impacts MNE positively (p-value < 0.05).

Though not reported, we performed an additional analysis to examine the differences between sectors. We found significant results for government (on MNE) and education (on both MNE and FP). For government on MNE the direct relations in Table 3 remained significant, except for IT budget. For education on MNE all relations became significant without sign changes. For the relation between education and FP all relation became significant, except for TITC and IT budget.

Variable		Stakeholder management (STM)	Managerial efficiency (MNE)	Financial performance (FP)
Intercept		4.477***	2.503***	2.572***
IT alignment competence	(H1)	.467***	.432***	.135
Technical IT competence	(H2)	.011	-.180*	-.013
Relational IT competence	(H3)	.146	.117	.440***
Employee IT competence	(H4)	.209**	.345***	.177*
Size		-.076	-.172	-.103
IT budget		.074	.255**	.073
R-squared		.420	.435	.556
Adjusted R-squared		.386	.403	.320
F		12.65***	13.48***	8.246***

Table 3. Regression results. The ***, **, *, represent a significant p-value < .01, .05 and .10 respectively

5 Discussion

The purpose of this study was to examine the link between IT capability and three types of organizational performance. With regard to this question, we conceptualized IT capability in four IT competencies and found that only employee IT competence has a consistent significant impact on all three organizational performance constructs. The impact of IT alignment competence and relational IT competence differ per dependent variable. Surprisingly, we found a negative impact between technical IT competence and one type of organizational performance (i.e. management efficiency).

Our findings partially confirm not-for-profit literature, where scholars found that NFP organizations have difficulties leveraging the potential that IT offers (Geller, Abramson, & Leon, 2010). This may be the result of NFPs focusing their resources to serve their community, while on the other hand, deferring some necessary IT investments. In some cases, an internal reorganization can support NFPs to discover new ways to use IT creatively and innovatively, beyond simply having a website (Hackler &

Saxton, 2007). However, stakeholders must be willing to support these organizational changes and accept that funding is needed to do so (Hackler & Saxton, 2007).

Perhaps the most surprising result of our study is the negative relation between technical IT competence and management efficiency. Our additional analysis suggested that educational NFPs may have failed to develop or invest in their technical IT competence and find themselves unable to exploit the potential that IT offers. An alternative explanation would be that NFPs are adopting IT because of coercive and normative pressures, but are unable to find an appropriate fit for their situation and therefore less likely to make optimal use of it. We believe more research is needed to fully understand the implications of our results.

Results from this study may also serve practitioners. NFP managers, who seek to improve their organization's performance, may obtain significant benefits when focusing their resources to improve the ability of their IT employees. Having competent IT employees may ease administrative burden by automating repetitive tasks, leaving more room for non-IT staff to deliver high quality services (Hackler & Saxton, 2007; Seth, Maher, & Forster, 2006).

5.1 Limitations and future research

Our study has a few limitations, but can also be extended in some areas. A sample size of 112 is relatively small. Especially when we partitioned our dataset for our additional sector analysis, the sample size decreased significantly; sample of education contains 5 observations. Since our survey is conducted in The Netherlands, it may limit the ability to generalize our results. Additionally, since our data represent a snapshot in time, it is difficult to infer a causal relationship between constructs. A longitudinal study might reveal that the interactions may have a positive impact that becomes apparent after a specific period of time. Finally, some scholars recognise differences within not-for-profit organizations as: governmental and nongovernmental organizations (Lee & Bhattacharjee, 2011; Moore, 2000). Future research should assess the impact of IT capability between these sectors to determine differences.

6 Contribution

Drawing upon the resource-based view, this study tests the relationship between IT capability and organizational performance in the not-for-profit sector. Based on a survey of 112 managers, we find that employee IT competence consistently impacts all three forms of organizational performance positively. The impact of alignment and relational IT competence is positive but differs per performance construct. Surprisingly, technical IT competence has negative impact on organizational performance (i.e. management efficiency). We believe more research is needed to fully understand these differences.

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