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Does ICT Policy Improve Interorganisational ICT for SMEs? *A Dutch Policy Evaluation Study*

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Abstract

Interorganisational ICT has become critical for the performance of both small and large organisations. SMEs however, traditionally lag behind in the uptake of these systems. In many countries, various policy programmes are initiated to improve ICT uptake by SMEs and support them in digital linking throughout their value chain. In the Netherlands, a nationwide policy programme was in place between 2002 and 2007 that is a prominent example of this type of policy initiatives. In this paper we present the results of an ex post evaluation of this programme, by comparing survey data collected among 516 participating SMEs with survey data collected among a control group of 124 SMEs. In bivariate analysis, significant differences are found between the two groups with regard to the adoption of several types of interorganisational ICT. These differences remain intact if split sampling of the groups is applied by size (small/medium) and sector (trade/finance/public). Furthermore, it is found that participants of the policy programme perceived significantly more added value of ICT. In interpreting these results however, pre-selection effects should be taken into account.

Keywords: interorganisational ICT, ex post evaluation, SMEs, policy programme

1 Introduction

In any value chain, collaboration between its actors has become critical and so has the linkage of ICT of its partners (cf. Barrett and Konsynski, 1982; Meier and Sprague, 1991; Daft, 2001; Morrel and Ezingard, 2002; Shapiro, 2009). ICT potentially

improves the effectiveness and efficiency of value chains through cost reduction and increasing possibilities for interorganisational communication, coordination and information exchange (Williams, 1997). As Papazoglou and Ribbers (2006, p. 280) put it: “*Interorganisational information systems (IOSs) are a specific class of information systems that automate the flow of information across organizational boundaries and enterprise information systems, and link an organization to suppliers, customers and possibly other organizations*”. On both organisational and chain level, the adoption, implementation and usage of interorganisational information systems and ICT is intensively studied (Zhu and Kraemer, 2002; Nelson, 2003). Within this ICT domain, SMEs are traditionally less mature and innovative than their larger counterparts (cf. Premkumar, Ramamurthy and Nilakanta, 1992; Damanpour, 1992) as they lag behind in the uptake of these systems (European Commission, 2008; 2010).

To address this backlog, various policy instruments are being applied in different countries (European Commission, 2008; 2010). Internationally there is (and has been) a wide mix of policy instruments and programmes on SME-oriented ICT adoption. It has been identified that in almost thirty OECD countries such policy is currently developed or deployed. The OECD Information Technology Outlook 2010 presents a typology of 24 types of ICT policies that they divide in five main categories: ‘fostering ICT innovation’ (including government procurement policy), ‘increasing diffusion/use’, ‘maintaining a healthy ICT business environment’, ‘enhancing the infrastructure’ and ‘promoting trust online’ (OECD, 2010).

A prominent example for the Netherlands is the policy programme “the Netherlands Goes Digital” (*Nederland Gaat Digitaal*, abbreviated to NGD) that was in place between 2002 and 2007. With this programme, a budget of € 33.5 million was spent to promote and support the adoption and use of ICT by SMEs; including interorganisational ICT such as e-business applications. SMEs could participate in the programme and receive free or sponsored workshops, seminars, consultancy advice and information materials. Initially in 2002, SMEs that are ‘technology followers’ were the target group of the NGD programme, but since 2004 the focus was on SMEs that are ‘technology leading’. The NGD programme was, for the Netherlands, a comprehensive and ambitious programme. It is estimated that some 27,000 SMEs (about 8%) have been reached by the various components of the programme. In addition, the programme has reached 85 industry organisations in the SME sector that actively contributed to its activities and events.

In this paper we present the results of an evaluation study of the NGD programme, which was initiated by its sponsor (the Dutch Ministry of Economic Affairs) near the end of the programme in 2006. At that time, the first notion was that the programme as such was successful in terms of its reach and publicity. It was unknown however, if the targeted SMEs actually set the next step in their ICT maturity and additionally became more aware about the added value of ICT. As argued above, ICT for interorganisational exchange can be considered as the most lacking, and yet most promising area for SMEs to innovate and boost their performance. The main question is therefore, if the NGD policy programme reached this far reaching goal and supported SMEs to become what is often called an ‘extended enterprise’ (cf. Bovet and Martha, 2000; Davis and Spekman, 2004). The related question is about situationality of the potential effect of the programme, i.e. did it differ between types of SMEs and/or types of interorganisational ICT?

This paper is driven by these two questions and structured as follows. In the next section we review related work on SMEs and interorganisational ICT, which feed our conceptual model. We then discuss the data collection, being the surveys that were done after the policy programme was finished among participating and non-participating Dutch SMEs. Section four contains the results of comparative analyses and in the concluding section we reflect on the implications of the results, including some critical reflection.

2 Theory and Conceptual Model

2.1 SME-focused ICT Policy and the Productivity Paradox

In general, ICT solutions for most SMEs are not ready-made packages. The successful realisation of ICT applications and the actual utilisation of ICT, involves lengthy and expensive learning and it is not possible to determine in advance that entrepreneurs will obtain all benefits of ICT. For many SMEs markets lack transparency. Combined with the fact that there are insufficient knowledgeable demanders (asymmetric information), this forms a relevant theoretical argument for promoting ICT application and use in SMEs. Especially considering the economy-wide positive impact of the application of ICT, this provides an argument to support the implementation of ICT, provoke ICT investments and improve the utilisation of ICT for SMEs.

It remains a fundamental question however, to what degree a government must be considered as legitimised and able (e.g. in terms of available knowledge, skills and timing) to effectively and efficiently ‘repair’ market failures through policy interventions. There is the possible risk that market failure gets *replaced* by government failure. Policy also involves costs and the (sometimes limited) market could be hindered by government intervention. For that reason, one should prevent too far-reaching and too specific ICT policy. In the Netherlands, Raes et al. (2004, pp. 317-318) advocate generic policies for ICT and policies that stimulate co-operation between firms and knowledge institutions, but also warn: “*However, the risk of government failure in such volatile markets is more than imaginary. Again, a careful approach by governments in designing and implementing such schemes is necessary.*” It should be noted that this mainly seems to refer to promoting technological progress in ICT and less about policy focused on ICT diffusion.

Still, there are many arguments to initiate and execute an ICT policy that focuses upon SMEs. These arguments have been collected in a series of OECD-reports in 2004 (“ICT diffusion to business: peer review”; OECD, 2004) which included country studies on Denmark, Finland, Italy, (South) Korea, Norway, and Switzerland. It appeared that in most countries, similar arguments are at stake for stimulating SMEs in their ICT uptake by the specific development of ICT policy. Examples of such arguments in those countries are:

- *Contribution of ICT to productivity growth and economic performances in combination with the dominant presence of SMEs.* Almost all countries point to recent OECD studies on the significant contribution of ICT to productivity and economic performances. This is often confirmed by national studies that sometimes are even specifically aimed at SMEs. The Danish ministry of Science, Technology and Innovation has for example calculated that there exists a positive correlation

between ICT usage and added value per employee for companies in the range of 10-49 employees. In addition, it is determined that SMEs play a very large role in the national economy and that there is much space to improve the utilisation of ICT.

- *ICT backlog of SMEs.* It is found for many countries of the peer review that SMEs have a significant backlog compared to large enterprises with regard to use and actual utilisation of ICT. Most countries view this as an argument for having ICT policy aimed at SMEs. In doing so however, boundaries are encountered. With some ICT applications that backlog of SMEs will never change, because not all ICT applications are relevant for all organisations (this is for instance one of the conclusions in the Danish peer review). In addition, the large differences between sectors and regions are often pointed out (e.g. Italy).
- *Market failure.* There are examples of countries (e.g. Denmark and Finland) where taking out market failures and realising attractive conditions for companies to use ICT are indicated as argument in favour of governmental intervention. SMEs would suffer most from market failures in the ICT domain. An example of a market failure is the lack of transparency of the ICT services and applications that are on offer in the market.
- *Connection between SMEs and the knowledge infrastructure is insufficient.* In most countries, SMEs collaborate less with knowledge institutions on ICT R&D compared to large organisations (e.g. Denmark and Italy). On average SMEs are less innovative than large companies, while according to policy makers it is of great importance to have competitive and knowledge intensive SMEs that stimulate future economic development. Overall, countries differ in the degree to which the themes of ICT and innovation are being coupled.
- *Alleviating a number of concrete problems of SMEs in the application of ICT.* In the peer review several SME-specific problems are presented that are used as arguments for an SME-specific ICT policy. Examples of these problems are:
 - SME management is insufficiently aware of the potential advantages of usage of ICT (Denmark, South Korea).
 - Opportunities are not being pursued because SMEs lack sufficient ICT skills (Denmark, South Korea, Switzerland).
 - SMEs are insufficiently able to determine their ICT needs and find suitable ICT solutions (Denmark).
 - SME customers have different demands for ICT applications and that problem is aggravated by a lack of standardisation (Denmark, Finland, Norway).
 - SMEs are uncertain about protection of privacy and consumer interests in the ICT era (Finland, Switzerland).

From the OECD study, it was also argued that international rankings (e.g. the e-readiness index of The Economist) constitute a trigger for the development of ICT policy by countries. If a country holds low scores in these rankings, this is used as an argument to use ICT policies to catch up (Italy). Likewise, leader countries use these rankings as an argument to (continue to) invest in ICT policy (Finland). Some countries, like Denmark, realise that as a small country with a high proportion of SMEs, they are dependent on foreign countries for a number of ICT developments.

Although there is strong policy interest in the usage of ICT by SME, the question remains if ICT is indeed the performance driver for these organisations. This goes back to the ‘productivity paradox’: “we see the computer age everywhere but in the productivity statistics” (Solow, 1987, p. 36). Solow observed that ICT investment levels were not positively related to productivity levels of countries and sectors. Currently, the consensus is that this phenomenon was indeed a paradox at that time and supported by that type of analysis, but this has changed. It has been shown that on organisational and individual levels ICT *does* increase productivity (e.g. Brynjolfsson and Hitt, 2000; Donselaar, Erken and Klomp, 2004; European Commission, 2010). For interorganisational ICT, this relationship is less certain and more research is needed.

2.2 A Conceptual Model to Investigate Policy Effects

In this study we design a conceptual model to investigate the effect of the Dutch NGD policy programme to improve the uptake of interorganisational ICT by SMEs. The model, which is depicted in Figure 1, consists of two parts that are assumed to be dependent upon participation in the NGD programme. The first part entails the question if participation by SMEs in the NGD programme has led to higher usage of interorganisational ICT systems and applications. The second part of the conceptual model is about the question if the participating SMEs, through the NGD programme, experienced a higher added value from ICT. Specification of the programme’s activities, the indicators of use of interorganisational ICT systems and the perceived added value of ICT are listed in Figure 1 as well. Finally, the conceptual model illustrates that the potential effect of the policy programme is also investigated by controlling for contingencies, being the employee size, sector and level of participation of SMEs. In the next section, it is described how in practice these measurements were conducted in an extensive field study among participants and non-participants of the NGD policy programme.

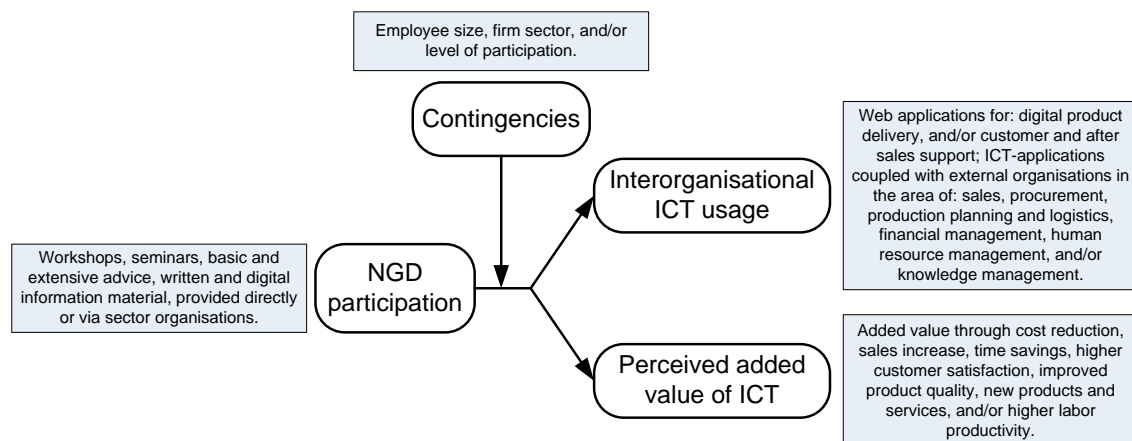


Figure 1: The conceptual model for this study

3 Data and Methods

Initiated by the Dutch Ministry of Economic Affairs a field research was executed in 2006, which resulted in a number of evaluation activities, including two extended

surveys conducted by telephone and the internet. Two target groups were approached to complete a tailor-made survey: a sample of the SME participants of the NGD programme (n=516), and a control group consisting of SME organisations comparable to the NGD participants, but who did not take part in the NGD programme (n=124).

The first group was selected by a (stratified) sample from the database of the NGD programme organisation. An e-mail with a request to complete a web survey was sent to 2,482 participants. This e-mail was preceded by an explanatory letter from the Ministry of Economic Affairs. The questionnaire includes – among other things – components on ICT usage and ICT impact on business. After about one week and again after another two weeks a reminder was sent via e-mail to those that did not respond (yet). After three weeks, 516 respondents completed the questionnaire in its entirety. This is a response rate of 21%. It should be noted that the response was reduced a priori because many e-mail addresses were shown to be outdated: 434 e-mails (17.5%) were undeliverable. Controlling for this matter results in a net response rate of 25.2% of fully completed questionnaires. Comparative survey studies among SMEs (e.g. the E-Business W@tch survey) reach similar response rates.

The second group can be considered a control group of SMEs (n=124). This group was selected from an address database that was available for surveying through a Dutch market research company. The composition of this control group was matched with the response group of the web survey among the NGD SME participants. For each SME respondent to the web survey, a ‘counterpart’ SME (according to size and industry) was selected, to ensure a ‘fair’ and unbiased comparison as good as possible. The control group of SMEs was surveyed by telephone, immediately after the completed web surveys of the SME participants were received. Within two weeks, 124 telephone interviews were realised according to a stratified sampling matrix. An abridged version of the web survey was used, including similar questions about interorganisational ICT use and perceived added value of ICT to the SME. In achieving the response of 124, refusals (do not want to participate, too busy to participate, not available) were obviously encountered; a net response rate of 26.7% was achieved.

Due to this sampling design, it is possible to compare NGD participants with non-participating SMEs, on the different aspects of interorganisational ICT usage and the perceived added value of ICT. Although selection bias cannot be excluded, it is at least reduced, which improves the measurement of the contribution of the policy programme to the interorganisational ICT use and perceived added value of ICT by Dutch SMEs.

4 Results

4.1 Do Participating SMEs Have Higher Usage of Interorganisational ICT?

In this section we analyse the differences (and their statistical significance) in use of interorganisational ICT between participants and non-participants of the NGD programme. We deliberately consider the differences on a number of indicators for interorganisational ICT, as it is a broad concept that covers several distinct business domains. In addition, the NGD programme was set up to improve adoption of ICT in general, so we can expect effects on all types. Also, this gives us the opportunity to see

whether participants in the NGD programme favoured specific types of interorganisational ICT above others.

Table 1 shows that the participants in the NGD programme scored higher than non-participants on all interorganisational ICT indicators. The differences between participants and non-participants are the largest for interorganisational ICT applications in the sales domain (36%), followed by those for financial management (32%). For digital product delivery (18%), knowledge management (14%) and human resource management (11%) the differences are smaller, compared to the other indicators. However, all differences are statistically significant.

Table 1: Differences in ICT usage between participants and non-participants; ‘*’ indicates significant difference (t-test; $p < .01$)

SME uses:	Non-participants (n=124)	Participants (n=516)	t-value	p (2-tailed)
A web application for:	Mean %	Mean %		
- Digital product delivery	7.3	25.6	-5.98	.00*
- Customer and after sales support	16.9	42.1	-6.19	.00*
ICT applications coupled with external organisations in the area of:				
- Sales	4.9	41.1	-12.42	.00*
- Procurement	6.8	31.8	-8.15	.00*
- Production planning and logistics	4.6	29.8	-9.13	.00*
- Financial management	10.3	42.1	-9.05	.00*
- Human resource management	12.8	23.5	-2.90	.00*
- Knowledge management	9.7	23.8	-4.26	.00*

An important question is whether the observed differences still exist when we take into account company size and industry, two characteristics that have a ‘proven’ effect on the level of ICT development of organisations. Table 2 provides an overview of some analyses performed for this purpose. We determined whether the above significant differences between participants and non-participants are still statistically significant when we isolate the following groups:

- Organisations with 1 to 9 employees (column ‘10-’ in the tables);
- Organisations with 10 to 250 employees (‘10+’);
- Organisations in trade, repair and hospitality (‘TRH’);
- Organisations in rental, professional and financial services (column ‘RPF’);
- Organisations in education, health, public administration and other services (‘EHP’).

We need to define these fairly coarse subcategories, because of the number of observations. When defining too specific subclasses, the number of respondents may become so small that no reliable averages can be calculated. Here we use the rule of thumb that analyses should be performed on categories with 15 or more respondents. An ‘*’ in Table 2 indicates that the difference between participants and non-participants

is statistically significant, based on the t-test conditions (significance level is 0.01 or less, two-tailed testing).

Table 2: Differences between participants and non-participants: subgroups; ‘*’ indicates significant difference (2-tailed t-test; $p < .01$)

SME uses:	Employee size		Sector		
	10-	10+	TRH	RPF	EHP
A web application for:					
- Digital product delivery	*	*		*	
- Customer and after sales support	*		*	*	*
ICT applications coupled with external organisations in the area of:					
- Sales	*	*	*	*	*
- Procurement	*	*	*	*	
- Production planning and logistics	*	*			
- Financial management	*	*	*		
- Human resource management		*			
- Knowledge management	*	*			

These results partly support the idea that all participants within the NGD programme use more interorganisational ICT. Both the relatively small and relatively large businesses score higher on almost all different interorganisational ICT applications when compared to their non-participating peers. For the three sectors that we distinguished, the results are more mixed: the differences are only significant for four (TRH, RPF) or two (EHP) out of eight indicators. A possible explanation for this result is that some of the interorganisational ICT application domains are not very relevant for the sector (e.g. digital product delivery for trade, repair and hospitality organisations, and production planning and logistics for all three sectors).

Finally, we analyse the impact of the programme by comparing differences *between* participants. To do so, we make a distinction between light and heavy users, based on a major dividing aspect within the programme: whether or not use has been made of the ‘extensive advice’. This activity can be considered the most complex and far-reaching for the organisation based on its contents. It is also distinctive because SMEs had to invest themselves, while other programme activities were provided at little or no cost. The expectation here is that heavy users of the programme have developed further in their use of interorganisational ICT compared to light users. The results are listed in Table 3.

Table 3: Differences between light and heavy users; ‘*’ indicates significant difference (2-tailed t-test; $p < .01$)

SME uses:	Light users (n=286)	Heavy users (n=230)
A web application for:	Mean %	Mean %
- Digital product delivery*	16	29
- Customer and after sales support	23	29
ICT applications coupled with external organisations in the area of:		
- Sales*	34	50
- Procurement*	27	38
- Production planning and logistics*	22	40
- Financial management	38	47
- Human resource management	21	27
- Knowledge management*	19	30

On all indicators, heavy users score higher than light users. Obviously, the absolute differences are smaller than those between participants and the control group, but still five out of eight are statistically significant.

4.2 Do Participating SMEs Perceive Higher Added Value of (Interorganisational) ICT?

We now move to the second part of our analysis: whether SMEs that participate in the NGD programme perceive higher added value of ICT for their organisations. Here we need to make the important reservation that assessing the direct economic impact of instruments such as NGD is not easy. There are indeed many non-policy factors that determine the state of corporate performance (in conjunction with the use of ICT). We measure the *perceived* added value of ICT on several indicators, as a proxy to the real added value. This entails a subjective evaluation of the respondent, but is therefore not of less value. This method of measuring ICT revenues has been used more often in IS research (cf. Tallon, Kraemer and Gurbaxani, 2000). It should also be noted that these measurements cover both *intra*- and *interorganisational* ICT, so we cannot completely attribute the experienced benefits to the latter category. However, in selecting these types of added value, we chose items that are generally considered to be benefits of interorganisational ICT.

Table 4 shows the results of this measurement, compared between participants and non-participants. Respondents could score the indicators on a scale from 1 = almost nil, 2 = little, 3 = neither small/great, 4 = fairly high, 5 = high.

Table 4: Differences in perceived added value of ICT (5-point scale) between participants and non-participants; ‘*’ indicates significant difference (t-test; $p < .01$)

SME has experienced added value of ICT through:	Non-participants (n=124)		Participants (n=516)		t-value	p (2-tailed)
	Mean	SD	Mean	SD		
Cost reduction	2.0	1.2	2.8	1.4	-5.85	.00*
Sales increase	1.9	1.2	2.9	1.3	-7.02	.00*
Time savings	2.8	1.5	3.5	1.3	-4.97	.00*
Higher customer satisfaction	2.2	1.4	3.2	1.3	-6.81	.00*
Improved product quality	2.0	1.4	2.8	1.5	-5.55	.00*
New products and services	1.9	1.3	2.9	1.5	-7.80	.00*
Higher labour productivity	2.1	1.4	3.0	1.4	-6.36	.00*

All differences are in favour of the participating organisations, and are statistically significant. On the economic-related performance indicators (such as cost reduction, time savings and labour productivity) the NGD participants hold significantly higher scores compared to the non-participants. This is in favour of the expectation that for SMEs in general, time and money are prerequisites for entrepreneurship, and ICT can improve these key conditions.

The next step in the analysis again aims to determine whether the above conclusion is robust when the data are broken down with regard to industry and size of the SMEs. The results of this step are listed in Table 5.

Table 5: Differences between participants and non-participants: subgroups; ‘*’ indicates significant difference (2-tailed t-test; $p < .01$)

SME has experienced added value of ICT through:	Employee size		Sector		
	10-	10+	TRH	RPF	EHP
Cost reduction	*	*	*	*	*
Sales increase	*	*	*	*	*
Time savings	*	*	*		
Higher customer satisfaction	*	*	*	*	*
Improved product quality	*	*	*	*	
New products and services	*	*	*	*	*
Higher labour productivity	*	*	*	*	*

Compared with the earlier analysis on ICT usage, Table 5 quite clearly shows that the participants significantly differ from the non-participants in a consistent way (i.e. for almost all industries and sizes). We therefore conclude that a robust difference can be found in comparing both datasets.

Finally, we examine whether these clear differences remain when we distinguish between light and heavy users. Table 6 contains the results of this comparison.

Table 6: Differences in perceived added value of ICT (5-point scale) between light and heavy users; ‘*’ indicates significant difference (2-tailed t-test; $p < .01$)

SME has experienced added value of ICT through:	Light users (n=286)	Heavy users (n=230)
	Mean	Mean
Cost reduction	2.9	2.7
Sales increase*	2.7	3.1
Time savings	3.5	3.6
Higher customer satisfaction*	3.0	3.4
Improved product quality	2.7	2.9
New products and services	2.8	3.0
Higher labour productivity	3.0	3.0

On almost all indicators, the differences in added value are in favour of the heavy users. These differences are statistically significant for two types of added value, however. While in the previous analysis participants scored systematically above the non-participants, within the group of participants there is only a significant difference in terms of increasing turnover and customer satisfaction. These results show that the programme participants are fairly consistently positive about the contribution of ICT to their business performance. The contribution they experience of ICT does not differ between different degrees of programme usage. Apparently light users are also already in a relatively ‘satisfied’ situation.

5 Conclusion and Discussion

In this paper, we discussed theoretical arguments for an ICT policy that focuses upon SMEs, like the bewildering array of ICT solutions available on the market, combined with SMEs that are insufficiently informed (asymmetrical information). This does not justify any far-reaching measures, but does justify promoting awareness-raising and transparency in the marketplace. In addition, the shortcomings in a variety of other systems can serve to substantiate an ICT policy that is directed towards SMEs.

We set out to evaluate NGD, a substantial ICT policy programme in the Netherlands, aimed at increasing adoption and use of (interorganisational) ICT by SMEs. Based upon our results, we arrive at the following conclusions. NGD participants are people (or organisations) who, in comparison to the control group:

- Use significantly more interorganisational ICT, and
- State considerably more frequently that ICT has enhanced their company’s performance.

These outcomes fit within the aims of the programme. When subgroups are defined, these results are consistent for firm size (employees). The results are less clear when a division is made into sectors, but this could be related to the irrelevance of certain types of interorganisational ICT for certain sectors. Within the group of NGD participants, heavy users do not differ from light users on all indicators, especially regarding the perceived added value of ICT.

Participants in NGD are relatively high performing SMEs. This could be the effect of taking part in the programme, (self-)selection or a combination of both. Two possible selection effects could play a role. First of all, not all SMEs have ever been invited – directly and individually – to take part in the NGD programme. We can therefore expect that SMEs that did participate already possessed a certain awareness of and familiarity with interorganisational ICT. Secondly, self-selection may take place, with the result that better-achieving organisations are more likely to take part in web surveys such as those used in this study.

The above results are very favourable for the NGD programme. They support the conclusion that it gave these SMEs a major incentive to become ‘ICT mature’ sooner, and to reap the benefits of these ICT investments sooner and better. However, forms of self-selection that could weaken this conclusion should seriously be considered. The selection effect relies on a number of phenomena that are hard to operationalise:

- Programmes as NGD typically attract those organisations that are already (pro-)actively engaged with ICT and internet, if not professionally then out of personal interest of the company’s employees;
- Programmes as NGD typically attract those organisations that are already (pro-)actively engaged with their environment, including campaigns and schemes from industry associations and governments.
- Organisations that are already in a favourable stage of development are typically better able to make use of programmes such as NGD and reap additional benefits from it.

The basis of these phenomena is in principle supported by the research of Van der Veen (2004) among NGD participants. In her conclusion, she stressed that government should aim to encourage conventional ICT as much as ‘renewed entrepreneurship’. The intended effect is that entrepreneurial SMEs receive the right incentives this way, the unintended effect is that the position of less attentive SMEs becomes harder and harder to improve.

In our study, it appears from the comparative analyses that taking part in the programme plays a more decisive role in the use of interorganisational ICT and perceived added value than the nature/intensity of participation. In terms of policy recommendations, this could be interpreted as a plea for basic, awareness-focused programmes, instead of complex, government supported implementation processes. Based on our results, reach seems to be more important and cost-effective than very intensive measures.

An important limitation of this study is that we analysed the added value of ICT in general. Future research should focus on the specific effects of *interorganisational* ICT. It would be interesting if we could then also surpass the level of *perceived* benefits and assess the *real* added value of interorganisational ICT. This is no easy task, and perhaps longitudinal, in-depth case studies are better suited to this kind of research.

Another evident limitation of our current work is that it focuses only on the Dutch situation. Although the OECD (2004) peer reviews present results from some other countries, it would be valuable to replicate our current study in other countries with a specific focus on interorganisational systems. However, if the exact same study were to be replicated, that would require a similar policy instrument to be in place in the countries to be studied. But, the conceptual model could also be broadened. Here, we

only looked at the influence of ICT policy (i.e. NGD participation) on adoption and the added value of (interorganisational) ICT, moderated by several contingencies. If we would also take other factors in consideration, e.g. technological and organisational characteristics, we could create a more general framework of the determinants influencing adoption of interorganisational ICT by SMEs. This is important, as Ramdani, Kawalek and Lorenzo (2009) found that the adoption factors for enterprise systems (e.g. SCM and e-procurement) differ from those of other information systems.

References

- Barrett, S., & Konsynski, B. (1982). Inter-organization information sharing systems. *MIS Quarterly*, 6, 93-105.
- Bovet, D., & Martha, J. (2000). *Value Nets: Breaking the Supply Chain to Unlock Hidden Profits*. New York: John Wiley & Sons.
- Brynjolfsson, E., & Hitt, L.M. (2000). Beyond computation: Information technology, organizational transformation and business performance. *Journal of Economic Perspectives*, 14(4), 23-48.
- Daft, R. L. (2001). *Organizational theory and design* (Seventh ed.). Cincinnati, Ohio: South-Western Educational Publishing.
- Damanpour, F. (1992). Organizational size and innovation. *Organization Studies*, 13(3), 375-402.
- Davis, E.W., & Spekman, R.E. (2004). *The Extended Enterprise: Gaining Competitive Advantage through Collaborative Supply Chains*. Upper Saddle River, New Jersey: Prentice Hall.
- Donselaar, P., Erken, H., & Klomp, L. (2004). R&D and Innovation: Drivers of Productivity Growth. In G. Gelauff, L. Klomp, S. Raes & T. Roelandt (Eds.), *Fostering productivity. Patterns, Determinants and Policy Implications* (Vol. 263, pp. 75-91). Amsterdam: Elsevier.
- European Commission (2008). *The European e-business report 2008: The impact of ICT and e-business on firms, sectors and the economy*. Luxembourg: Office for Official Publications of the European Communities.
- European Commission (2010). *Europe's Digital Competitiveness Report 2010* (Vol. 1). Luxembourg: Publications Office of the European Union.
- Meier, J., & Sprague, R. (1991). The evolution of interorganizational systems. *Journal of Information Technology*, 6(3), 184-191.
- Morrell, M., & Ezingard, J.-N. (2002). Revisiting adoption factors of inter-organisational information systems in SMEs. *Logistics Information Management*, 15(1), 46-57.
- Nelson, M.L. (2003). *The adoption and diffusion of interorganizational system standards and process innovations*. University of Illinois, Champaign, Illinois.
- OECD (2004). *ICT diffusion to business: peer review. Country reports Denmark, Finland, Italy, Korea, Norway, and Switzerland*. Paris: OECD Publishing.
- OECD (2010). *OECD Information Technology Outlook 2010*. Paris: OECD Publishing.

- Papazoglou, M.P., & Ribbers, P.M.A. (2006). *E-business: Organizational and Technical Foundations*. Chichester: John Wiley & Sons.
- Premkumar, G.P., Ramamurthy, K., & Nilakanta, S. (1992). An empirical assessment of the impact of Interorganizational relationships on the adoption and diffusion of interorganizational systems. Paper presented at the *Thirteenth Annual International Conference on Information Systems (ICIS)*.
- Raes, S., Gelauff, G., Klomp, L., & Roelandt, T. (2004). A Policy Agenda for Higher Productivity Growth. In G. Gelauff, L. Klomp, S. Raes & T. Roelandt (Eds.), *Fostering productivity. Patterns, Determinants and Policy Implications* (Vol. 263, pp. 305-321). Amsterdam: Elsevier.
- Ramdani, B., Kawalek, P. & Lorenzo, O. (2009). Predicting SMEs' adoption of enterprise systems. *Journal of Enterprise Information Management*, 22(1/2), 10-24.
- Shapiro, J.F. (2009). *Modeling the supply chain* (Second ed.). Pacific Grove, California: Duxbury.
- Solow, R. (1987). We'd better watch out. *New York Times Book Review*, July 12, 36.
- Tallon, P., Kraemer, K.L., & Gurbaxani, V. (2000). Executives' perceptions of the business value of information technology: A process-oriented approach. *Journal of Management Information Systems*, 16(4), 137-165.
- Van der Veen, M. (2004). *Explaining e-business adoption: Innovation & Entrepreneurship in Dutch SMEs*. University of Twente, Enschede.
- Williams, T. (1997). Interorganisational information systems: issues affecting interorganisational cooperation. *The Journal of Strategic Information Systems*, 6(3), 231-250.
- Zhu, K., & Kraemer, K.L. (2002). E-commerce metrics for net-enhanced organizations: Assessing the value of e-commerce to firm performance in the manufacturing sector. *Information Systems Research*, 13(3), 275-295.