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eStrategy and ICT Investment in Slovenia

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Abstract

Empirical findings show that investments in information-telecommunication technologies (ICT) contribute significantly to the economic growth at macro and micro level. At the same time, we witness a slowdown in ICT investment in Slovenia, in spite of the fact that there still exists a gap in the level of ICT use in comparison to more developed countries. The article presents main findings of different approaches to measuring the impact of ICT in Slovenian firms. A positive impact of ICT is found primarily with intensive ICT users, which should stimulate all firms to further invest in the area. Since on the contrary a slow-down in investments in ICT is occurring, we claim that Slovenian firms lack a coherent long-term eStrategy. Such behaviour may result in under-exploitation of the potential that ICT can have for productivity growth and competitiveness of companies.

Keywords: ICT investment, eStrategy, productivity growth.

1. Introduction

The impact of ICT industries¹ as well as ICT diffusion and applications in other sectors and segments of national economy is significant. During the late 1990s, ICT accounted for a large and growing share of investment and contributed significantly to output growth, particularly in United States (OECD 2002). Countries that have experienced a substantial pick-up in multifactor productivity growth in the second half of the 1990s typically have had a more rapid diffusion of ICT technologies, as well as lower costs of ICT technologies (OECD, 2001).

In spite of several methodological problems and data comparability², the OECD report on the economic impact of ICT (OECD, 2004a) confirms three effects of ICT on

1 OECD definition of ICT-producing industries includes following industries according to the ISIC Rev.3:
manufacturing: 3000, 3130,3210,3220, 3230, 3312, 3313;
services: 5150, 7123,6420,7200.(OECD,2000)

2 More about measurement issues see in OECD, 2003 and Bučar, 2005.

productivity and growth. First, as a capital good, investment in ICT contributes to the overall capital deepening and therefore helps raise labour productivity. Second, rapid technological progress in the production of ICT goods and services contributes to more rapid multifactor productivity growth in the ICT-producing sector. As a third effect, greater use of ICT may help firms increase their overall efficiency (Pilat, 2004).

ICT may be used to organize or streamline the underlying business processes. For example, when computers are linked into networks, they can do both: facilitate standard business processes or enable introduction of new methods of doing business. The effects of organizational changes may in many ways surpass the effects of production process changes (Atrostic et al, 2004). Viewed this way, ICTs are productivity-enhancing technology.

Slovenia started investing in ICT later than the leading developed countries, just as other new EU member states (NMS). A more dynamic push in ICT investment occurred in 1999, reflecting increased concerns associated with Millennium bug on one hand and the prospects of the introduction of value-added tax in second half of 1999. But while other NMS are increasing their ICT investments in recent years, Slovenia has not followed such dynamics. The share of investments in GDP in Slovenia is lower from the average in EU 15 as well as lower from most NMS. Also, trend performance of Slovenia regarding ICT expenditure in GDP during the period 2001–2004 was negative (EIS, 2005).

Similar tendencies can be illustrated by other data on ICT investment in Slovenia.³ During the period 1996–1999 the share of ICT in total investment⁴ (in current prices) had increased from 12.6 to 15 percent, but had since declined annually to drop to only 10.4 percent⁵ by 2003. The comparisons with developed countries show that Slovenia lags behind in the share of ICT investment in total investment. The share of ICT investments in total investment was between 15 and 30 percent in 2001 in developed countries (OECD, 2004b). Trends in Slovenia reflect that ICT investment is not a priority in investment decisions. The authors believe that one of the key reasons for such attitudes is the lack of systematic monitoring of ICT impact both at the level of national economy and at the levels of enterprises. Also, many Slovenian firms do not see ICT as enabler technology and therefore have no eStrategy, according to which “they would rethink the existing rules of business and develop new business models, elaborate cohesive strategic direction and devise and evaluate the strategic options that best deliver sustainable and flexible growth and value” (Bodily and Venkataraman, 2006).

Starting from the above stated facts, the paper shows the findings of four-year research project⁶, where internationally developed methodology was applied to assess the impact of ICT on economic growth and productivity in Slovenia. Different approaches were applied, from econometric models to interviews and case studies to assert the state of the art in Slovenia in regard of ICT effects. Main findings are contrasted with other data and trends in surroundings. Key question we are asking is whether the results of the ICT application so far can explain the lack of interest in ICT investment in Slovenia or is there some other reason contributing to such attitude.

3 Data used here refers to new capital investment and expenses for used equipment in firms and organizations with more than 10 employees. The data is in current prices.

4 In total investment the investment in housing construction is not taken into account.

5 Data in constant prices show slight drop of the share of ICT investment in total investment, due to the application of hedonic indexes.

6 The research was conducted within Targeted research projects programme, financed by the Ministry of Information Society (ex) and Ministry of Science and Technology during 2002-2005.

2. ICT Investment in Slovenia

Due to their specific characteristics, ICT are applied in all sectors. During the period between 1996 and 2003 the growth of ICT investment in Slovenia was mostly the consequence of high investments in service sectors, as demonstrated in *Table 1*. The investment of service sector in ICT was in the 2003 nearly four times the size of investment in manufacturing and thus represented nearly 80 per cent of total Slovenian investment in ICT. This on one side reflects the increased role of services in Slovenian economy and on the other side high information intensity of service sector, suggesting high level of ICT use and broad spectrum of applications.

In the service sector, highest share of ICT investment is accounted for by transport and communications, due primarily to the high investments in telecommunication equipment. This is reflected in *Table 1*: if only information technologies are taken into account, the share of this sector is significantly lower. Financial intermediation is a sector with high ICT investment as well, but in 2003 public administration surpassed its share. It has to be noted however that ICT investment of the education sector did not follow the general growth trends in ICT investment. ICT expenditures of the education sector even declined in nominal terms between 1999-2003 that is reflected in substantial gap of Slovenia behind the EU15 in terms of computer density per 100 pupils (Stare, Kmet, Bučar, 2004).

Table 1: Investment in ICT and IT, by sectors, 1996, 1999 and 2003, in per cent

	ICT			IT		
	1996	1999	2003	1996	1999	2003
Total	100.0	100.0	100.0	100.0	100.0	100.0
A Agriculture	0.7	0.5	0.2	1.0	0.6	0.3
B Fishing	0.0	0.0	0.0	0.0	0.0	0.0
C Mining & quarrying	0.1	0.3	0.2	0.1	0.3	0.3
D Manufacturing	15.1	12.8	15.8	21.1	19.6	20.4
E Electricity, gas and water	3.7	2.9	2.7	3.0	3.8	2.5
F Construction	1.2	1.5	1.3	1.2	1.8	1.5
G Wholesale, retail, repair	9.9	8.7	8.2	12.6	13.3	10.6
H Hotels and restaurants	0.6	2.3	2.1	0.6	1.9	2.8
I Transport, communication	30.1	37.2	28.5	10.8	11.4	13.9
J Financial intermediation	11.5	9.6	12.2	16.6	14.9	16.0
K Real estate, rent and business services	6.2	5.9	6.2	8.6	9.1	8.2
L Public administration	8.3	8.9	13.1	10.5	12.7	13.7
M Education	5.8	3.2	2.8	7.6	4.0	3.4
N Health and social security	2.7	2.8	1.7	2.9	3.6	2.0
O Other community services	3.9	3.4	4.8	3.4	3.1	4.5

Source: Stare, 2005.

Illustrative is also the comparison of the share of investment in ICT in different sectors in Slovenia with the share of such investments in other countries.

What we can see in *Table 2* is the re-confirmation of a high share of ICT investment in total investment in the case of post and telecommunication sector as well as relatively high share of ICT investment in financial intermediation and business services. In these sectors the gap between Slovenia and more advanced ICT countries (Netherlands, UK and USA) is not so high. On the other hand, most of Slovenian manufacturers still do not assign investments in ICT sufficient priority, since the lagging behind in the shares of ICT investments is more significant. We also need to bear in mind that we are talking about relative shares: should we compare nominal values, the gap would be significantly larger, especially considering the fact that the price of ICT does not vary substantially in different countries⁷. On average, Slovenian companies allocate to investment in ICT around 30% of their total investments, which by itself is not a reason for concern. More problematic is the fact that, according to the firm-level data, there are still about 15% of companies who do not invest at all in ICT (See details in Stare, Jaklič, Kotnik; 2005).

⁷ In fact some of the OECD findings show that ICT prices per unit are sometimes even lower in more advanced countries (OECD, 2003).

Table 2: Average share of ICT investment in total non-residential gross investment, (1996–2001), in per cent

NACE	Slovenia	France	Germany	Netherl.	UK	USA
01-05 Agriculture	6	0	3	2	4	3
10-14 Mining	3	8	9	7	1	4
15-16 Food processing	6	5	11	14	9	11
17-19 Textiles and leather	10	8	3	18	22	20
20 Wood processing	6	6	8	11	13	11
21-22 Prod. of paper, printing and publishing	16	8	20	25	20	28
23 Prod. of oil derivatives	11	11	23	9	3	4
24 Chemicals and chemical products	9	9	18	9	12	13
25 Production of rubber and plastic products	4	8	12	10	13	10
26 Prod. of other non-metal products	4	8	9	9	11	10
27-28 Production of metal and metal products	6	6	6	17	12	14
29 Production of machinery and equipment	6	10	15	25	24	32
30-33 Production of electrical and optical equipment	12	9	25	41	27	35
34-35 Vehicles and other transport equipment	6	9	13	23	10	16
36-37 Furniture	6	11	16	13	11	21
40-41 Electricity, water and gas	5	17	10	8	9	10
45 Construction	8	4	11	13	7	12
50-51 Wholesale and repair	10	13	22	22	21	44
52 Retail	11	16	25	14	14	25
55 Hotels and Restaurants	6	12	2	6	2	7
60-63 Transport and warehouse	5	10	13	12	8	19
64 Post and telecommunication services	60	24	48	29	52	54
65-67 Financial intermediation	34	47	41	47	41	43
71-74 Business services	23	21	18	24	24	52
75-85 Public admin., education and health	11	7	9	15	13	14
90-99 Other public, common and personal services	19	24	7	17	12	34

Source: P. Kotnik (2005); Inklaar et al. (2003).

On the other hand, a number of analyses rank Slovenia on the top among transition economies regarding the development of telecommunication infrastructure and information society technologies (IST) penetration (Statistics in Focus, 2002, ICT Enlargement Futures, 2002, SIBIS+, 2003, eEurope+, 2004, eEurope Summary Report, 2004). Rapid adoption of some elements of IST was on one hand spontaneous while, on the other hand, it was driven by actions of the government (computer literacy education) and the introduction of competition (mobile telephony). Nevertheless, *Table 3* shows that certain NMS have already overtaken Slovenia concerning some indicators of information

society (IS). Further, Slovenia lags behind the EU 15 in regard of broadband access, e-commerce diffusion by companies and Internet use by individuals⁸.

Table 3: Information society indicators

	ICT expenditure as % of GDP	Mobile phone subscriptions per 100/inh	% of household with Internet access	% individual regular users of Internet	% of households with broadband access	% of enterprises buying online
	2004	2004	2005	2005	2005	2004
EU15	6.3	83*	53	46	25	32
Slovenia	5.2	93	48	40	19	26
Czech Republic	7.1	106	19	26	5	31
Estonia	8.6	93	39	54	30	31
Latvia	7.6	52*	42	36	13	-
Lithuania	5.8	89	16	30	12	13
Hungary	7.1	86	22	34	11	14
Poland	7.2	60	30	29	16	10
Slovakia	6.0	79	23	43	7	-

* 2003

Source: Industry, trade and services - Information society statistics. Eurostat. <http://epp.eurostat.cec.eu.int>, Statistics in Focus, 2005.

Relatively favourable position of Slovenia with regard to basic IS indicators in comparison to other new member countries should not be used as excuse for slow ICT investment activities of business sector. While the access problem has become less significant as a differentiating factor between the companies (and between states), growing disparities are found in the intensity of ICT use, in particular in the area of more sophisticated applications and e-business. The digital divide is no longer in the access to ICT but has moved to the area of comprehensiveness and intensity of ICT use. This is a more difficult divide to overcome, since while the purchase of ICT equipment primarily requires availability of financial resources, the intensity of ICT use depends on several rather complex factors like skilled human resources, readiness to use more sophisticated business models, supported by advanced ICT applications, etc.: in short- the use of ICT requires more comprehensive approach to ICT diffusion: e-Strategy. It is therefore important to assess the dynamic of ICT use in Slovenian companies to see if the potential positive impact of ICT is exploited or not.

⁸ Data refers to weekly users of Internet in the age bracket of 16 and 74.

3. The Intensity and Effects of ICT Use in Slovenian Companies

We turn here to the results of two different analyses of the intensity of ICT use. First one, performed by Stare, Jaklič and Kotnik (2005), looks separately at the firms in service sector and in manufacturing and using econometric modelling tries to identify linkages between productivity and the levels of ICT investment, the size of firms, ICT intensity and export propensity. The analysis⁹ applies the approach of combining firm-level data from different statistical surveys, carried out by the Statistical Office of the Republic of Slovenia (Department of structural business statistics). The analysis includes only firms for which information on the size and the breakdown of investments by main components (including ICT investments) was available¹⁰.

Table 4: Intensity of ICT use in Slovenian companies during 1996–2002

	1996	1997	1998	1999	2000	2001	2002
All firms							
ICT/ employees*	465.3	151.6	146.4	202.6	183.1	398.7	97.0
ICT/ employees (median**)	43.2	44.9	47.6	52.0	41.5	38.9	6.0
ICT in investment (%)	29.9	29.5	29.9	27.7	28.2	28.7	28.5
Service sector firms							
ICT/employees*	703.5	203.5	172.7	314.1	271.4	550.1	111.9
ICT/employees (median**)	74.6	70.0	72.5	85.8	68.0	57.2	3.5
ICT in investment (%)	36.5	36.8	37.3	35.5	36.6	35.9	35.7
% intensive users***	58.1	56.0	59.5	60.8	60.2	58.7	59.5
Manufacturing sector firms							
ICT/ employees*	184.3	98.8	96.6	74.3	88.2	193.1	51.6
ICT/ employees (median**)	22.3	26.0	28.4	28.7	26.0	25.5	0.85
ICT in investment (%)	22.7	21.8	22.0	20.4	19.4	19.8	19.8
% intensive users***	41.7	40.4	40.9	41.0	40.1	40.0	39.5

*Average value of investments in ICT per employee in 1000 SIT, deflated values (1996=100), current price indexes applied.¹¹

**Median is the middle value of the indicator; half of the companies have the value above and half below.

*** Intensive ICT users are defined as firms exceeding the median value of ICT share in total investment for the sample of firms.

Source: Stare, Jaklič, Kotnik, 2005: Calculations based on SORS data, Structural Business Statistics.

9 See details on methodology, data and results in Stare, Jaklič, Kotnik; 2005.

10 The firms with zero value for investments, physical capital or value added were excluded from the analysis. Due to the specification of the estimated models (using logs of values) we also excluded firms with a negative value added.

11 Deficiency of this approach is that it doesn't include lowering of ICT prices parallel to increased capacity of ICT, especially in hardware. Values can oscillate significantly over the years.

Key finding of the above analysis was that the service firms use ICT more intensively than the manufacturing ones (*Table 4*). The share of intensive ICT users among service sector firms was during the entire period 1996–2002 at the level of 59 per cent, while the same share among manufacturing firms was 40 per cent. Average share of ICT investment in total investments (intensity of ICT use) was significantly higher for service sector firms in each individual year. During the observed period the average share of ICT investment was 35 per cent in service firms and between 19 and 22 per cent in manufacturing firms. Even when measuring the intensity of ICT use by the value of ICT investment per employee (deflated values), the service sector firms again stand out as more intensive users in comparison to manufacturing sector.

The analysis also looked at how the impact of ICT on productivity¹² varies depending on intensity of ICT use, export propensity and the size of firms. The estimates of production function for selected variables of service sector firms show statistically significant impact of ICT use on productivity for all firms, regardless of the size or export propensity, but only for the intensive users. In service sector firms, where ICT use is below average, the impact of ICT on productivity is not statistically significant¹³ (Stare, Jaklič, Kotnik, 2005: 109- 111). Similar are the results for manufacturing firms as well: only the intensive ICT users benefit from ICT impact on productivity, suggesting that intensive use of ICT is important for the increase of productivity. This is in part also the result of network effects/ synergy spillovers, which are more significant if overall ICT use is higher as well as if ICT is applied in more business processes and units. The estimates show that in the firms with above average investment in ICT the productivity increase due to ICT was between 5 to 9 per cent (*ibid*, 110).

A somewhat different approach was used by Hovelja (2005). The assumption of his model is that due to several problems associated with the exploitation of ICT, one cannot assume that ICT investment will be followed, after certain time lag, by efficient use of new technology. By comparing what the optimal use of ICT in different business processes could be and the percentage of the actual working hours, dedicated to ICT use in specific business process, an utilisation rate can be calculated. Empirical research, carried out on a sample of 1000 largest Slovenian enterprises focused on finding out the utilisation rate of ICT in Slovenian companies and related the capacity utilisation rate to the creation of value added.¹⁴

The survey results showed that the sample companies could have performed on average 63.8 per cent of all working hours with ICT, yet in fact they performed 51.3 per cent. On the basis of this estimate, the average capacity utilisation rate for 2004 was 79.2 per cent. The highest utilisation rate of ICT was in finance and in logistics, while the lowest capacity utilisation was in manufacturing. Significant differences in capacity utilisation were found among companies. Since the methodology is based on FED methodology (Doyle, 2000, Morin et al., 2004), where it is estimated that capacity utilisation rates around 82–83 % reflect efficient use of specific technology (Bansak et al., 2003), it can be concluded that Slovenian utilisation of ICT is relatively good. Yet, to cite Hovelja, average results can be misleading: even the gathered data shows large differences in the rate of utilisation both in different areas and among different firms. What his analysis also showed, is that statistically significant positive impact of ICT on value added can be detected only among those firms, who use ICT above average (Hovelja, 2005: 125-126).

12 Results are based on value of investment per employee, but similar results were achieved with the share of ICT investment in total investment.

13 The results of the intensive users of ICT could be in part explained by the fact that such companies have in any case better business results. As claimed by Brynjolfsson and Hitt (2000: 33), there exists certain correlation, since the characteristics of a firm (like higher productivity) affect also more intensive application of the ICT and *vice versa*.

14 In addition to these questions, the research tried to identify factors, which contribute to high/low use of ICT, to ICT investment level and ICT application in business processes in the Slovenian firms.

While there should be continued effort to improve data available as well as methodology in measuring the utilisation rate of ICT and the contribution of intensive use to business results, even the results available now suggest that firms who invest above average and use ICT dynamically benefit from these technologies. Why then reluctance on the part of slow investors? Part of the reason, we believe, lies in the scarcity of regular and comprehensive measurement of ICT impact, both at macro level as well as at enterprise level. Some of the research in the area of evaluation of ICT projects, which we will present in the next chapter, seems to confirm this proposition.

4. The Assessment of ICT Impact by Slovenian Companies

The evaluation practice is not yet well developed in Slovenian business culture. Various evaluation methods are slowly finding their ways in management circles. A research on evaluation of e-business projects (Vehovar et al, 2003) focused on the methods applied by Slovenian companies in the process of evaluation of the impact of e-business projects. For our hypothesis, the most relevant is their finding that only 13 % of the interviewed companies evaluate e-business projects, while two thirds have not even thought of evaluation. If you do not monitor the impact of your investment, it is difficult to justify the continuation or increase of such investment. It also means that you lack a strategy in the area of ICT investment and application and confirms a statement made by one of the managers of a leading IT company in Slovenia, who sarcastically remarked that Slovenian managers decide to invest in ICT simply because »..everyone is doing it«.

This in part explains the findings of Vehovar (2005) on the impact of ICT investment where firms were asked to rank the satisfaction with ICT projects. Firms with relatively modest ICT investment (up to 0.7 million SIT) graded the impact at 3 at the scale from 1-5, yet also in the firms where the size of investment was significantly higher, the level of satisfaction did not reach 4,0. Individual aspects of satisfaction (satisfaction of employees, productivity gain, improved market access) have scored even significantly lower (see details in Vehovar, 2005: 90-91). A number of firms expressed their dissatisfaction with ICT investment, since they felt no clear positive impact. In particular, smaller firms were less satisfied with the ICT impact. Combined with answers to some of the other questions in the survey, this suggests that their planning phase was insufficient¹⁵ and/ or that their expectations of the ICT benefits were unrealistic.

Why some firms have managed to introduce and exploit ICT more successfully than others and have experienced also a more positive impact of these technologies on their business? The answer to this question could help those who are sceptical as to the impact of ICT and have so far invested insufficiently in ICT. It would also prevent the dissatisfaction found out in the previously mentioned survey. Here the results of a set of case studies, performed by Jaklič, Bavec, Bučar and Stare (2005) are illustrative.

The main objective of the case studies was the identification of the major problems and barriers occurring during the process of ICT integration in business process as well as reasons for failures and determinants of success. Particular attention was given to the changes that were traced during the process of ICT diffusion, in particular firms' organizational changes (organizational structure, processes, introduction of innovation), fluctuation and dismissal of personnel and the changes in organizational climate. The

15 When firms were asked if they have planned for organizational change to accompany the ICT project, the smaller firms most often did not see organizational change as a significant component of ICT project (Vehovar, 2005:92).

selected case studies¹⁶ covered Slovenian firms that made a significant ICT investment during the recent years. ICT investments were related to initial introduction of ICT, reengineering of business processes with ICT, renovation of ICT, or integration of ICT within a firm.

Planning has been identified as the most important stage of ICT projects. Experience and knowledge gained in past ICT projects largely improved the planning stage of ICT projects and resulted in better identification of potential problems, more detailed processes identification and provide for more holistic solutions. In the cases studied, better planning had not only shortened the implementation time, but had also improved the success of implementation.

The presence of strategic development program with integrated ICT component led to successful planning stage with more carefully documented processes and well thought solutions. Slow adoption, various “pilot” projects, or “optional” renovation of particular departments or functions, that were found in the cases of insufficient/lacking strategic development programs as regard ICT use frequently resulted in longer implementation time, higher costs (exceeding planned) and larger difficulties with system integration. This confirms our assumption that a comprehensive eStrategy contributes to success of ICT implementation.

The case studies also demonstrated that management view (and knowledge) on ICT and its role has significant impact on the exploited potential. The cases of successful ICT implementation reveal relatively high skilled IT engineers within management and “high quotation of IT” within top management. The important role of top management in decision-making process on the level and scope of ICT investment has been confirmed in other research as well. Hovelja (2005) found that the lack of support of both top and middle-level management can seriously endanger the positive contribution of new technologies. Other firm level studies on ICT impact in Slovenia based mostly on interviews with IT people or the company executives pointed to the fact that only a small number of firms have a long-term ICT strategy (18%). Decision to invest in new ICT solutions was carried out because managers believed ICT would improve business processes (Savodnik, 2004a), yet these expectations of the benefits were not based on any serious return on investment analysis, or measurable objectives that an ICT project should achieve (Savodnik, 2004 b). This reflects that the managers still poorly understand ICT and their impact, and that most IT people do not understand business logic or purpose. Findings in interviews with both groups of stakeholders confirmed this (Bavec, 2003).

5. Concluding Remarks

ICT is no panacea but a technology that can help business transform and enhance performance. As proven by presented research on measuring the ICT impact in Slovenia, intensive users of this technology do experience positive contribution to value added and business performance. But as case studies have demonstrated, ICT must be seen as a tool enabling the firm to change and reorganize its business processes in line with the demand of market competition and not as an end in itself. The lack of systematic approach to ICT projects, both in the planning stages as well as in the evaluation of the impact, seems to stand out as a key reason why several Slovenian firms hesitate in making an ICT investment an integral part of their business strategy.

¹⁶ At this stage, eight detailed case studies were carried out, taking into account different size/ branch of both manufacturing and service sector firms. The findings were complemented by earlier case study work carried out by Uršič, Bučar, Pivka and Stare (2002), Bavec (2003) and Bučar (2001).

Slovenian firms should not follow the advice of business gurus like Carr (2003) that “IT doesn’t matter anymore”. With the average share of ICT investment of 30 per cent of total investments, we are still far behind the saturation reached by USA companies, where nearly 50 per cent of capital expenditures have been located to ICT over a prolonged period. According to anecdotal evidence, there are still business executives who would not let their fingers touch a keyboard, much less incorporate ICT in their strategic thinking. ICT is today seen as infrastructure technology that supports business performance. Yet, as pointed by Symons (2004) in an environment where technology enables business, IT strategy must be embedded within the business strategy and not developed as an afterthought. In this respect, continuation of research, measuring ICT impact at the national and firm-level, could provide essential inputs in eStrategy both at the firm level (justifying ICT investment and giving guidance on appropriate implementation strategy) as well as at the national policy level.

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