

REPORT 2

OBJECTIVE 2

THE CONTRIBUTION EFFICIENT OF SOFTWARE INDUSTRY ON PRODUCTIVE SYSTEM

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**PROMETEO 2014
MINTEL**

A. SOFTWARE CONTRIBUTION ON PRODUCTIVE SYSTEM

Software is an integral part of Information Communication and Technology (ICT). It has been argued that increases in technology usage commensurate with increases in productivity. In manufacturing industry the key ways in which ICT can increase productivity are through its capacity to reduce costs, increase the capability of machinery, and provide increased flexibility in production planning and scheduling.

ICT allows for increased scale and speed of machinery operations as well as an expanded management span of control/coordination. Increased capability comes about through the digital control hardware embedded in the machinery and the process execution systems that monitor and control factory operations.

Additional productivity and performance enhancements may accrue to those companies that successfully integrate process control systems with corporate systems through software solutions such as manufacturing execution systems (MES). A major challenge in this area is encouraging managers to 'trust' software and machine generated data, monitoring and analysis to validate processes without the need for physical inspection and activation.

In the corporate level, studies indicate that substantial productivity gains have been achieved by sales teams through the adoption of customer relationship management (CRM) systems that provide for electronic transfer of orders from the field to systems that manage the order fulfilment process.

Productivity is the fundamental economic measurement tool of a technology's contribution. The success of any organization today is largely dependent on their ability and willingness to adopt and use new technology in their daily operations. Despite much investment in technology, returns on technology investment have been minimal. It is shown by Weill's (1990) study that significant productivity could be attributed to transactional types of information technology (IT) (e.g. data processing), but was unable to identify gains associated with strategic systems (e.g. sales support) or informational investments (e.g. e-mail infrastructure).

B. SOFTWARE CONTRIBUTION ON PRODUCTIVE SYSTEM IN ECUADOR

Detailed discussions of impact of ICT on productivity in Ecuador business environment was based on survey performed by Ministry of Telecommunication and Information Society (Mintel) in 2013 using Survey Monkey. Survey was performed to all business types and companies within Ecuador. A number of 402 response the survey but only 180 were valid to proceed to data analysis. Figure 1 shows the location of company which response to the survey. It's easier to motivate company management in Pichincha and Guayas provinces to participate on the survey.

Figure 2 shows the business sector of respondent. Business sector of company respondent is differentiated into software, hardware, telecommunication, internet, and content; services; commercial; industry (manufacturing); tourism; and agriculture and fisheries. The highest response was get from manufacturing sector and the lowest response was from tourism sector. This is not surprising as mentioned by Berrioska, Executive director of AESOFT, generally tourism and cocoa industries are reluctant to adopt and use technology. This survey

was performed through Survey Monkey which means the respondent should connect to internet to be able to participate.

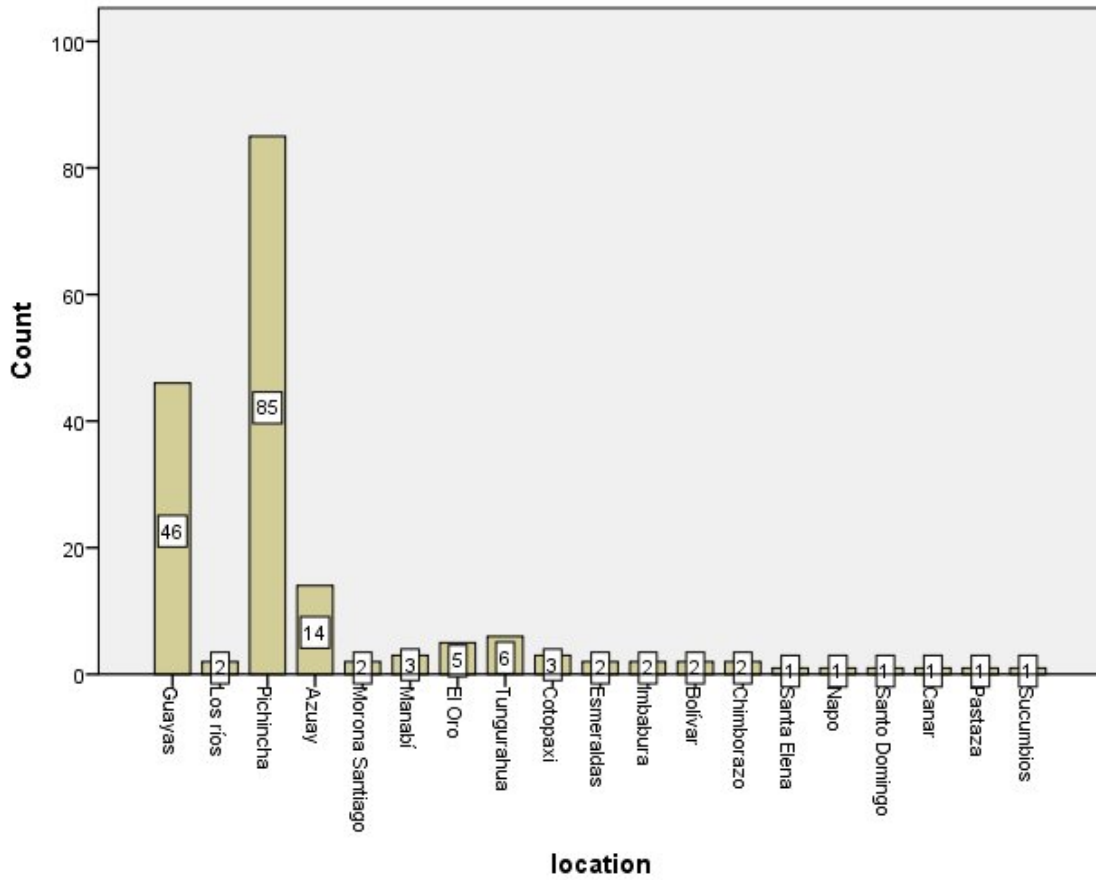


Figure 1. Company location and the number of company responds to the survey

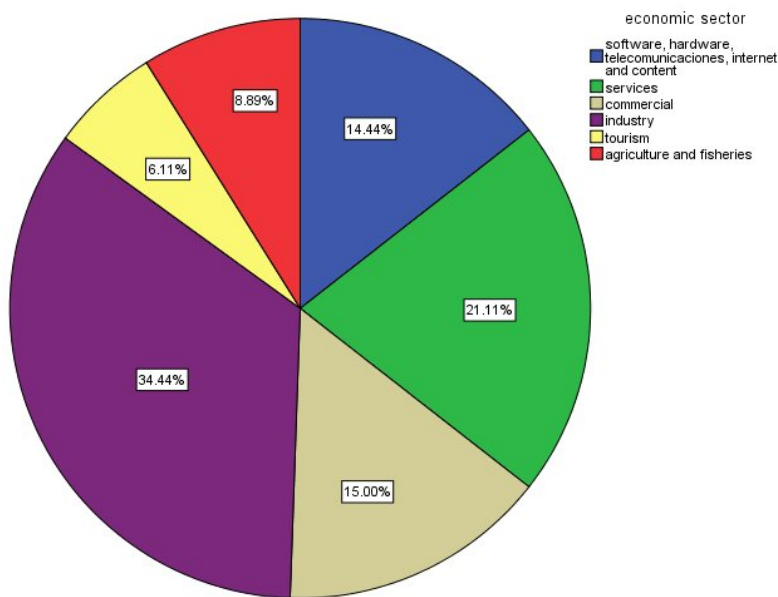


Figure 2. Business sector of company

A few questions were asked in order to the company management opinion relating to the important of technology on their productive sector. The first question is the important of ICT generally. Figure 3 shows that 91.67% of respondent agree that the ICT is important. But interesting as there is 8.33% foresee that ICT is not important. It is not surprising with this statistics, as few scholars show that the troubling problem of underutilized systems continue. Low usage of installed systems has been identified as a major factor underlying the “productivity paradox” surrounding lackluster returns from organizational investments in information technology (Sichel 1997).Despite impressive advances in hardware and software capabilities,information technology adoption and use in the workplace remains a central concern due to mentioned facts.

Problem of underutilized can be raised from HCI or human factors, that is, operators/users of the technology refuse to wholly adopt the technology to fully utilize the potentials of the technology (Weill, 1990). Therefore users/operators should be convinced that by using a certain technology will result in free of effort (Davis, 1989).

More specifically, we asked the importance of ICT on productive system. As shown on Figure 4, there is 98.33% admitted that ICT is important for productive system. There is 1.67% found that ICT is not important for productive system. Although the percentage is very small but still this opinion is necessary to investigate the reason behind the answer. The value of functionality is visible only when it becomes possible to be efficiently utilized by the user(Shneiderman&Plaisant, 2004). Usabilityof a system with a certain functionality is the range and degree by which the system can be used efficiently and adequately to accomplish certain goals for certain users. The actual effectiveness of a system is achieved when there is a proper balance between the functionality and usability of a system(Nielsen, 1994). The unimportance of ICT on productive system can’t be accused as the result of the failure of technology. As noted by Rogers (1962), the degree to which an invention is perceived, should not be difficult to understand, learn, or operate. It is most probably due to HCI. Most sophisticated software and technology are worthless unless they can be used properly by men. Successful exploitationof ICT occurs at the individual level, as it is the individual employee whooperates the various software purchased by organization. When employees are reluctant to change in any given organization, technology implementation will be fail.

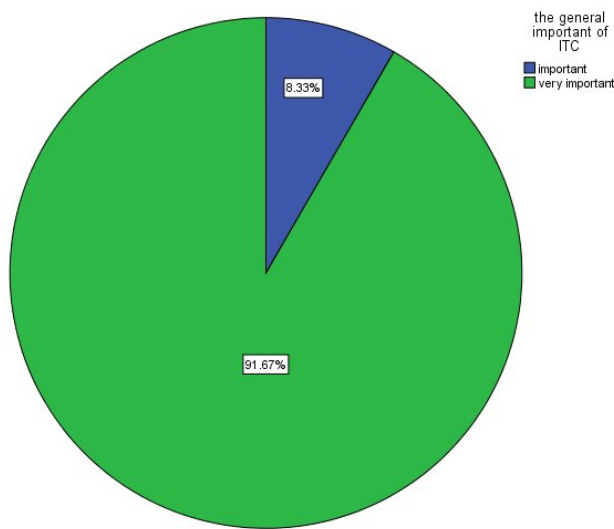


Figure 3. The general important of ICT

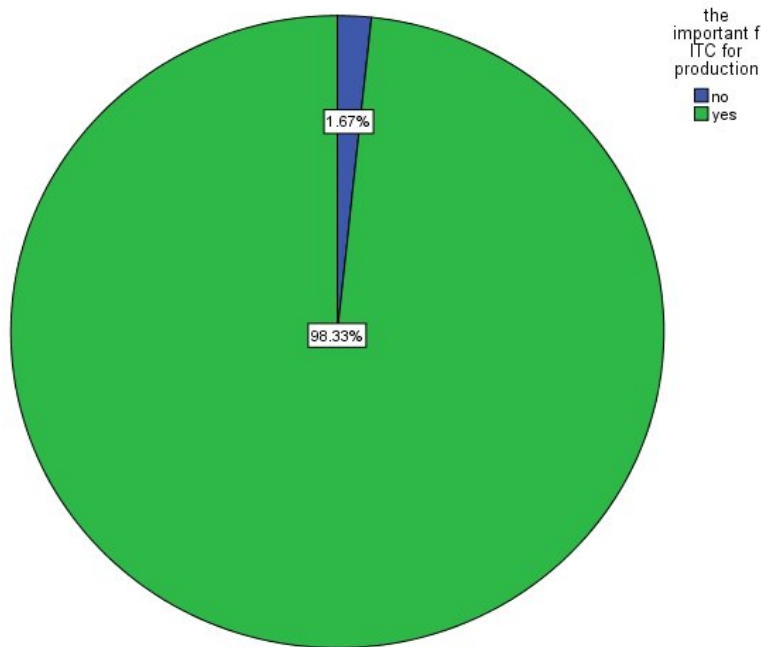


Figure 4. The important of ICT on production system

To get more insight of the company opinion towards the important of ICT on business, respondent was asked to assign rank to a few aspects of business activities. Respondent was asked how important ICT on:

1. The process
2. Optimization
3. Company prestige
4. Cost reduction
5. Training
6. Product innovation
7. Services innovation

Using statistic tool, it was tested whether respondent perceive ICT is important to each aspect significantly. The frequency of responses was categorized into important and not important with cut point is 5. The hypotheses test then performed towards:

- H₀₁: ICT is not important for the process
- H₁₁: ICT is important for the process
- H₀₂: ICT is not important for the optimization
- H₁₂: ICT is important for the optimization
- H₀₃: ICT is not important for the company prestige
- H₁₃: ICT is important for the company prestige
- H₀₄: ICT is not important for the cost reduction
- H₁₄: ICT is important for the cost reduction
- H₀₅: ICT is not important for the training
- H₁₅: ICT is important for the training
- H₀₆: ICT is not important for the product innovation
- H₁₆: ICT is important for the product innovation
- H₀₇: ICT is not important for the services innovation

H₁₇: ICT is important for the services innovation

Hypotheses rejection or acceptance is based on significance value (Exact Sig. (2-tailed)) on last column of the table. Null hypotheses is rejected when significance value less than 0.05. Since the significance value less than 0.05 for all aspect tested, thus we can conclude that ICT is important for all aspects tested. From this study it was evidence that company management accept the important of ICT on the process, optimization, company prestige, cost reduction, training, product innovation, and services innovation. This is in line with the evidence that successful business organizations recognize the importance of technology in running an efficient operation and maintaining their competitive edge. The exploitation of technology is a necessity but one can try new technologies only when an individual is ready to adopt the new technology.

Table 1. Binomial test of hypothesis

		Category	N	Observed Prop.	Test Prop.	Exact Sig. (2-tailed)
The important of ICT on process	Group 1	<= 5	31	.17	.50	.000
	Group 2	> 5	149	.83		
	Total		180	1.00		
The important of ICT on optimization	Group 1	<= 5	24	.13	.50	.000
	Group 2	> 5	156	.87		
	Total		180	1.00		
The important of ICT on company prestige	Group 1	<= 5	45	.25	.50	.000
	Group 2	> 5	135	.75		
	Total		180	1.00		
The important of ICT on cost reduction	Group 1	<= 5	29	.16	.50	.000
	Group 2	> 5	151	.84		
	Total		180	1.00		
The important of ICT on training	Group 1	<= 5	57	.32	.50	.000
	Group 2	> 5	123	.68		
	Total		180	1.00		
The important of ICT on product innovation	Group 1	<= 5	37	.21	.50	.000
	Group 2	> 5	143	.79		
	Total		180	1.00		
The important of ICT on services innovation	Group 1	<= 5	25	.14	.50	.000
	Group 2	> 5	155	.86		
	Total		180	1.00		

The role of company management is very important for this case. The change management initiatives such as getting the employees involved, attending to employees concerns, and making available support groups will mitigate the effect of readiness to adopt and use new technology. Early user involvement in the design and implementation of new business processes as well as extensive top-down and cross-functional communication may generate enthusiasm for software adoption (Stratman & Roth, 2002). Other efforts that can be deployed to change management are establishing a support organization such as help desk, online user manual, etc. (Wee, 2000), and leadership, communication, training, planning, and incentive systems (Norris, Hurley, Dunleavy, and Balls, 2000). Effective change management is critical for implementation of technology and business process reengineering (Grover, Jeong, Kettinger, & Teng, 1995). Without appropriate change management processes, enterprises may not be able to adapt to the new systems and to capitalize on performance gains (Kim et al., 2005).

ICT adoption as well as its impact most probably are different among business sectors so does the perception of company management on different business sectors. We performed hypotheses test for this purpose as following:

- H₀₁: There's no different opinion among business sector managements of ICT important for business process
- H₁₁: At least one business sector management accept it differently
- H₀₂: There's no different opinion among business sector managements of ICT important for optimization
- H₁₂: At least one business sector management accept it differently
- H₀₃: There's no different opinion among business sector managements of ICT important for company prestige
- H₁₃: At least one business sector management accept it differently
- H₀₄: There's no different opinion among business sector managements of ICT important for cost reduction
- H₁₄: At least one business sector management accept it differently
- H₀₅: There's no different opinion among business sector managements of ICT important for training
- H₁₅: At least one business sector management accept it differently
- H₀₆: There's no different opinion among business sector managements of ICT important for product innovation
- H₁₆: At least one business sector management accept it differently
- H₀₇: There's no different opinion among business sector managements of ICT important for services innovation
- H₁₇: At least one business sector management accept it differently

Again the rejection or acceptance of null hypotheses is based on significance value which is Asymp. Sig. in this case (Table 2). Null hypotheses is rejected when Asymp. Sig. less than 0.05. Based on Table 2 we can conclude that there's no different opinion among business sector managements of ICT important for process, optimization, company prestige, and cost reduction. We found that at least one business sector management is accept differently the important of ICT on training, product innovation, and services innovation.

Table 2. Hypotheses test of importance based on business sector

Test Statistics ^{a,b}							
	The important of ICT on process	The important of ICT on optimization	The important of ICT on company prestige	The important of ICT on cost reduction	The important of ICT on training	The important of ICT on product innovation	The important of ICT on services innovation
Chi-Square	2.354	10.167	10.639	9.182	13.046	12.873	21.338
df	5	5	5	5	5	5	5
Asymp. Sig.	.798	.071	.059	.102	.023	.025	.001

a. Kruskal Wallis Test

b. Grouping Variable: economic sector

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