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Sustainability Impacts in the IT Strategic Alignment

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Abstract. Information Technology (IT) has been undergoing changes in their way of being governed. These changes has made proximity IT and business generating strategic alignment business, where business objectives are deployed in IT objectives. This strategic alignment may be affected and impacted for various external and internal factors to the business, including sustainability which is based on three pillars: economic, social and environmental. The aim of this paper is to evaluate the Influence of these three pillars in the IT strategic alignment processes, using the Delphi Method to obtain the IT experts consensus about influence on these processes. The main result shows there is preponderance that of the Influence of the economic pillar in most cases, but that the social and environmental pillars are already considered relevant processes in risk management and strategic planning.

Keywords: COBIT, IT Governance, Sustainability, Green IT, Sustainable IT.

1 Introduction

The evolution that the Information Technology (IT) area has experienced in recent years has generated greater integration with corporate business areas. This integration has meant that IT area support increasingly competitive advantages and add value for business strategy. As a result, boards of directors have been concerned with the IT responsibilities, controls and targets, in other words, emerged the IT governance need [1; 2; 3].

IT Governance is responsibility of board of directors in the definition of leadership aspects, organizational structures and processes to ensure that IT supports and extends the organization's goals. One of the main implementation governance consequences in Enterprises is the emergence of the IT strategic alignment, which is also considered one of the focus areas, aiming to sustain the relationship between business plans and IT, align IT operations with the business, defining the value proposition [1; 4; 5; 6; 7].

The COBIT Model, one of the most widely used in IT Governance, is based on the use of processes and controls, divided into four domains, mapped in five IT governance focus areas. The domains are: Plan and Organise (PO); Acquire and Implement (AI); Deliver and Support (DS), Monitoring and Evaluation (ME). The

focus areas are: Strategic Alignment; Value Delivery; Resource Management; Risk Management; Performance Monitoring [5].

Strategic Alignment is impacted by factors resulting from internal and external environments to the business. Among the external factors, sustainability is one of that impact not only the IT strategic alignment but the entire organizational environment. Sustainability is designed as the capacity to meet the present generation needs without compromising the future generations ability to meet their own needs. Sustainability is achieved through the integration of three dimensions also known by pillars, forming a theory of the Triple Bottom Line (TBL). The three pillars are: economic, social and environmental [8; 9; 10; 11; 12].

Energy savings in data centers, virtualization, consumables planning disposal, use of suppliers with the sustainable practices and Green IT practices are some of the consequences of the sustainability impacts in IT strategic alignment [13; 14; 15; 16].

Believing in the existence of these impacts and influences, the this article purpose is to evaluate qualitatively the pillars influence of the TBL in the IT strategic alignment processes. Specifically, the evaluated processes integrate domain PO COBIT model.

2 Methodology

The paper object consists of two sets of elements: PO domain Processes, which map the Strategic Alignment; pillars of sustainability. The PO domain choice gave up just by being in it that starts the alignment between IT and Business. The processes studied were: Define a strategic IT plan; Define the information architecture; Communicate management aims and direction; Manage IT human resources; Manage quality; Assess and manage IT risks; Manage projects [4].

Once entries are important elements in a process, an sustainability influence analysis was performed on each input the PO domain processes. Table 1 shows the number of inputs on each PO domain process.

Table 1. Numbers of processes inputs.

Process Code	Process	Total input
PO1	Define a strategic IT plan	10
PO2	Define the information architecture	5
PO6	Communicate management aims and direction	4
PO7	Manage IT human resources	2
PO8	Manage quality	3
PO9	Assess and manage IT risks	8
PO10	Manage projects	4

The Delphi method was used for the analysis of each input and the response if they are not influenced by each pillar of sustainability, which was made from a consultation of experts. The choice of this method of research is justified because there is no large-scale distributed knowledge on the subject which favors consulting experts and not restricted to a survey on a larger scale [17; 18; 19].

The Delphi method is conceptualized as a tool for identifying trends and processes to support decision making, possessing three basic characteristics: anonymity; controlled feedback and statistical group responses. The anonymity among respondents is the way to minimize the reciprocal influence between participants. The feedback controlled decreases noise that commonly arise in the participants interaction in a discussion. Statistical group responses reflects the opinion of the respondents appropriately aggregated around individual opinions predominant [17].

Iterations and feedback-controlled obtains a forecast that contains the view of the majority of research participants, where recommend participation from 10 to 18 experts in at least three iterative rounds [17; 18].

In this study, thirteen IT experts were asked, where in the first round, respondents answered only multiple choices questions. From the second round questions were accompanied by a feedback from the previous round and the responses were accompanied by a review of each respondent. Some details about the IT expert can be seen in Table 2.

Table 2. Detail about the IT expert

Level of education	Experience	Total expert
Master degree	Academic and professional	3
Master degree	Academic	3
Doctoral degree	Academic and professional	2
Doctoral degree	Academic	1
Specialization	Academic and professional	3
Specialization	Professional	1

There were eight possible answers for each processes input: all pillars influence, no influence pillar, only economic pillar influences, only social pillar influences, only environmental pillar influences, and combinations two by two pillar influence. Consensus was considered when more than 50% of the respondents agree with one of these possibilities.

After the experts consensus about questions asked, we found the inputs percentage affected by sustainability pillars in each case, thereby establishing, through the scale shown in Table 3, the degree of influence. This scale Influence levels are based on the same Likert levels used in traditional surveys.

Table 3. Influence scale of the processes.

Level	Degree of Influence	Metrics
0	Null	Process inputs are not influenced
1	Low	Between 1% and 40% process inputs are influenced
2	Average	Between 41% and 60% process inputs are influenced
3	High	Between 61% and 99% process inputs are influenced
4	Total	All inputs are influenced by the process

3 Results and Discussion

For the first round consensus was found in 28 of 36 entries, as seen in Table 4.

Table 4. First round result.

Process Code	Input	Pillar	Consensus
PO1	Business strategy and priorities	All	77%
PO1	Enterprise Strategic direction for IT	All	77%
PO1	Programme portfolio	All	62%
PO1	Report on IT governance status	Economic	69%
PO1	New/updated service requirements	All	54%
PO1	Updated IT project portfolio	All	54%
PO1	Updated IT service portfolio	All	54%
PO1	Performance input to IT planning	Economic	54%
PO1	Cost-benefits reports	All	54%
PO2	Strategic and tactical IT plans	Economic	54%
PO2	Performance input to IT planning	Economic	54%
PO2	Performance and capacity information	Economic	54%
PO2	Post-implementation review	None	54%
PO6	Report on effectiveness of IT controls	Economic	54%
PO6	Strategic and tactical IT plans	Economic	54%
PO6	IT project and service portfolios	All	54%
PO6	IT-related risk management guidelines	Economic	54%

PO8	Strategic IT plans	Economic	54%
PO8	Detailed project plans	All	54%
PO8	Remedial action plans	All	54%
PO9	Strategic and tactical IT plans	Economic	54%
PO9	IT service portfolio	All	54%
PO9	Enterprise appetite for IT risks	Economic	54%
PO9	Historical risk trends and events	All	54%
PO9	Security threats and vulnerabilities	All	54%
PO9	Contingency test results	All	54%
PO10	IT project portfolio	All	54%
PO10	Post-implementation review	None	54%

After the second round consensus was reached in 6 inputs, as can be seen in Table 5. Two entries were pending with the consensus for the third round.

Table 5. Second round result.

Process Code	Input	Pillar	Consensus
PO1	Risk assessment	All	100%
PO2	Business requirements feasibility study	All	83%
PO7	Business requirements feasibility study	All	83%
PO7	Documented roles and responsibilities	None	66%
PO9	Project risk management plan	All	66%
PO9	Supplier risks	All	83%

At the second round end there were still two inputs in which there was a consensus. Started the third round with questions and feedback controlled on 2 inputs with pending consensus. The consensus was reached at the third round end and Table 6 shows the result.

Table 6. Third round result.

Process Code	Input	Pillar	Consensus
PO10	IT skills matrix	Economic	60%
PO10	Development standards	None	54%

From the information about the each pillar influence on each input and using the scale levels shown in Table 2, found the influence level of each pillar on each of the processes of strategic alignment in the PO domain. The results are shown in Table 7.

Table 7. Sustainability Influence in the Processes.

	Economic Pillar	Social Pillar	Environmental Pillar
Define a strategic IT plan	Total	High	High
Define the information architecture	High	Low	Low
Communicate management aims and direction	Total	Low	Average
Manage IT human resources	Average	Average	Average
Manage quality	High	Average	Average
Assess and manage IT risks	Total	High	High
Manage projects	Average	Low	Low

It is considered in the analysis processes for which the consensus percentage was greater in the first round have greater certainty in the art. The processes for which consensus took longer to be achieved and have greater doubts or lack of specialists.

Analyzing the data presented in Table 6, it was found that the pillar that most influences the processes contained within this study is the economic. It was also an influence almost similar between the social and environmental pillars. And more about the processes influenced by sustainability in general are the PO1 (Define a Strategic IT Plan) and PO9 (Assess and Manage Risk).

It is believed that the process PO1 Total influence of economic factors and the high social and environmental factors is due to the character's own IT strategic planning to deploy the corporate strategic planning, which considers sustainability in the following ways:

- Economic: making decisions based on profit increase, customers, brand value;
- Environmental: prioritizing strategies that less environmentally friendly;
- Social: the understanding of the role of the corporation in society.

The high influence in PO9 is understood due to sustainability always be included in the risk environment, as a matter considered by the management of corporations. The risk that IT poses to the company's image to society when there are established environmental strategies, or even the risk of IT investments must be considered. Disregarding the economic pillar, the other four cases examined (PO2, PO6, PO7, PO8 and PO10) receive an influence ranging from low-and middle pillar of sustainability.

4 Conclusions

Given the goal of qualitative assessment of the degree of sustainability pillars influence, it appears that it was hit. The table with sustainability influence in IT processes found summarizes the experts perceptions about the economic, social and environmental pillars influence in the processes of the strategic alignment Plan and Organise (PO) of the COBIT model.

A possible continuation of this research can be given towards the use of the Delphi method to evaluate the influence of sustainability on other processes such as transaction, transition, architecture as well as in other areas of focus of governance.

This research was restricted to the COBIT model, but suggests the influence of sustainability assessment processes and / or practices of other models of management and IT governance, such as ITIL, CMMI, ISO2000, ISO38500, to discover correlations that help organizations to have their IT departments increasingly aligned to the concepts of sustainable development.

References

1. Tuttle, B., Vancervelde, S.D. An empirical examination of CobiT as an internal control framework for information technology. *International Journal of Accounting Information Systems* 8: 240-263 (2007). Available at: <http://www.sciencedirect.com/science/article/pii/S14670895070004250>. Accessed on: Mar. 2013.
2. Luciano, E. M., Testa, M. G. Controles de governança de tecnologia da informação para a terceirização de processos de negócio: uma proposta a partir do COBIT. *JISTEM J.Inf.Syst. Technol. Manag. (Online)*, São Paulo, v. 8, n. 1, (2011). Available at: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1807-17752011000100012&lng=en&nrm=iso. Accessed on: Mar. 2013.
3. Lunardi, G. L., Becker, J. L., Macada, A. C. G. Um estudo empírico do impacto da governança de TI no desempenho organizacional. *Produção*. São Paulo, 2012. Available at: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0103-65132012005000003&lng=pt&nrm=iso. Accessed on: Mar. 2013.
4. ISACA, 2008. *CobiT – 4th Edition (Version 4.1)*, 3 ed. Information Systems Audit and Control Association, IT Governance Institute, Rolling Meadows, USA.
5. ISO, 2008. Norma ISO/IEC 38500:2008.
6. Bernroider, E. W. N., Ivanov, M. IT project management control and the Control Objectives for IT and related Technology (CobiT) framework. *International Journal of Project Management* 29: 325–336 (2011). Available at: <http://www.sciencedirect.com/science/article/pii/S0263786310000529>. Accessed on: Mar. 2013.
7. Weill, P., Ross, J. W. (2004). *IT governance—How top performers manage IT decision rights for superior results*. Boston: Harvard Business School Press.
8. Luftman, J. Net al. Transforming the Enterprise: the alignment of business and information technology strategies. *IBM Systems Journal*, vol. 32, n. 1, p 198-221, 1993
9. Henderson, J.C.; Venkatraman, N. Strategic Alignment: Leveraging Information Technology For Transforming Organizations. *IBM Systems Journal*.v.32, n.1, p.4-16, 1993.

10. Elkington, J. Triple bottom line revolution: reporting for the third millennium. Australian CPA, v. 69, p. 75, 1994. Available on: <http://www.cpaaustralia.com.au/apps/library/itemdetails.aspx?itemno=89725>. Accessed on: Mar. 2013.
11. CMMAD. Nosso futuro comum. Rio de Janeiro: Fundação Getúlio Vargas, 1991.
12. Oliveira, L. R. de et al . Sustentabilidade: da evolução dos conceitos à implementação como estratégia nas organizações. Produção. São Paulo, v. 22, n. 1, (2012). Available on: <http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0103-65132012000100006&lng=en&nrm=iso>. Accessed on: Mar. 2013.
13. Bose, R., Luo, X. Integrative framework for assessing firms' potential to undertake Green IT initiatives via virtualization – A theoretical perspective. Journal of Strategic Information Systems 20: 38-54 (2011). Available on: <http://www.sciencedirect.com/science/article/pii/S0963868711000047>. Accessed on: Mar. 2013.
14. Faucheux, S., Nicolai, I. IT for green and green IT: A proposed typology of eco-innovation. Ecological Economics 70: 2020-2027(2011). Available on: <http://www.sciencedirect.com/science/article/pii/S0921800911002084>. Accessed on: Mar. 2013.
15. Cristovão, A. M., Costa, I. Virtualization: The Advantages of This New Paradigm in the It Landscape and the Positive Environmental Impact of This Technology. In: International Conference on Advances in Production Management Systems (2010), Cernobbio , Italy.
16. Joumaa, C., Kadry, S. Green IT: Case studies. Energy Procedia 16: 1052-1058 (2012). Available on <http://www.sciencedirect.com/science/article/pii/S1876610212001786>. Accessed on: Mar. 2013.
17. Dalkey, N. C. The Delphi method: An Experimental Study of Group Opinion, The RAND Corporation, RM-5888-PR, 1969.
18. Landeta, J. Current validity of the Delphi method in social sciences. Technological Forecasting& Social Change, 73, 467–482, 2006.
19. Pill, J. The Delphi Method: substance, context, a critique and an annotated bibliography. Socio-Econ.Plan.Sci., 5, 57-71, 1971.