STRATEGIC IT USE THROUGH THE ADAPTATION AND INCORPORATION OF BUSINESS-IT ALIGNMENT MODELS

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Abstract: The seamless integration of business and manufacturing processes is a difficult task that can be facilitated through IT consulting services. However, if the structure of these services fails to consider the problems of aligning IT and business, this might affect their effectiveness. This paper presents a methodology to systematize IT consulting services that are obtained by modelling a process system in a pattern that adapts and incorporates a set of reference models to align IT and business. Alignment models are analyzed by the conceptualization of what we call the features of the IT consulting services. To validate the methodology we have defined a process based on a case study method which has been applied in Cuban enterprises in the food production sector.

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1 INTRODUCTION

E-Business models in the manufacturing sector respond to the demands of an extremely competitive market and highly specialized business processes (Cheng and Bateman, 2008) (ISIC, 2008). A key feature of these process-oriented models is to structure the organization into two basic groups of processes: those located in the enterprise levels and those deployed in production plants.

The seamless integration of both groups has been addressed in works that abstract the logic of production elements as IT services integrated into a Business Process Management System (BPMS) (Gilart et al., 2007).

To ensure the implementation of such IT solutions is extremely complex because of the high dependence of the solution to the continuity and diversification of business models (Jansen et al., 2007). IT consulting services are a complement to facilitate the implementation of IT solutions to these sophisticated levels of integration and specialization. Today, these services have a low level of conceptualization if analyzed from the perspective of the traditional IT-business alignment and strategic use of IT (Carr, 2004).

This paper presents the results of a research that aims at developing a methodology to systematize strategic IT consulting services. These services are formalized by modelling a process system in a pattern that adapts and incorporates a set of reference models in the field of Business-IT Alignment (BITA), IT governance models and IT value management. In the methodology, these models are analyzed by the conceptualization of what we call the *features of the IT consulting services*. These features are systematized to offer, as a way out, a consultant solution that provides a sort of IT integration that vertically and seamlessly incorporates different types of business processes in manufacturing organizations.

The features of the IT Consulting Services (ITCOS) are grouped into two classes for analysis. The first covers the ITCOS scope features (consulting intervention, working tool, nature of service, IT market segmentation) while the second class comprises the ITCOS integration features. This integration is understood in terms of theoretical frameworks to integrate IT and business and it is subdivided into three dimensions: architectural, IT governance and communication.

The macrostructure of the methodology is a system of three processes: consultancy diagnosis, design of strategic consulting patterns, and implementation of ITCOS archetypes.

The microstructure is the adapt/incorporate pattern that ensures a simple and uniform modelling of selected reference models to be used as conceptual frameworks for consultancy.

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The work is divided into four sections. Following the introduction, the second one presents the ITCOS features. The third section shows the system of processes obtained as a result of applying the adapt/incorporate pattern. Finally, the fourth section presents the validation of the methodology. To this end we have defined a process based on a case study method which has been applied in Cuban enterprises in the food production sector.

2 CONCEPTUAL FRAMEWORK

The two structural elements of the methodology are the ITCOS features, and the definition and use of the adapt/incorporate pattern. This pattern itself and the system resulting from its implementation have been modelled based on the Eriksson-Penker Extension for Business Process Modelling (Eriksson and Penker, 2000).

The *consulting intervention* ITCOS feature is taken from studies by Schein (Schein, 1999) and three approaches of intervention are defined: expert, doctor/patient and process.

The *nature of service* ITCOS feature opens the spectrum of potential consultancy objects. The nature of these objects is analyzed by means of dimensions: *business consulting* as commercial activity, functional classification of business Information Systems (IS) and the types of IS that support the management process at the operational, tactical and strategic levels (Laudon and Laudon, 2007).

The *IT service market* ITCOS feature offers a more detailed view of the consulting business dimension. This feature is based on market segmentation variables and marketing-mix techniques in the context of IT services (Kotler et al., 2007). Gartner's proposal (Babai et al., 2006) is the reference for its five dimensions: vertical segmentation, line of services, solutions, acquisition methods and platform.

The *working tools* ITCOS feature focuses on knowing what kind of value the client of IT consulting services expects when identifying a set of potential consultancy objects. This feature was conceived based on the foundations of the IT value management methods (McShea, 2006). In this sense, the dimensions of this feature reflect the type of method: financial, multi-criteria, and strategic frameworks.

Conceptual integration, the fifth and last ITCOS feature, combines consulted reference models that relate to IT alignment and business (Chan and Reich, 2007). We share the view of Chen (Chen et al., 2010) to classify the dimensions of this feature in terms of: *via architectural conceptual integration, via IT governance conceptual integration and via communication conceptual integration*.

2.1 Adapt/Incorporate Pattern

The adapt/incorporate pattern governs the uniform modelling of consulting processes defined in the methodology.

This pattern was obtained as a result of fine-tuning adaptation needs and the subsequent integration of three reference models:

- Model to evaluate the maturity level of the business-IT alignment (Luftman, 2000)
- Strategic alignment model (Henderson and Venkatraman, 1993)
- IT Balanced Scorecard model (Keyes, 2005)

Luftman's model has been consolidated and validated as an indispensable reference in studies on the alignment from a multifactorial approach (Luftman and Kempaiah, 2007). During the more than 10 years of extensive application of this method, the absence of more prescriptive tools to assume the issue of alignment has been verified.

Henderson and Venkatraman's model provides a structural and dynamic view of Business-IT alignment. Despite its many applications (Chan and Reich, 2007), we decided to analyze the authors' original proposal.

The IT Balanced Scorecard (IT-BSC) model is itself a model adapted from the original research by Norton and Kaplan (Kaplan and Norton, 2004). The argument of these authors that the balanced scorecard is a reference model to be contextualized in specific domains is an important motivation.

Under these considerations, these three models are re-conceptualized to the language of the ITCOS features. In addition, we considered it appropriate to analyze other models related to the field of IT governance as complementary reference models. Such are the cases of ITIL, COBIT and Weill and Ross (Harris et al., 2008). These models, although not different in essence from the guiding models, are dominated by a typical language that had to be re-conceptualized as well.

The result of the analysis of guiding and complementary models concluded that these were addressed as processes themselves. Therefore, the use of a diagram of processes was effective to represent the two latent sub-processes: to adapt a reference model to be used as a consultancy

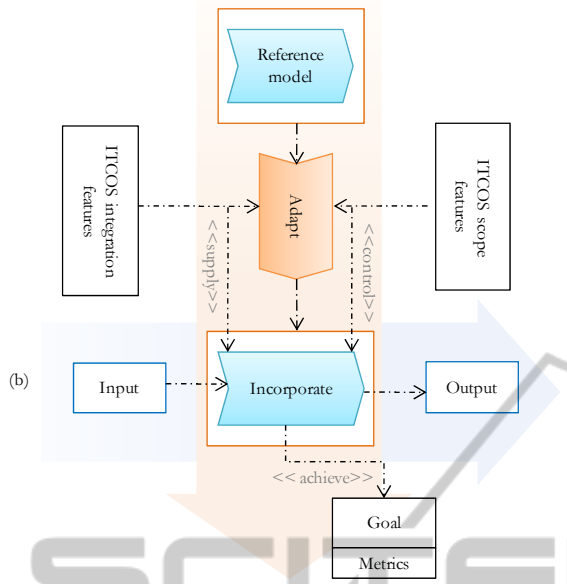

Figure 1: Adapt/Incorporate Pattern.

framework (Figure 1a) and to incorporate a way out to this adaptation as a process itself that is again adjusted to be incorporated (Figure 1b).

The ITCOS features are the control and supply resources as specified by the selected process modeling.

The graphic representation of the pattern is simple and it explicitly shows the reference model being instantiated as a framework for consultancy.

3 METHODOLOGY

The methodology consists of a system of three modelled processes following the adapt/incorporate pattern (figure 2). An inductive method was used to analyze the proposal of (Gilart et al., 2007) and identify a group of *generalizable elements* that would contribute to the creation of a consultation framework along with the governing and complementary reference models already addressed. This decision ensured the relevance in the design of the methodology because it was based on the integration of specific IT and it was complex enough to obtain generalizable elements that are candidates to form a framework for integral consultancy.

Generalizable elements as a solution are: manufacturing with flexibility and vertical integration of processes. The goal of the process system is to facilitate the strategic use of these solutions types, while the generalizable elements as a concept are e-Business paradigms (specialized in

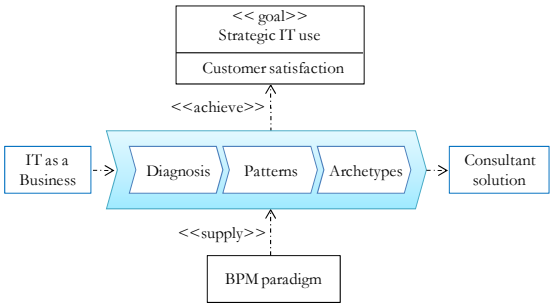

Figure 2: Process system of the methodology.

the field of e-Manufacturing), and BPM. These elements complement the supplying resources already existing in the adapt/incorporate pattern.

3.1 Consultancy Diagnosis

The first process, the diagnosis, has been designed based on Luftman's model. Its selection was based on the analysis of the integration ITCOS feature in its communication dimension. The guidelines followed in the sub-process of adaptation are:

- The criteria and sub-criteria are considered diagnostic elements and they are contextualized to the field of IT consulting services.
- The use of Likert's scale will not be applied and processed as a questionnaire but as a structured consultation used within a line of intervention (ITCOS feature) by the consultant to evaluate a given diagnostic element through interviews and different observation types.

In the case of the integration sub-process, the two main characteristics are:

- To standardize the IT organization for the consultancy diagnosis modelling it as business and IT components according to the Business Motivation Model (BMM, 2010).
- To assess the consulting capabilities through the consultant's assessment of diagnostic elements which are most problematic for the integration of generalizable elements as a solution so as to obtain candidate consultancy objects.

In this first phase of the methodology the consultant has prioritized a set of diagnostic elements, has made a qualitative assessment and has identified opportunities for consulting candidates.

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3.2 Design of Strategic Consulting Pattern

The candidate consultancy objects are inputs to the process of Design of strategic consulting patterns as the second most important stage of the methodology. These patterns go deep into the consulting opportunities that have been obtained in the diagnosis. For this purpose, the process of conceptualization focuses on the Henderson and Venkatraman (SAM) model. SAM's adaptation process has two guidelines:

- To use its structure of quadrants and domains as a classifying framework for business and IT components obtained in the diagnosis, which have been grouped and classified on the list of candidate consultancy objects.
- To adjust the use of alignment perspectives as mechanisms for strategic IT consulting.

The integration process has two key milestones:

- Selecting which adapted SAM perspectives are relevant to define consulting mechanisms that are consistent with generalizable elements seen as a solution.
- Grouping concept-type generalizable elements as a conceptual consulting platform to enrich the selected SAM perspectives and to make two specific pattern types: e-Manufacturing consultant pattern and BPM consultant pattern.

For the definition of the e-Manufacturing consultant pattern, we select the candidate consultancy objects located in the business strategy quadrant. In this case, the conceptual consulting platform is the e-Business paradigm. That is, the consulting opportunities identified in the diagnosis are formalized in business components that have a strategic importance in a production strategy heavily based on IT. The instances of this pattern are: *competitive potential*, *organization infrastructure strategy* and *organization strategy fusion*.

The formation of the BPM consultant pattern is based on the selection of consultancy objects located in the IT strategy quadrant. In this case, the conceptual consulting platform of the pattern is the BPM paradigm. The consulting mechanism activates the technological strategies for the vertical integration of processes facilitated through the full or partial incorporation of the BPM cycle phases. The instances of the BPM consulting pattern are: *technological potential*, *IT infrastructure strategy* and *IT strategy fusion*. Figure 3 shows the structure of the two patterns.

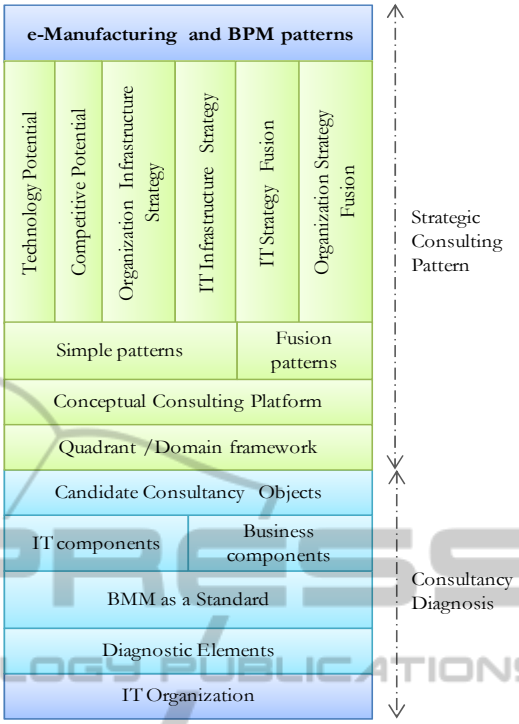

Figure 3: Structure of the strategic consulting pattern.

3.3 Strategic IT Consulting Service Archetypes

The resulting strategic consulting pattern of the second phase of the methodology will be the controller of the process that implements strategic IT consulting service archetypes (archetypes SITCOS). The reference model considered as consulting framework is the IT-BSC.

The IT-BSC adaptation process takes place at two levels:

- To contextualize to the field of IT consulting services the following elements of basic IT-BSC: perspectives, objectives, indicators and cause/effect relationships. This contextualization is based on COBIT and ITIL models.
- To replace the levels of the IT-BSC strategic map with new levels in accordance with the decision areas of the Weill/Ross IT governance model. The new levels would be (IT consultancy levels): IT principles, architecture, infrastructure, applications and investments.

Finally, the essence of the integration process is defined as a techno-change initiative (Markus, 2004). The goal is to make all the elements adapted from IT-BSC operational.

4 VALIDATION

To validate the methodology we have defined an evaluation process following the case study method (Yin, 2009). The prerequisites for the selection of this method are present in this research:

- Research questions: how does the methodology systematize ITCOS features? and Why does the proposed methodology facilitate the integration of specific IT incorporations such as manufacturing with flexibility and vertical integration of processes?
- Research contemporary events: compliance in fact.
- Control of research events: assisting those responsible for IT strategy through technological consultancy does not necessarily guarantee that the advice will be taken in the way and to the extent recommended by the consultant.

The evaluation process (figure 4) has been modelled with the same extension for process diagrams used to model the process system of the methodology — Eriksson-Penker extension.

The intervention protocol is obtained as a result of preparing the case. This protocol will control the sub-processes of collection, analysis and reporting of the case. The parts of this protocol are: nomination of the cases, units and context of analysis; access and classification of evidence; and implementation schedule.

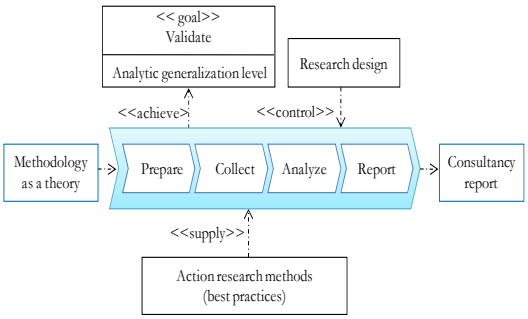

Figure 4: Process to Assess the Methodology.

This evaluation process was applied in a group of Cuban organizations in the sector of food production. The case study took place over 14 months between October 2009 and December 2010. The overall schedule of the case recorded: each assessment phase, the line of analysis followed by the consultant, the chain of actions, and the sources of evidence and their types.

As part of the implementation schedule, a unique case in the context of the Cuban manufacturing organizations that produce food as a result of animal exploitation was designed. The unique case was designed with three units of analysis: ministerial-IT, firms-IT and solution environment-IT.

The structure of the chain of evidence in the case showed how the consulting services were systematized. The development of this case allowed us to answer the research question on how the methodology systematizes the IT consulting services features and to evaluate the rigor of the proposal, while the relevance of this work was to propose concrete solutions to problems that are valid in organizations under study.

The consultant solution in the ministerial-IT level is to implement a merger of the two existing IT service providing centers. The solution proposed in the business-IT level is to implement a coherent strategy for centralized IT governance. Finally, the consultant solution in the development environment-IT level is the execution of a project to set up an academic BPMS as YAWL (Hofstede et al., 2010) under a techno-change paradigm.

The design of a unique case is an opportunity for the IS academic community to know how the fusion and restructuring of business units in Cuban manufacturing organizations impacts on the selection of a type of IT governance and on the relationship between enterprises and their IT service providing centers.

5 CONCLUSIONS

This paper presents the results of a research in the field of IT consulting services. This type of service is re-conceptualized based on a set of frameworks of reference in the field of BITA and IT governance. This re-conceptualization process is carried out through the design of a pattern that adapts them and incorporates them into a coherent system of consulting processes. To validate the methodology we designed a process based on the case study method. The results obtained after applying this method allowed us to prove the conceptual validity of the methodology and the relevance of providing concrete consulting solutions in the domain of a group of Cuban organizations engaged in food processing.

The value of the results is transferable to other Cuban manufacturing enterprises involved in a process of organizational restructuring that may impact on their IT service providing centers.

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