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Procedia Computer Science 121 (2017) 145–151

Procedia
Computer Science

www.elsevier.com/locate/procedia

CENTERIS - International Conference on ENTERprise Information Systems / ProjMAN - International Conference on Project MANagement / HCist - International Conference on Health and Social Care Information Systems and Technologies, CENTERIS / ProjMAN / HCist 2017, 8-10 November 2017, Barcelona, Spain

Bridging IT requirements to competitive advantage: The concept of IT value planning

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Abstract

As other investments within an enterprise, information technologies should support the business strategy of a company and provide value to it. IT projects and their requirement engineering must include aspects of competitive gains in accordance to the strategic position of the company. I suggest that IT managers and engineers must take competitive strategy into account when specifying the requirements for a new IT product and check that its operation supports competitive objectives. This paper introduces the concept of IT value planning that portrays the relation between competitive advantage as defined in enterprise strategy and requirements collections as part of IT projects. Furthermore, hypotheses on the links between both variables are presented along with the research approach.

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Peer-review under responsibility of the scientific committee of the CENTERIS - International Conference on ENTERprise Information Systems / ProjMAN - International Conference on Project MANagement / HCist - International Conference on Health and Social Care Information Systems and Technologies.

Keywords: Competitive advantage; Business-IT alignment; IT strategy; requirements; IT value planning

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1. Introduction

In every industry, information technologies play a decisive role regarding operational efficiency and value delivery to customers. Value creation and competitive advantage are treated in a wide variety of publications comprising manifold management disciplines, such as strategic management, innovation management, or value analysis. Besides, numerous papers, IT frameworks, and so-called bodies of knowledge deal with links between information systems and business objectives. Current focus of IT and project management literature is on processes, organizations, roles, responsibilities, resources, competencies, capabilities, tools, techniques, and cultures, but not on artefacts and their connectivity to competitive strategy and requirement engineering^{1, 2, 3}. This paper includes requirements for IT products into the discussion about value and competitiveness, examines the logical context between them, and discloses the dependencies. The literature review in the next section provides brief sights on popular technology management methodologies, explains how they refer to business and strategy, and highlights linkages and gaps. These insights support synthesis of concept of IT value planning that depicts logical links between IT products and competitive advantage and that helps practitioners in planning and inspection of requirements. Objectives and design of ongoing research are presented as well as expected relationships between requirement categories and competitive impacts.

2. Literature review

Portfolio management is applied by companies to meet organizational strategies and to achieve strategic objectives⁴. It is an integral element of the strategic plan of a company. Realization of benefits to the company is a measure of portfolio success. Operations, programs, and projects are components in the layer below a portfolio. Business value increases by effective use of project, program and portfolio management process that help meet strategic goals^{5, 6, 7}. Portfolio management aligns programs and projects to strategy and benefits⁸. Thus, projects are linked to strategy via portfolios or programs.

Depending on size of an organization and the extent of strategic changes, projects might be part of a program or of a portfolio, which organizes programs and projects. The use of portfolio, program, and project management possesses the ability to employ processes to meet strategic objectives and to accomplish higher business value. Whatever structure is appropriate to a major endeavor, each level must support the goals from business strategy. If organizations initiate projects without structuring them under portfolio or program umbrellas, they need to directly derive project objectives from strategy or check for their compatibility to strategic objectives (Figure 1).

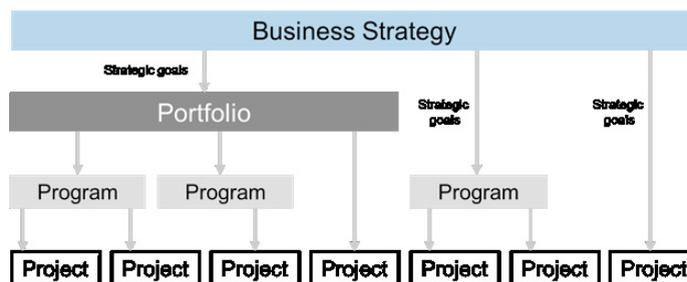


Fig. 1. Project objectives directly derived from business strategy or via portfolio/program

Project failures are frequently a consequence of vague requirements or fuzzy project objectives because of unclear or unknown company strategy. Project managers must know superordinate goals from strategic plans. Empirical data from IT projects show lack of recognition of company objectives. 18 % of questioned IT managers stated that the absence of clear business objectives is the biggest problem. Hence, clarity of business strategy and its consideration by project managers are crucial success factors for IT projects⁹. Through all planning stages, from competitive positioning, as part of strategy development, to requirement analysis, as part of IT project management, cohesion must be maintained and organized to succeed in IT delivery, i.e., to provide more value and therefore to increase competitiveness.

Business analysis estimates total sales, costs, and profits after creation of marketing strategy for a new product. Thereby, a company determines if its objectives may be met^{10,11}. Strategy analysis as part of business analysis provides context to requirements analysis and design definition for a given change¹². The role of a business analyst and his or her deliverables explains the benefits of this management discipline. She or he takes information from strategic plans and goals to conduct a feasibility study and to develop a business case that includes cost estimates and business benefits. Based on that, a decision can be made by the sponsor. That means, a proposal for a new project is being selected or rejected¹³. If a project proposal is approved, a project manager will initiate the project. Due to PMBOK¹⁴, projects are initiated because of internal business needs or external influences which trigger needs analysis, business cases, and feasibility studies. Hence, deliverables of business analysis are linking strategy with projects. BABOK¹⁵ illustrates the relationships between its knowledge areas. In the core, the link between strategy and requirements is presented (Figure 2). Requirements analysis is an essential part of scope management following project initiation. Again, links between company strategy, projects, and product requirements become apparent.

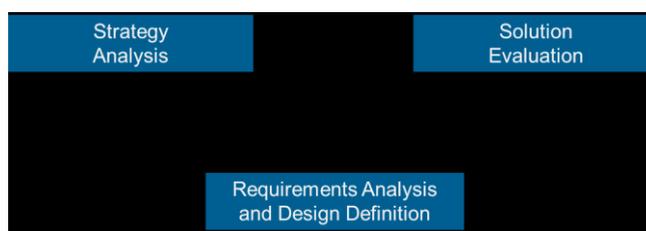


Fig. 2. Relationships between core knowledge areas derived from BABOK

Architecture management by TOGAF¹⁶ also reflects the relation between strategy and requirements via initial phase architecture vision and subsequent phase business architecture. Architecture vision includes strategic topics such as mission statement and business value, whereas business architecture covers documents that are crucial inputs for project deliverables.

Innovation management is a business science and practice that contemplates processes to successfully translate ideas either in operational improvements or into profitable products on a market. These products should possess new or advanced characteristics that are valued by customers. Technological development and their early conversion in beneficial product attributes are key to gain advantage in market places. New product development (NPD), a strategy for growth, encompasses activities and goals that are consistent or equal to the ones being in research focus. Viewing the eight-stage linear model for NPD from Trott¹⁷, the stages idea generation, idea screening, concept testing, business analysis, and product development can also be identified in project management, particularly prior to project initiation.

Many other papers, frameworks, and body of knowledges deliberate the strategic dimension of technology but do not comprise competitive advantage and context to IT specifications^{18, 19, 20, 21}.

We can infer that IT projects and their requirements are connected to strategy as various established concepts mirror. Though, the relation between competitive advantage and requirement specification is still a gap to be explored.

3. The concept of IT value planning

From my observations in practice, IT requirements specifications were often decoupled from business strategy resulting in stakeholder dissatisfaction and deviation from original competitive intentions. Reasons were missing interfaces in a firm's organization, insufficient processes, or poor communication between strategic management and IT management. Beside organizational shortcomings, there are different people, various interests, diverse business mindsets, or other underlying behavior. However, it can be asserted that definition of requirements must be set and verified in close context with business strategy via all stages in between. Over this extensive path, competition-critical information gets lost. There is the need to examine the coherence of planning outcomes over the top-down process of IT value planning. Each planning stage requires inputs as well as resources and capabilities for processing to generate outputs. IT value planning concentrates on the outputs of the planning stages (artefacts) rather than the assets, tools, or skills to generate them. The chain and the concept of IT value planning are based on previous short analysis and following logic:

- Enterprises in competitive environments must sustain their competitive advantage²².
- Competitive advantage is a key topic in business strategy²³. Business strategy is based on competitive position in targeted market segment and competitive priorities²⁴.
- IT strategy and architecture must support the business and align to business strategy^{25, 26}.
- Portfolios, programs, and projects must be aligned to strategic goals²⁷.
- IT products (systems, services, or results) are introduced by applying project management methods²⁸.
- Requirement analysis is part of scope management in project management²⁹.
- IT products are designed based on collected requirements³⁰.
- IT products in operation are investments must provide value, i.e., returns on investments³¹.

Therewith, I conclude that IT product requirements should refer to competitive advantage. The chain in figure 3 depicts main planning stages for producing IT values in a chronological order and represents the proposed conceptual model. It outlines an IT planning sequence and will be used throughout the research work to explain the connection of IT product requirements to competitive position in a product space or on a market place. Each planning stage must process the outputs from the preceding stage by breaking them down and detailing them for the purpose of the ensuing stage.

Figure 3 illustrates possible outcomes (artefacts) from each phase of the IT value planning concept. The bridge refers to main outcomes from IT product requirement phase, the requirements specification and its coherence to the stated competitive advantage out of a firm’s marketing strategy.

Key challenge is to sustain consistency of value contributions over the long chain that encompasses a wide variety of managerial activities and roles. IT project managers are invited to verify items in the list of requirements and their reference to attributes of competitive advantage from a marketing plan. As an example, how would a specified functional requirement for new monitoring and reporting system of a customer contact center relate to the strategic statements for competitive advantage?

The concept of IT value planning is of high practical use since it connects marketing management with IT management over various phases and makes artifacts from each stage transparent. The application of the IT value planning concept will help companies to track the value creation over all phases from rough competitive plan to detailed product design. IT architects and requirement engineers may refine IT requirements in order to achieve better competitive impacts as given by the strategy.

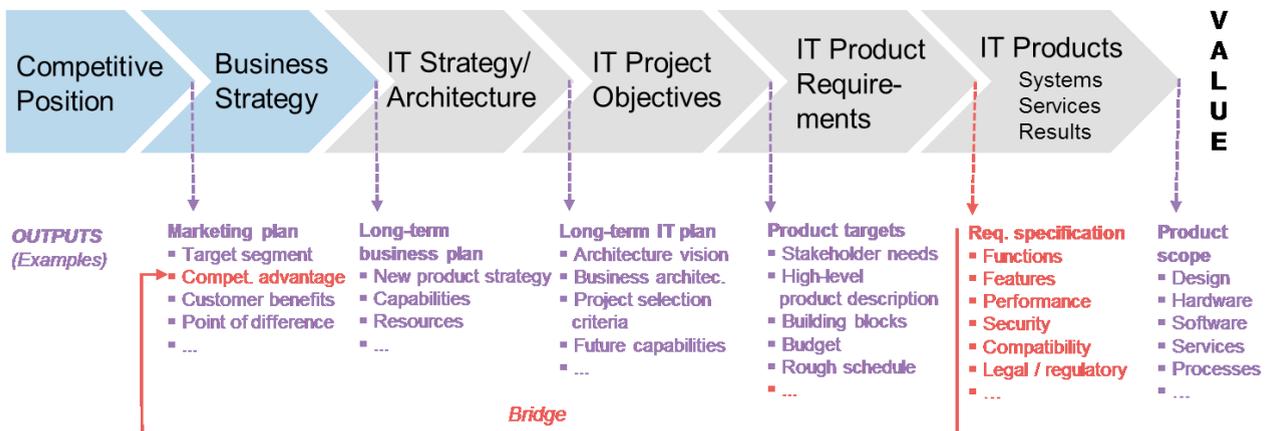


Fig. 3. IT value planning for deriving IT product requirements from competitive position

IT managers and project managers should verify whether the requirements are compatible to their companies’ competitive strategy. If not, requirements can be adjusted to provide IT solutions that comply to strategy for competitive advantage. Understanding the link between both helps realigning the requirements and subsequently refining or correcting IT product design. Furthermore, best practices and metrics can be derived for measuring competitive impacts. Requirement specifications might be looped back into the firm’s strategy (e.g. by benchmarking)

to adjust it. Research results can inspire or motivate decision-makers to modify their communication and process flows between marketing management and IT engineering.

4. Research objective and research question

The goal of the research is to build and to test a theory that explains relations between types of requirements for IT products and strategic impacts on competitive advantage. The theory will help to answer the research question: "How will fulfilments of various types of IT requirements impact competitive advantage of an enterprise?"

5. Research methodologies

The ongoing study is exploratory using multiple methods. The approach is abductive, a mix inductive and deductive reasoning in two phases. Abduction is suited to introduce new ideas by combining deductive and inductive approaches³². Applying both research methods, qualitative and quantitative, allows building and testing theory³³.

In the induction phase, a content analysis on vendors of IT products has already been carried out. It investigated IT vendors' view on the relationship between competitive advantage of their customers and the IT products that vendors sell. As a result, IT vendors clearly emphasize competitiveness of their buyers. Noticeable patterns and moderate positive correlations among competitive strategies were found that support the statement of existence of relationship between competitiveness and IT product requirements³⁴.

The upcoming deduction phase is to test hypotheses by a sequential mixed methods study, starting with a survey for quantitative analysis. The deduction phase does not only include quantitative part but also a qualitative test. Deduction begins with primary data collection from non-probability sampling using questionnaires. A set of hypotheses will be tested by collecting and analysing data from IT managers to confirm or to contradict the hypotheses³⁵.

Research will continue with execution of semi-structured interviews to probe significance of quantitative results by exploring with a few participants at a selected enterprise as a case study. Obtaining statistical results from a sample and following up with few individuals will help to explain quantitative results in more depths³⁶. The interviews will also help when questionnaires reveal unexplainable results or insufficient data. Another reason for following up with qualitative research is to better understand causality, i.e., to explain the relationships between variables.

Quantitative evaluation will comprise Pearson correlation coefficient for each value combination of nominal variables. Values of independent variable are requirements categories (e.g. workplace features, security, performance, etc.) while dependent variable is impact on competitive advantage, which is also categorical.

To check internal consistency, Cronbach's α will be calculated³⁷. The average inter-item correlation will be corrected by Spearman-Brown formula. Cronbach's α values greater than 0,7 will be accepted³⁸. In addition, Spearman's rank order rho will be calculated to examine monotony of the course.

Beside correlation, statistical tests will be performed by configural frequency analysis³⁹ to determine types and antitypes in contingency table. Pearson's χ^2 will be used to assess independence. χ^2 test statistics are computed for each observed value at a level of significance $\alpha = 0,05$ for critical values.

6. Hypotheses testing and theory building

A theory will be constructed to explain the links between the nominal variables types of requirements and competitive impact. This theory will base on results from examinations of four hypotheses:

H₁: Successful specification and fulfilment of functional IT requirements increase competitive advantage.

H₂: Failure to identify and to meet functional IT requirements will have minor impacts on competitive advantage in the short-term.

H₃: Successful specification and fulfilment of non-functional IT requirements will have minor impacts on competitive advantage.

H₄: Failure to meet non-functional IT requirements results in competitive disadvantage (competitive losses).

For each of six categories of requirements it will be asked, if competitive advantage is assumed to increase, provided that requirements are successfully met and IT product is operational. Options to answer are “Yes” or “No”. For functional requirements, author predicts significant higher number of “Yes” compared to number of “No”. For non-functional requirements (performance, security, legal/regulatory), a significant higher number of “No” are estimated compared to “Yes”.

Next question for all requirement groups will ask for competitive impact, if requirements are not met. In this case, negative competitive impact is predicted for non-functional requirements, while non-fulfilment of functions have less severe or no impact on competition. Table 1 presents assumed relationships by symbol “X”.

Table 1: Expected relationships between categorical values

| IT products requirements for | Competitive advantage | | | |
|------------------------------|---|---|--|--------------------------|
| | What is the impact on competitive advantage if requirements will successfully be met? | | What is the impact on competitive advantage if requirements will NOT be met? | |
| | Gain in competitive advantage | No or neglectable impact on competitive advantage | No or neglectable impact on competitive advantage | Competitive disadvantage |
| Customer experiences | X | | X | |
| Workplace features | X | | X | |
| Supply chain efficiency | X | | X | |
| System performance | | X | | X |
| Security | | X | | X |
| Legal / regulatory | | X | | X |

7. Conclusion

The link between competitive advantage as defined in strategy and requirements collections for IT products exists and is worth to be explored in depth, since increasing competitiveness is key for companies to survive on the marketplaces. The concept of IT value planning has been introduced. In contrast to other conceptual frameworks for business-IT alignment, IT value planning is founded on artefacts from sequential planning phases. It helps to understand the need to verify specified requirements in view of its contribution to strategy and competitive advantage. Engineers and IT managers should verify each requirement and its relation to competitive advantage as defined in business strategy. Empirical research is ongoing for categories of requirements and its relation to impacts on competitive advantage.

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