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The Impact of Strategy, Business, and Information Technology Variables of Industrial Companies on Enterprise Architecture Design

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Abstract

Architecture, a word derived from Greek, means the fundamental structure. Many process professionals believe that this term is synonymous with "business architecture." However, business process theorists usually emphasize the key role of process in defining the overall objectives of an organization. In fact, most process specialists view systems and organizations as a large process that converts inputs into outputs. They usually divide an organization into one or more value chains, and the value chain into several large business processes. This division continues through several stages until it reaches organizational activities and tasks. After creating key outputs and value chains, they proceed to define stakeholders, value propositions, Key Performance Indicators (KPI1), process management plans, and all the tools and methods that managers need to achieve optimal organizational performance. It is assumed that information technology leverages its capacity to support the organization's business process architecture. Strategies within an organization and its accompanying business structure, along with the integration of these two aspects with information technology, play a key and fundamental role in shaping a cohesive enterprise architecture.


Keywords: Strategy, Business, Information technology, Key performance indicators, Enterprise architecture.

1 | Introduction

Business architecture is defined as the analysis and design of a business's structure, strategy, metrics, processes, and capabilities. It is a geographical representation that illustrates the network through which work, information, and authority flow within an organization. Business architecture is described as a relationship

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between business strategies and perspectives. It bridges organizational strategy and business model on one side, and its performance on the other. Business architecture describes the architecture of an entity and provides valuable insight into it. It aligns tactical demands and strategic goals, centering itself within analytical, operational, and motivational frameworks that connect all these aspects [1], [2].

A critical feature of business architecture is that it incorporates real-world aspects of an organization and shows how they interact. It is defined as an overarching concept that includes decorative, operational, and constructive concepts. Trade and business methods are among the most important areas that have been rapidly and significantly impacted by the application of new information and communication technologies and the internet. Many traditional methods of earning income have been transformed, and many new methods and values have emerged. A business model is a method of conducting business in such a way that the company can sustain itself and ensure its survival, in other words, generate revenue. In a general sense, e-business can be said to be the application of all information systems to strengthen and control business processes, and today these processes are developed using web-based technologies [3].

2 | Importance of the Topic

An organizational strategy is a systematic, implementable plan with a defined time horizon for achieving the organization's long-term goals. In the hierarchy of organizational strategic management, after outlining the vision and defining the *raison d'être* (mission), long-term objectives must be designed. Organizational strategies specify the tools and methods for achieving these long-term organizational objectives. Organizational strategies mean employing methods that provide an organization with superiority over its competitors. Strategic planning is a process undertaken to achieve the organization's strategic goals and find the necessary resources. This process involves the members and resources of an organization. For an organization to plan for its future position, it must define its current position. Then, it must specify the position it intends to achieve in the future. All documents obtained from the above process are called strategic planning. The organization's strategy and mode of operation must be adjusted based on the difficult conditions in that situation [4], [5].

To achieve the ultimate goals in organizations for competition with other organizations, strategy must be utilized. Strategy brings business logic to the organization. If the organization's goal does not materialize in action and implementation and merely remains a goal, it will be of no benefit. To be able to use strategy and goals in the form of action, specific behavioral standards must first be determined. Process architectures are tools that group processes into appropriate categories. Most process architectures use the concept of the value chain as the basis for these groupings. The most common reason people use process architecture is to help group processes into a classified structure to better understand how processes relate to each other and how processes help get things done. Process architecture as a time-saving reference tool. In fact, there are a wide variety of applications for process architecture, but most organizations only employ a limited number of them at the beginning of their process management projects. The most common reasons people use process architecture include defining processes, creating a common language, identifying process improvement opportunities, and evaluating performance. Most organizations use process architecture for basic process-related activities such as creating process definitions, process discovery activities, mapping, and creating a common language. In other words, most organizations use process architecture only as a reference model to understand processes, make changes to the way work is done to fit the framework, and create a standard model to ensure that work is done efficiently, all of which are basic applications of process architecture.

The next common use of process architecture that naturally occurs after defining processes is to conduct process improvement activities. Once an organization has created a common framework and mapped its processes, it can use the information collected during the process identification and mapping stages to find areas for improvement. Process architecture can be used as a basic structure to find capability and performance gaps for improvement opportunities. This information ultimately helps the organization understand gaps and prioritize them based on the value created during the processes. Many organizations also

use process architecture as a starting point for improving organizational performance. To fully understand how to improve organizational performance, it is first necessary to determine how efficiently things are currently being done. To determine this, the current level of performance of work through organizational processes, the performance and value of each process, and the determination of areas that are underperforming, do not create value for the customer, are redundant, and have incompatible definitions and processes must be determined.

Business process architecture is a hierarchical model that explains the relationship between different elements of a business to achieve business goals. An organization is a complex system in which several elements work simultaneously in different directions. These elements include: vision, purpose, mission, strategies, goals, processes, technologies, people, products, and services, none of which alone is sufficient to deliver value. Designing and implementing a process architecture will be very difficult without a comprehensive and coherent understanding of all organizational processes. Just like building a complex building that cannot be properly executed without a master plan and understanding of its components, process architecture also requires an initial comprehensive view. In fact, process architecture is a map that shows where each process is located, how it relates to other processes, what role it plays in the value chain, and how it can be improved. Process architecture acts as a bridge between business strategy and its operational implementation.

A goal-based process architecture approach begins by determining the primary goals of the system and how those goals affect each other. Once goals are defined, creating a process architecture links together the steps necessary to achieve those goals. Process architecture refers to the structure and design patterns in an organization or system that define how processes are implemented and the interactions between them. The issues that place each process in its own place and define the correct relationship between processes in the organization's process puzzle, as well as the integration of processes and consensus among the members of an organization, are the same as business process architecture. One of the key aspects of process architecture is that it helps align processes with the strategic goals of the organization. This alignment means that each process should be defined in a way that helps achieve the organization's overall goals. As a result, processes are considered not only as operational tools, but also as key factors in the realization of business strategies.

3 | Theoretical Foundations of the Research

3.1 | Strategy

A strategy specifies how an organization intends to create value for shareholders, customers, and citizens. In other words, a strategy is a comprehensive and all-encompassing plan that shows how a company intends to achieve its mission and objectives. Business-level strategy is about how to compete successfully in specific markets and deals with how a single business unit achieves competitive advantage.

3.2 | Business

Refers to a place of business or an economic enterprise established to provide goods, services, or both to customers in exchange for money and wages, with the goal of earning income.

3.3 | Information Technology

Information technology includes all tools and methods that receive, store, process, exchange, and utilize information.

3.4 | Key Performance Indicators

Key Performance Indicators (KPI) are metrics for measuring performance based on a specific goal over time. These indicators are essentially milestones for measuring progress. Performance indicators help all departments of an organization, including finance, human resources, marketing, and sales, to grow at a strategic level.

3.5 | Enterprise Architecture

Enterprise architecture is a macro-level view of organizational missions and tasks, work processes, information entities, communication networks, hierarchies, and the order of work execution within an organization, undertaken with the aim of creating integrated and efficient information systems. A company's architecture must be based on a strategic vision. The organization's vision is an embodiment of the desired future that the organization intends to achieve. Achieving the vision depends on the organization's current and future capabilities. A single organizational capability cannot guarantee sustainable competitive advantage. Sustainable competitive advantage comes from the synergy of various organizational capabilities. In other words, information technologies, as one of these capabilities, will show the greatest effectiveness and efficiency when systematically combined with other organizational capabilities.

4 | Research Background

Mahmoudi et al. [6], in a study titled "presenting a framework for assessing organizational maturity," defined enterprise architecture as one of the most important and practical solutions for any organization to achieve strategic alignment of information technology with business, and a powerful tool for organizing complex information systems.

Rezaei et al. [7], in a study titled "presenting a method for developing an enterprise architecture plan," divided the components of enterprise architecture planning into three states: current state, desired state architecture, and transition strategy. They considered each component as a prerequisite for the next component and stated that if the steps of the enterprise architecture plan development process are not carried out correctly, the entire system's performance will face increased costs and wasted time.

Ramadan Qomi [8], in a study titled "facing the future challenges of enterprise architecture," described the slow and erosive structure of enterprise architecture and the resulting potential project failures due to improper planning in achieving lean enterprise architecture.

Jafari et al. [9], in a study titled "investigating the impact of implementation components of business process reengineering projects on the success of these projects," introduced six hypotheses in the research and their significant relationships. The results of the study rejected four hypotheses, namely, the impact of senior management support for the reengineering project, the role of culture building in implementing the reengineering project, training reengineering concepts to employees, and intra-unit communication in implementing the reengineering project. It then confirmed two hypotheses, namely, information technology infrastructure in maximizing the effectiveness of the reengineering project and the key role of reengineering project management.

Khashman [10], in a study titled "investigating the impacts of the change management approach on organizational strategies' performance with the mediating role of business process reengineering project management," addressed the importance of the role of business process reengineering project management in organizations and the impact of their performance on strategy formation when encountering change management components. The mediating role of the reengineering project manager was confirmed, which can itself influence the organization's new architecture, roles, and responsibilities.

5 | Research Methodology

This research falls within the scope of descriptive-survey research and is a type of applied research. The statistical population of the present study consists of middle and senior employees of four large factories in Semnan Industrial City. The sampling method in this research is non-probability convenience sampling, and the sample size, calculated using Cochran's formula, is 205. The research questionnaire was developed using base articles, and the Cronbach's alpha of the indicators is summarized in *Table 1*.

Table 1. Question reliability rate.

Row	Variables	Reliability Rate
1	Strategy variables	0.865645
2	Business variables	0.988206
3	Information technology variables	0.889772
4	Enterprise architecture design	0.961714
5	Overall reliability	0.865645

6 | Data Analysis

6.1 | Average Variance Extracted

Table 2. Convergent validity fit index.

AVE Fit Index	Standard Values	Estimated Values
Strategy variables	More than 0.5	0.75
Business variables	More than 0.5	0.64
Information technology variables	More than 0.5	0.68
Enterprise architecture design	More than 0.5	0.72

According to the calculations shown in *Table 2*, the values for these variables are above 0.5, which indicates good convergent validity for the model.

6.2 | Structural Model Fit

According to the data analysis algorithm in the Partial Least Squares (PLS) method, after examining the fit of the measurement models, it is time to examine the fit of the research's structural model [11].

6.2.1 | Z-score significance (t – value)

Table 3. Model fit index.

T - Value	Standard Values	Estimated Values
Strategy variables	More than 1.96	3.1
Business variables	More than 1.96	3.4
Information technology variables	More than 1.96	2.4
Enterprise architecture design	More than 1.96	5.9

6.2.2 | R squares criterion

As previously mentioned, this criterion indicates the effect of an exogenous variable on an endogenous variable, and 0.19, 0.33, and 0.67 are considered three criteria for weak, moderate, and strong R² values [12].

Table 4. Convergent validity fit index.

R Squares Values	Standard Values	Estimated Values
Strategy variables	0.19 , 0.333 , 0.673	0.77
Business variables	0.19 , 0.333 , 0.673	0.82
Information technology variables	0.19 , 0.333 , 0.673	0.77
Enterprise architecture design	0.19 , 0.333 , 0.673	0.8

6.2.3 | Goodness-of-Fit criterion

This criterion is calculated using *Eq. (1)*:

$$\text{GOF} = \sqrt{\text{Communalities}} \times R^2.$$

Table 5. Communalities values.

Component	Communalities Values	Communalities
Strategy variables	2.157	0.6605
Business variables	2.356	0.5901
Information technology variables	0.063	0.1803
Enterprise architecture design	1.061	0.3205

So the value of Goodness-of-Fit (GOF) is equal to:

$$\text{GOF} = \sqrt{\text{Communalities}} \times R^2 = \sqrt{0.66055} \times 0.791.$$

$$\text{GOF} = 0.7228.$$

Given that the three values 0.01, 0.25, and 0.36 are introduced as weak, moderate, and strong values for GOF, with a value of 0.7228 obtained, the overall model fit is confirmed.

Table 6. Summary of results.

Hypothesis	Standard Coefficient	T Statistic	Result
The impact of industrial organizations strategic variables on enterprise architecture design	0.326	4.675	Hypothesis confirmation
The impact of business type variables in industrial organizations on enterprise architecture design	0.203	2.245	Hypothesis confirmation
The impact of the variable role of IT in industrial organizations on enterprise architecture design	0.361	4.678	Hypothesis confirmation

7 | Conclusion

Understanding the impacts of components involved in enterprise architecture design will not be complete without considering the examination of factors related to organizational strategies, business structure, and information technology associated with enterprise architecture, each of which holds a unique key position. Enterprise architecture must be accompanied by strengthening data analysis and process mining, and the results from their outputs should lead to the design of lean enterprise architecture. Numerous challenges exist in organizations regarding achieving lean architecture, but when the structure is defined as process-centric, roles, responsibilities, and duties will become apparent. At the current time, the automation of organizational processes is carried out by enterprise resource planning software, but alongside various types of this software, operations and transactions at all levels must first be identified, an improvement approach defined for them, an analysis of the current and future state along with a feasibility report conducted, and then approved, budgeted, and implemented. Changes in organizations are occurring noticeably and continuously. Utilizing reporting resources that analyze businesses and provide a picture of their future can significantly assist in enterprise architecture. The progression of organizational strategies must be shaped by the implementation of processes, and competitiveness within the organization should be based on processes.

Suggestions

- I. Organizations should define process management and strategic information systems management areas within their organizational structure, especially in the project technical office. Thus, the project technical office areas will be divided into four main areas: construction and civil engineering projects, project product feasibility study projects, business process management and re-engineering, and strategic information systems analysis [13].
- II. Organizational information systems must be defined and monitored based on information system standards with the following breakdown: 1) transaction processing system for data processing, 2) management information system for providing information needed by managers, 3) decision support

- system for decision-making in semi-structured problems, 4) geographic information system for digital display of geographic maps, 5) expert system for acting as a consultant in unstructured problems, 6) executive information system for providing information needed by senior managers, 7) group decision support system for support, and 8) artificial neural network for interaction-based learning.
- III. Specialization and commitment to selecting a re-engineering project manager for system analysis and achieving organizational excellence by identifying and utilizing excellent tools.
 - IV. Development of information and communication technology infrastructure in the organization and formation of strategic networks with suppliers, customers, and other stakeholders based on Project Management Standards (PMBOK).
 - V. Defining continuous improvement projects and identifying essential elements for achieving sustainable success (in accordance with ISO9004:2018).
 - VI. Dashboard creation for management reports and utilization of business intelligence tools with the help of Power BI software.
 - VII. Design and analysis of supply chain structure by referencing areas related to chain design based on location, routing, network design, and simulation using Anylogistix software [14].
 - VIII. Determining KPI and monitoring key performance results for organizational employees to optimally define individuals' roles and their duties in the organizational architecture.
 - IX. Using analysis and forecasting references regarding the future of businesses and defining the business, organizational, and product life cycle to determine lean organizational architecture (Gartner).

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