

Business process management and organizational environment - building a management control system for shipping companies

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Abstract. One of the biggest challenges of contemporary businesses relates to the lack of alignment between strategic and operational levels of organizations. The study reveals a management control system (MCS) that is built around organizational business processes and is aimed at an alignment of the managerial focus between strategic plans and objectives and organizational operations. Besides, the paper underlies the importance of the organizational environment in the design of a MCS and defines environmental factors influencing the control mechanisms. The study emphasizes the appropriateness of the business process management (BPM) perspective for the design of a MCS. The research is designed as a case study based on the activities of two Norwegian shipping companies that provide delivery services for offshore oil and gas installations and have experience of operations in demanding operational environments.

Keywords: Business process management, management control, strategic alignment, systemic approach, organizational environment, maritime industry

1. Introduction

In order to sustain in the current complex and dynamic business environment, organizations need to improve their decision-making systems and response capabilities on both strategic and operational levels [1, 2]. However, the traditional approach to management control and decision-making mostly focuses on the strategic initiatives of the organizations [3], thus ignoring the actual operational level of companies [4]. Such “blind” managerial focus can be devastating for the companies in the changing periods. It breaks down the organizational architecture into separate components, disrupts the connection between them and distorts the actual picture of the organizational activities [5] that leads to the mismatch between the strategy and operations [6, 7].

This paper aims to develop a management control system that aligns strategic plans and operational needs, and deploys a business process management (BPM) perspective for that purpose. In turn, the BPM perspective assists in the development of an enterprise-wide strategy [8] by giving a possibility to study organizations through the lens of activities that goes beyond the borders of functional divisions and business units [9]. It suggests the establishment of support from senior management [10] and provision of alignment between the strategy and organizational processes [5].

Organizational business processes are highly influenced by the business environment. Thus, a thorough proactive analysis of the environment and its concomitant factors will give an opportunity to respond to the changes. Once trying to develop competitive advantage, a company should develop and promote a clear understanding of strengths and weaknesses, and provide control and rapid change of the business processes it performs [1]. For that purpose, the organizational management control system should reflect changes in the environment. Thus, the second aim of the paper is to reveal the factors of the organizational environment and the way they influence management control system.

The paper is structured in the following way: the next section presents the theoretical insight of the paper. Then, it explains methodological choices of the author. Afterwards, empirical findings are presented and discussed. Finally, the paper identifies limitations of the study, and suggests implications for future research.¹

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2. Theoretical insights

2.1. Management Control and Management Control Systems

Organizations are complex by their nature due to a large number of tasks, procedures, resources, individuals, and relations. In order to deal with such a complexity, every organization needs control that includes motivation of personnel, integration of various parts and efforts in an organization, provision of information regarding operations and performance, and development, implementation and promotion of strategic plans and objectives [11]. The concept of management control is widely discussed in the literature, and a large number of its definitions are presented [3, 12-15]. Some of the discussions emphasize the importance of employee behaviour in the achievement of organizational goals [16], while the others focus exclusively on accounting practices [13]. However, Chenhall goes beyond accounting and behavioural control, and emphasizes that management control is a broad term that includes both control function and support in decision-making [15].

There is a clear need for a systemic approach to management control in the contemporary academic literature [3, 12, 13] even though it is considered as an intricate endeavour due to the number of challenges. First, the definition of management control varies from study to study and it is not defined what it is focusing on. Second, the question arises what should be included and excluded from the management control system. Finally, due to the complex and individual nature of organizations, it is challenging to study management control in an empirical way [12].

There was a number of studies attempting to develop a framework for MCS research [16-18]. However, there is still a lack of a holistic view towards control mechanisms as they are usually studied in the literature by means of a reductionist approach. Such an approach focuses on isolated controls like accounting [3] and might thus fail in the conditions of managerial complexity by ignoring the connection between various controls [19] and their connection to the organizational environment [1, 20, 21]. For the purpose of this paper, the study will be based on the approach developed by Chapman et al., suggesting that MCSs are designed to assist the management of an organization by ensuring appropriate results of performance and by protecting the organizations from potential threats [22].

Most of the aforementioned discussions in the literature relate to the strategic level of organizations, and that is why they fail to ensure alignment between the strategic plans and objectives and actual operations. The paper will therefore attempt to fill this gap and satisfy the need for a MCS that will connect MC mechanisms and activities performed by the companies [23, 24].

2.2. Business Processes (BPs) and Business Process Management (BPM)

Every company performs business processes [25], i.e. end-to-end activities that convert input (e.g. [26-28]), into predetermined output (e.g. [29-31]), delivering value (e.g. [27, 29, 31]) to the external or internal customers. The focus on the business processes that are the key elements of business performance become vital for the companies due to increased cost, time and quality competition, rising complexity and establishment of inter-organizational cooperation [32]. Business process management follows the activity-based view (ABV) based on Porter's study of the competitive advantage that explains success of the companies by unique configuration of value chains that represent a set of activities aimed at development, production and promotion of the companies' products. [33].

In order to function effectively, BPM needs to be integrated into a coherent management system, i.e. management control system that will incorporate all the tools, procedures and applications in order to align operations with strategic objectives and develop organizational process orientation aimed at value creation (e.g. [32], [5], [34]). However, such systems are traditionally studied as a software (e.g. [32], [35], [36]), and a systemic view on BPM started to evolve recently [1], [21], [32].

Applying a systemic approach, it is necessary to consider the inputs of the environment that are processed by the systems and their influence on the system's elements [1]. For example, Paim et al. state that there is a number of external forces that influence BPM and require changes in the business processes

modelling and execution in order to respond to the external environment [37]. In addition to that, specific requirements and/or regulations of the industry might influence BPM by increasing the complexity [38].

2.3. Organizational environment

Organizational environments are characterized as a set of attributes [39], i.e. a large number of factors that can influence organizational activities. In order to survive and compete, it is vital for the companies to be aware of the changes in the environment, as well as to be able to respond to such changes rapidly [39-41].

Environmental turbulence refers to the changes that cause uncertainty and unpredictability, and is characterized by such features as complexity and volatility. In turn, complexity, i.e. a high degree of interconnections and interdependencies between the actors of the environment, and volatility, i.e. high degree of instability and uncertainty, are the main dimensions of turbulence [2]. Unstable supply of and dependence on numerous actors for the input factors, competition in the market growing customer demand, economic fluctuations, recurring regulation adjustments and technological improvements are examples of turbulence factors. [42, 43].

Turbulent business environments pose specific challenges towards the management control systems of an organization. For instance, following the contingency theory, Chenhall suggests that turbulent environments call for more sophisticated MCSs that will provide tighter financial control and more flexible interpersonal cooperation [15]. Following this contingency view, Gomes shows that the environmental changes that lead firms towards a more dynamic context have a strong influence on the management control systems [44]. Similarly, Otley points out that every control system must possess the possibility to foresight to a certain degree of environmental changes and make it possible for a firm to react proactively [18]. However, in an environment of constant uncertainty, this might not always be possible and it leaves the question if the management control systems work in such a context and if it enables the company to learn from the data that it produces?

The appropriateness of the business process management perspective in the uncertain environment is also ambivalent. On the one hand, Nurcan et al. suggest that modelling of the business processes in a turbulent environment is insufficient due to the high degree of changes [45]. Benner and Tushman suggest that process management, due to its focus on minimization of variation, restricts companies capabilities to develop alternatives and, as a result, to respond rapidly to changes [46]. On the other hand, Sutcliffe et al. suggest that BPs can be designed for provision of enhanced performance in unstable environments by development of “intuition and flexibility” of the involved people that reflects on the ability to respond promptly to the changes in the environment. Moreover, it can ensure adequate and predicted behaviour of the employees in uncertain conditions by provision of structured work arrangement [47].

3. Methodology

In this paper, the author draws on an exploratory field study of the Norwegian shipping companies in order to develop a framework of management control systems that is based on the business process perspective and to reveal the influence of the business and operational environment on the configuration of such management systems. For that purpose, two Norwegian shipping companies were chosen, namely Nordnorsk Rederi (NNR) and Sørnorsk Rederi (SNR)². Both of the companies have built their MCSs around their main business processes. Besides, the chosen companies are the only two Norwegian shipping companies that perform in both moderate (non-Arctic) and turbulent (Arctic) operational environments.

The shipping companies are the owners of the platform supply vessels (PSVs) that provide delivery and pick up services for offshore installations (e.g. oil production platforms). PSVs are the key elements of upstream logistics and delays in their activities can endanger the operations of the installations by causing disruptions, and, as a result, increasing the production expenses due to the downtime [48].

NNR has more than 30 years' experience of the operations and has extensive experience in the harsh Arctic conditions. It owns and manages on the contract basis several platform supply vessels (PSVs) and specializes mainly on the provision of offshore supply services. SNR has almost 50 years' experience of

² By the request of the companies their names were anonymized.

operations and owns a fleet that consists of not only PSVs but also standby/rescue vessels, multipurpose support vessels, and cargo carriers. The company also has experience from various areas of operations, including Arctic. In addition to supply services, it provides such services as towing, anchor-handling, rescue, etc. Since the main aim of both companies is to provide high quality services and safe operations, the main research focus was centred on the safety and quality systems of the companies.

Due to the specific challenges of activities in the Arctic region, such as harsh climate and weather conditions, remoteness, lack of infrastructure and area-specific experience [2, 49], operations in this region require adherence to very high security and safety standards, strict rules and regulations, and efficiency demands. It is suggested that the aforementioned challenges will result in a need for more advanced quality and safety management systems.

Primary data was collected by means of semi-structured in-depth interviews. Semi-structured interviews were based on a predefined interview guide that included three main parts. First, questions about organizational business processes were asked. This part of the framework was based on the BPM system developed by Margherita, and included questions related to the process strategy, process model, process execution, and process performance. Second, there was a number of questions related to the business environment of the companies that were aimed at identification of the main actors that could affect organizational business processes. Finally, the guide included some area-specific questions that were aimed at finding out how different operational environments affect organizational business processes (e.g. it was asked about the differences in planning, procedures, equipment, crewing, etc. between Arctic and non-Arctic regions). The author has conducted interviews with the crew on-board, managerial staff onshore (managing directors, quality, health, safety and environment (QHSE) managers, QHSE advisors, chartering managers) and representatives of the chartering companies.

Secondary data used for the study included vessel-shore communication documentation and documentation distributed between the different parts of the organization, company market reports, audit reports, laws, regulations, and descriptions of different types of vessels operating offshore in the annual reports, company newsletters, investor reports and features in industry magazines.

The collected data was coded and categorized according to the elements of BPM system suggested by Margherita, and business and operational environments. However, the system suggested by Margherita appeared to be inappropriate for Norwegian shipping companies. Thus, the actual system used by them is presented in the following section.

4. Empirical findings

4.1. Management control systems of shipping companies

The study of the shipping companies has shown that their management control systems are focused on several aspects of the organizations activities, namely process modelling, process planning, process execution, process control, and IT management support application.

Process Modelling

Process models of the shipping companies include the description of organizational processes regarding the quality and safety of the services, such as certification, training, manning, logistics, cargo handling, risk assessment and risk management, and preparedness. In general, they are described in the organizational operational manuals. Such manuals include detailed information of the purpose, procedures, owners, and executors of the processes of deliveries starting from preparation of the vessel going to the installation and returning to the port. On the one hand, they serve as organizational process map and provide a clear picture of the company's architecture. On the other hand, they provide clear guidance on the procedures that should be maintained in order to provide safe services with high quality standards.

Process Planning

Maritime business is a demanding business environment that requires appropriate planning of the operations. Planning includes resource planning as well as route planning and contingency planning.

Resource planning refers to the planning of human, physical and financial resources and involves external actors such as operators, logistics base and training institutions. Physical resources include vessel technology configuration and supporting resources needed for performing an operation. Human resources refer to the crew configuration and appropriate level of competences for fulfilment of specific operations. Financial planning implies budgeting for each vessel for both particular operations and reporting period (usually one year).

Due to the complexity of the maritime operations and potential danger for the environment, shipping companies develop contingency manuals that describe the purposes, responsibilities and instructions for potential crisis situations. The main challenge of such planning refers to the large amount of actors involved into search and rescue operations. In order to deal with such issues, managers within the companies develop contingency manuals that describe precisely the processes that should be maintained in particular crises situations. In turn, they include such information as the owner of the process, the purpose of the process, responsibilities, instructions and guidelines.

The information received from the process planning is used, in order to evaluate how much resources are consumed during the operations, how the crew is prepared for the operation and how it prevents crises situations.

Process Execution

The process execution aspect refers to the actual performing of the operation, i.e. delivery services and following the instructions and methods developed in the operational manuals. One of the most important issues of the process execution from the managerial point of view refers to provision of adequate communication with the vessel and reception of timely information regarding the vessels operational performance. This is arranged by means of IT application that is aimed at timely workflow distribution.

IT management support application

Both of the studied companies mentioned that they are using IT applications developed to support maritime shipping operations. Such applications execute several functions. First, they provide the appropriate level of documentation workflow (they keep and update all organizational documents connected to the quality and safety managing). Second, they provide appropriate communication between the vessel and the shore (on a daily basis, the chief crew reports through the applications regarding the performance of the vessels). Third, they process received information and deliver the information to the decision-maker.

Process control

Process control is the main area of managerial focus that includes monitoring and analysis of the information received from various sources, decision-making, implementation of prevention and correcting actions, and motivating and rewarding. Based on the processes described in the operational manual, organizations develop their key performance indicators (KPIs) that they use to define and compare the actual performance (information received from the process execution) and the effectiveness of the quality and safety systems versus predefined goals (information received from process planning) or historical data. Such KPIs include indicators related to navigational performance (e.g. navigational deficiencies, navigational incidents, etc.), operational performance (e.g. operational cargo incidents, operational deficiencies), technical performance (e.g. unplanned downtime due to technical reasons, failure of critical equipment and systems), environmental performance (SOx efficiency, contained spills), and HR performance (lost time injure frequencies). After the evaluation, companies decide on the rewarding of the crew and onshore staff.

In order to promote strategic goals and objectives, organizations use both formal and informal mechanisms. Thus, the companies' values and beliefs, as well as appropriate behaviour of the employees are prescribed in codes of conduct. However, both of the companies arrange informal meetings with the crewmembers or informal visits of the managerial staff on-board. On the one hand, this promotes safety and quality cultures of the companies, and on the other hand, it gives a better understanding for the managerial staff of the processes that are happening on-board.

Summing up the main areas of management control systems, it is important to underline the integration of managerial control and IT management support application throughout the whole organizations. Managers

of both companies have a clear understanding and envisioning of the processes in the companies and develop their management control systems around these processes. All the performance indicators are built on the main processes that are performed (both core and management processes) by the company. The deviations in such indicators give a signal for the managers to involve themselves into operations and correct the actions of their personnel. In order to receive timely information and indicate the changes, companies are extensively using specialized IT applications that report about the changes in the processes execution. The management control systems of studied shipping companies are summarized in Figure 1.

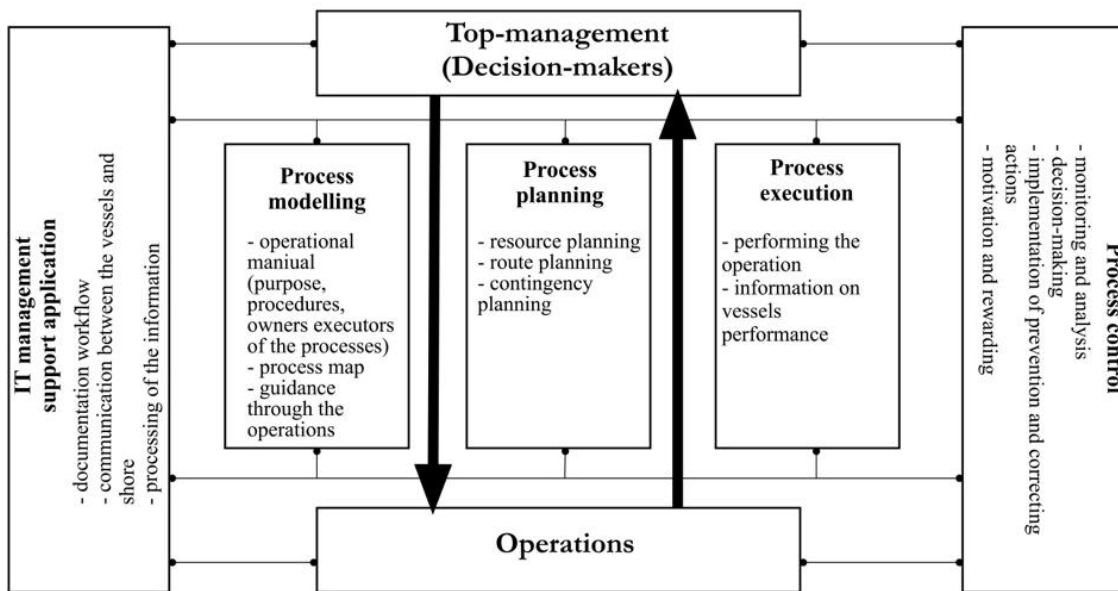


Fig. 1. Management control system of the shipping companies

4.2. Organizational environment

While developing the control mechanisms and management control systems, both shipping companies took into considerations their organizational environments (that included operational and business environments). The main factors from such environments can be divided into several groups namely customer needs, operational context, regulations and industry.

Customer needs are one of the most influential drivers of the management control systems design. The main customers of the shipping companies are the oil and gas companies that use delivery services in order to supply their offshore installations with needed goods. Customers send their requirements regarding the crew configuration and competences, as well as the technology configuration and functionality of the vessel.

High level of competition in the industry requires cost efficient solutions. Thus, the resource planning function of the management control system has to raise attention to the main cost drivers and find the ways for the managers to balance between appropriate level of technology and competence configuration and cost.

Maritime operations are exposed to a high level of risk that increases in harsh environmental conditions. Once the companies made a decision to operate in the Arctic region, they faced a number of challenges that required adjustments of the management control systems. The lack of experience in the operations demanded development of additional training courses for the crew. Besides, due to the lack of the appropriate infrastructure in the Arctic region, the PSVs should be escorted by the rescue vessels. However, the high expenses of the operations in the industry and the attempt to minimize operational costs have led to the number of innovations and development of the multipurpose platform supply vessels that can perform rescue operations. On the one hand, multipurpose function of the vessels results in the increased costs of vessels design and building. On the other hand, it decreased the costs of actual operations dramatically. However, multifunctionality reflected in the increased complexity of design processes and vessels' technology configuration, and increased resources needed for operations (additional crew members

connected to particular functions, competences, additional certification, NOFO³ requirements, advanced procedures, etc.). In order to provide appropriate level of competence to correspond to the requirements, the shipping companies adjusted their process control and developed sophisticated competence matrices that provides a clear picture of the competences available. They developed individual profiles for all members of the crew and assure correspondence of the people to the tasks needed. Both of the companies provide bottom-up communication, in order to assess the conditions of working for the crewmembers and give them an opportunity to give their feedback regarding the work of the onshore staff.

Regulations. The Norwegian shipping industry is very demanding, especially when it comes to the operations in the Arctic. Regulations and increasing requirements of the operators are calling for a constant adjustment of the procedures and increase of the quality, health, safety, and environmental standards. There are still no mandatory regulations for the operations in the Arctic. However, the Polar Code (developed by the International Maritime Organization as the first mandatory normative document regulating operations in the polar waters) will add additional processes for the vessels and influence the technology configuration and the competence portfolio of the shipping companies. This will lead to adjustment of the process map of the organizations, and it will eventually influence the process-modelling component of MCSs.

Besides, operations in foreign countries also call for adjustment of the existing procedures regarding the crew exchange and adding time to the vessels inspection if needed. For instance, operations in the Arctic area in Russia required additional time for visa procedures and inspection of the vessel every time it was entering the port. Thus, additional financial resources should have been involved to fulfil the requirements of Russian authorities (visa expenses, on-berth time, etc.), and the process portfolio of the Russian operations was extended.

Industry. The companies that provide shipping services for offshore installations are operating in a narrowed market, and adaptation of the vessel for provision of their services outside the niche is rather costly or even impossible. This requires from the companies to search for cost efficient solutions and to adapt rapidly to the changes. Moreover, the recent decrease of oil price influenced the industry dramatically. If in the beginning of the Norwegian oil and gas industry development most of the investments were focused on technology and infrastructure development, the companies have now to focus on the optimization of their processes. In such a way, process modelling requires a high degree of flexibility and adaptability to the rapid changes in the industry.

5. Discussion and conclusions

The purpose of the study was twofold. First, it was aimed at aligning of the strategic and operational management initiatives by development of a management control system that is built on the organizational business processes. The study has shown that mismatch between organizational strategy and operations can be improved by a deployment of the business process management perspective into management of organizational activities. In turn, the studied shipping companies developed a number of control mechanisms and management practices. Such mechanisms and practices pierce organizations, provide adequate information for the decision-making and contribute to the development and implementation of prevention and corrective actions. In fact, the management control systems of the studied companies incorporate two management systems approaches developed by Chenhall [15] and Margherita [32]. On the one hand, MCSs of the shipping companies deal with the broad scope of information from the organization and its environment and use this information for decision-making. On the other hand, such MCSs are built around organizations' processes, incorporate various tools and techniques for managing these processes, and promote process philosophy within the companies.

In order to provide strategic and operational alignment, the shipping companies integrated control practices and IT support management applications that provided adequate communication between the levels and appropriate information flow for decision-makers. The study revealed the facilitating role of an IT application in the management control system that is vital for the achievement of performance goals [24],

³ Standard of Norwegian Clean Seas Association for Operating Companies "Requirements of oil recovery vessels on the Norwegian Continental Shelf"

thus denying its management role in the process organizations that was widely discussed in the literature [32, 35, 36].

The second aim of the study related to the role of the environment in the design of the MCS that is built on the organizational business processes. The study of the shipping companies has proved the appropriateness of the BPM perspective in a turbulent environment [47]. First, the BPM perspective on the organization gave the companies a clear understanding of the operations maintained and the way they contribute to the management control system through an arrangement of the links between activities, resources, strategic objectives and performance indicators [6, 7]. Second, the system of the KPIs developed on the base of thorough analysis of the environment gave a possibility to sense the change in the environment, adjust business processes, and develop prevention and correcting actions for MCSs [1]. The analysis of the organizational environment has revealed a number of factors that influence MCSs, namely the customer needs, the operational context (specificity of maritime operations), the industry, and the regulations. The study has shown that the aforementioned factors influence MCSs calling for changes in their configuration, adjustment of organizational processes maps and development of more sophisticated control mechanisms. Finally, MCSs built around the business processes gave a clear understanding of the responsibilities, procedures and appropriate behaviour to the personnel and contributed to the promotion of the strategic plans and objectives [16, 17, 22].

The study has a number of limitations and, therefore, suggests directions for future research. First, the study has revealed the MCS built around the organizational business processes that needs further development and empirical evidence. Thus, it might be fruitful to analyse the MCSs of the companies that are operating in the other process industries and compare them with the MCSs of the shipping companies to reveal similarities and differences. Second, the study has identified a number of environmental factors and the way they are influencing the MCSs. However, it did not assess the degree of the influence. Thus, quantitative studies of the links between environmental factors and MCSs reconfiguration can contribute to the development of the response strategies and response capabilities towards the changes in the environments. Third, the sampling of the study is limited to only two companies operating in the shipping industries, thus, extension of the sample size might influence the results of the paper. Finally, the paper focuses only on the environmental contingencies that influence MCSs. The study of a wider number of contingencies, such as organizational size or culture might shed light on additional control mechanisms of the MCSs.

6. List of references

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