The Future of Economic Decision-Making in Project Management

ABSTRACT

Project management has become the best way to plan for both the future. Its importance in finding appropriate solutions to the situation is undoubted. Because of the cost factor of operations, barely any of the projects fail to involve economic decision-making. The complexity in making economic decisions causes some of the projects to make the wrong economic decisions due to lack of proper information. Financial decision-making involves more than just collecting information and making decisions based on the information. For the formed economic decisions to be viable, a deep analysis of the economy must be done to estimate the future economy. The research focuses on the future trend and relevance of economic decision-making in project management. It is based on testing the influence of economic decision-making, innovativeness, risk profile and size of the management team on the success of a project. The primary theme is to evaluate the level of significance of economic decision-making in project management.

KEYWORDS

Economic Decision-Making; Future; Risk; Project Management

INTRODUCTION

The Future of Economic Decision-Making in Project Management

Among the various fields of application of mathematical methods and means of computer technology there is one, which, from the point of view of human activity, is extremely important. This area of decision-making in situations where the consequence of the results of choosing a particular course of action can be very serious. Decision-making is a special kind of human activity, consisting in choosing one of several solutions (Best, 2016). Anyone who has faced such a choice in making business or personal decisions knows how complex it is and how much mental effort it requires (Galli, 2018b; Caro, Briggs, & Siebert, 2012). Any methods that help a person better understand what he wants and what he has, which help to evaluate from a single position the desired goals and available resources, are not only useful, but sometimes simply invaluable.

The methods that helped to make decisions for a long time were the subject of attention of both practitioners and theoreticians. Many economists, specialists in state (administrative) management, lawyers, and military worked on such methods (Caro et al., 2012).

However, only in recent decades has a scientific direction emerged, for which the central questions are how a person makes decisions and how it can and should be helped in difficult problems of choice. Decision-making problems are posed and considered from unified positions, regardless of the areas of the specific application (Caro et al., 2012). This formulation of the question is fully justified, since there is already a lot of evidence that there are common features and characteristics of people's behavior when making economic, political, social, and technical decisions. The generality of people's behavior and the commonality of the requirements for their behavior determine the uniform methodological tasks that decision theory is engaged in (Tatić & Činjarević, 2016).

The need to have progressive and project management that ensures the successful tackle on issues facing institutions or the society is unavoidable (Caro et al., 2012). Project management has become the modern day method of approaching both the future and dealing with the problem presently facing the community. There as a result arises need to study the best practices in handling projects to ensure their success (Fox, 2016). The success of a project refers

to better solutions to problems and strategies to execute the various process. Such success would better the living conditions and improve on the methods of doing things. Many projects have been conducted in the past and certain developments made. Some projects have also failed in achieving their purpose leading to a necessity for interrogation of failure whether total or partial.

The research focuses on the future economic decision-making in project management. Economic decisions refer decisions that involve cash. Economic decision is made on a daily basis from an individual level to the central banks of the various countries. Because of globalization, the economy has become interdependent and difficult to evaluate. The evaluation of economy is mainly done using models that are input to forecast the future movements in the economic level. Effective economic decisions can only be made upon accurate analysis of the economic situation. The research tries to establish whether the economic decision as a factor influence the success or fail of projects.

Problem Statement

The social and economic environment is changing at a very significant rate. This poses a big challenge to project managers who are expected to always make good decisions. Making decision in a complex environment is not easy (Fatfouta, Schulreich, Meshi, & Heekeren, 2015). The use of past approaches may not be handy in such situations. It is therefore important to have an idea about the future economic decision-making in project management. The paper intends to explore this need.

The Research Hypothesis

H1. Future economic decisions in project management are likely to be based mainly on mathematical models.

Originality

Making a contribution to literature about the future of economic decisions in project management is this study's aim. It also aspires to assess the likenesses and differences of economic decision-making models elements with other concepts such as mathematical models, while maintaining a focus on their assessment tools. Any data is collected from other studies and research that has been compiled into a well-mannered approach. Overall, the basis of this paper is derived from other research that tests the hypotheses.

Any perspectives within this study have been taken from other researchers, but it suggests new methods for resolving current problems. The study's purpose and hypotheses are explained within this paper, as well as the methodology and its findings. It authorizes an important growth reveal for practical and hypothetical applications through a design-science-investigate strategy. Additionally, it produces a suitable model for the future of economic decisions in project management. Initially, this paper features an outline of development models, while considering their evaluation instruments as answers to the examination question. There is also a breakdown of how the outline was created, as well as an assessment of the evaluation instrument. Any result of a meeting is further explained within the study. This is followed by preliminary discoveries and suggestions within the conclusion, which not only shows investigative limitations, but it also discusses ideas for future research.

By contributing to the limited amount of literature on the future of economic decisions in project management, this paper plays a crucial role in the profession. Within the study, there are findings that emphasize the advantages of using economic decision-making tools in project management. However, it also explains the disadvantages that arise when performance and sustainability are disregarded. Problems that can arise in the real world are laid out in this study to illustrate how valuable it is to do so when discussing theories. Since practicing economic

decision-making tools in project management is practical, this study is valuable for examining these subjects in both theory and practice.

Contribution to the Field & Profession of Industrial Engineering

This study is an asset to the Industrial Engineering (IE) profession and research field. It provides information that will help to economize on time, materials, machine time, money, energy, work hours, and resources that delay productivity. Thus, any goals will be met more expediently and efficiently. This study even guides engineers on how to categorize and conserve the system with the most up-to-date technologies. Overall, engineers will find an improvement in productivity, as well as in the quality of their work. The model provides assistance for organizations, their products, and other important aspects. Additionally, it can benefit practitioners, as well as organizations, by helping them to employ useful strategies.

This study is, undoubtedly, a useful contribution to research. With straightforward vocabulary that can be understood by any reader, the study can supply vital information to everyone, including industrialists. The study not only shows an unexplored side of the future of economic decisions in project management, but it also illustrates how essential and effective this model is for companies. A theoretical outline is featured in the study to guide readers on pertinent details and information, which makes it easy to reference in future studies. Clearly, such research is useful for a company to gain a competitive edge, and it contains valuable research for the IE profession, as well as the research field.

LITERATURE REVIEW

The chapter acknowledges the extensive research done on project management and economic decision-making. The review includes the past decision making approaches as well as the proposed future decision making approaches.

Project Management

A project means an individual or collaborative undertaking that is meticulously organized and designed to attain a particular purpose. The outcomes of a project are predetermined through appropriate planning and managing of resources (Fung, 2015). Project management refers to the use of skills, knowledge, craftsmanship, and tools in performing activities of a project to its conclusion efficiently. A project brings together individuals from different disciplines, geographical regions and also of various schools of thought who focus on achieving the objectives of the project (Agrawal, Barker, & Haimes, 2014).

In project management, there is variety of risks. Admissible risk entails loss of profit, critical - revenue (the full value of the goods sold), catastrophic risk leads to the death of the company due to loss of property and bankruptcy (Agrawal et al., 2014).The source of risk in making a decision may be psychological characteristics of the manager, which in relation to risk can manifest themselves in the range from reinsurance (risk of inaction) to adventurism (actions beyond justified risk).

In order to avoid the possibility of failure or to prevent significant harm in decision-making, it is necessary to analyze the risk and determine its consequences (Agrawal et al., 2014). The purpose of the risk analysis is to provide managers and potential partners with the necessary data on the feasibility of participating in the project and provide for measures to protect them from possible financial losses. When analyzing the risk in the decision-making process, the principles proposed by the American expert B. Bermmer are used:

1. Losses from risk are independent of each other;

2. A loss in one direction from the "risk portfolio" does not necessarily increase the probability of loss in another
3. The maximum possible damage should not exceed financial capabilities of the participant.

An important feature of managerial decision-making processes is the need to take into account the influence of uncertain factors and to consider all possible consequences of alternatives for selection. In this regard, it is of great practical importance to develop models for decision-making under uncertainty (Agrawal et al., 2014). These models provide structuring and processing of information about the problem being solved, and thus, at least partially, make up for the incompleteness of the initial data available to the manager.

Common Managerial Decision Approaches

Contemporarily, the managerial decision is done using different approaches. The adoption of managerial decisions involves the application of different strategies. Some of these strategies are explored below.

1) Use of hierarchy in decision-making is carried out by the majority of firms with the purpose of coordination of activity and strengthening of centralization in management (Felder & Mayrhofer, 2017). In American companies, managers usually delegate their authority to make decisions closer to the level at which there is more information needed, and which directly participates in the implementation of a particular solution (Tatić & Činjarević, 2016). American managers prefer not to enter into direct contacts with subordinates who are more than one hierarchical level in making decisions, so as not to violate the principle of chain management.

2) Use of target interfunctional groups in decision-making in American firms is quite widespread. Such target groups are usually created on a temporary basis. Their members are selected from different departments and levels of government. The purpose of creating such groups is to use the special knowledge and experience of group members to make specific and complex decisions (Locatelli & Mancini, 2012). Target groups are most often engaged in creating new products. Then, they include engineers, marketing specialists, production workers, financiers, and suppliers. Initially, they prepare information at a high professional level, on the basis of which the top management makes a decision to allocate capital for the development and introduction of new products (Felder & Mayrhofer, 2017). The head of the target interfunctional group is appointed one of its members or a superior leader,

3) Using formal rules and procedures in decision-making is an effective way of coordinating actions. However, the instructions and rules impose rigidity on the management system, which slows down innovative processes and makes it difficult to amend plans because of changing circumstances (Locatelli & Mancini, 2012).

4) The use of spikes in decision-making is aimed at coordinating the activities of the firm in the cents. Planning is an important type of management activity, to which managers spend a significant part of their time (Steimer & Douglas, 2013). While drawing up plans, a process of combining interests and goals between different levels of government is carried out. Control and accounting systems are adapted in American firms to management tasks, and on their basis, plans are being developed. Managers constantly monitor the performance of planned indicators and can correct them with the appropriate justification for such need before the companies top managers or heads of production departments.

The American manager is characterized by more individualism than collectivism in decision-making (Cuéllar & Mashaw, 2017). This distinguishes the American type of management from the Japanese and to a certain extent from the West European one.

Individualism manifests itself in one-man management in the decision-making process, individual enterprise in achieving leadership, individualization in the payment of managers.

The American style of management is not the present for the future, but the future for the present. Hence, planning for perspective, forecasting, marketing, pursuing the goal-it is better to understand the consumer and adapt to his requirements, to anticipate market changes and to take timely measures in the sphere of production (Grover, 2016).The organization of the firm and the management process in American firms are focused on the consumer, on his requests and tastes.

An important feature of American management is the individual approach to the employee in order to stimulate the performance of the assigned work with maximum responsibility (Cuéllar & Mashaw, 2017). Hence the great role is given to the upbringing and training of workers, raising their professional level and initiative in their work. The management philosophy in American firms is based on the fact that the goals of the employee coincide with the objectives of the firm. This approach led to the principle that "the manager must know every employee in person," and this, in turn, put forward the task of continuously studying personnel and promoting staff in terms of skills and initiative (Felder & Mayrhofer, 2017).

The most important areas for decision-making are the definition of the policy of investment and the introduction of new products. Decision-making in the field of investment in the United States involves making preliminary calculations of their payback and efficiency (Virine & Trumper, 2017). If the payback or efficiency of the proposed investment is above zero, then investments are advisable, as they increase the capital of the firm (Hair, Black, Babin, & Anderson, 2014). At the same time, it is necessary to take into account the results of the payback analysis and the effectiveness of other alternative investment options, choosing the highest indicator from them.

The formulas for calculating such indicators are very cumbersome (Cuéllar & Mashaw, 2017). They provide for the calculation of all possible cash receipts and costs throughout the life of the investment object. As a result, these cash receipts or profits are expressed in current-time prices less future receipts as if they could have been received as an increase in invested capital in some other equal-risk region.

In practice, there are other ways to determine the feasibility of investment. These include, in particular, calculations: the payback period; on the impact of investments on dividends; on shares of the current year; compared with this rate of return with a general rule for the firm as a whole. Regardless of which method is used by the firm for decision-making, each investment decision must follow the general planning system and the approval of capital investments. Most US firms develop annual financial plans) that contain a list of projects already approved or expected to be financed next year. This plan is prepared by the top management of the firm on the basis of proposals developed at the grassroots levels (Felder &Mayrhofer, 2017).

The process of making decisions about the introduction of new products in US companies can be divided into four consecutive stages. At the first stage, an idea or concept of a new product is developed. Ideas for new products and new spheres of entrepreneurial activity flow from all departments of the company, as well as from customers (customers) to the department of new products (or marketing department), where specialists assess the demand in the market and the technical and economic capabilities of the firm (Miles, 2014). With a positive assessment of the prospects of the new product, experts prepare a proposal that, along with proposals for other goods to study and prioritize. Such a committee is usually created at the senior management level of the firm and provides overall guidance to the entire innovation process for new products.

In the second stage, if the committee for new products approves the proposal, the product is developed by specialists-marketers and technology specialists (Cuéllar &Mashaw, 2017). The production engineers in terms of such factors as cost, quality, and durability study preliminary design of the product, and if necessary, changes are made to the design. The final version of the product is analyzed to estimate the unit cost, sales price, profit, sales volume and potential net payback (profitability) for several years in advance. Then the product version and the plan for the practical implementation of the idea are again sent to the committee for new products for final approval,

At the third stage, new products are tested, both laboratory and field (on the market). According to the test results, necessary changes are made to the product and a detailed plan for its introduction to the market is developed (Felder & Mayrhofer, 2017). At the same time, the question is solved whether it is necessary to finance the mass production of the product based on market volumes. At the fourth stage, a transition to full-scale production of the product is carried out on a regular basis. At this stage, special attention is paid to the following issues: coordination of quality control; creation of stocks of raw materials, materials and components; advertising and product promotion in the market; creation of a wholesale distribution system; stimulating sales.

Many large American firms have special departments or services for developing product samples and conducting their tests (Project Management Methodologies, 2015). In these departments, engineers and technicians-specialists in production and technology work. Often a production engineer is entrusted with the overall management of the whole process of manufacturing a new product with the subordination of functional specialists who are associated with this process. Under his leadership, a management group of specialists can also be created, which can subsequently become a permanent unit (production department).

The function of R & D in American firms is usually centralized at the highest level of management, which manages funds, funds and special research units that are engaged in the development of a new product (Felder & Mayrhofer, 2017). Therefore, decisions on the size of investment and the timing of development and implementation of new products are made at the highest level of management. Production departments and enterprises actively participate in the development of a new product, but they have an important role at the stages of testing the technological design ideas, developing a new product and launching it into production.

The introduction of new products is one of the most difficult tasks to be solved in production departments. Its implementation requires coordinating the efforts of workers of different divisions: in designing (Tatić & Činjarević, 2016). Manufacturability, production and marketing. Often, the group of developers of new products includes representatives of the customer. Members of the product development group may have different interests. So, usually design engineers are interested in creating a technically advanced product; producers strive to reduce the cost of production within the technology used; customers are interested in the low cost of the new product and in that it meets their requirements.

The involvement of the customer in the development of a new product is often crucial to its success in the market. New products manufactured by only one monopoly firm in the market allow it to increase sales volumes by attracting new customers, delivering new products to its old customers, attracting customers from other firms that produce similar products, but old samples (Felder & Mayrhofer, 2017). As innovation and new products dramatically increase the competitiveness of the firm, they are subject to commercial secrecy, and firms are seeking to patent them as soon as possible.

Mechanism for Making Managerial Decisions

The firm can use both a simple and complex mechanism of interaction in management, which depends on the complexity of the decisions made and the possibilities for their implementation.

1) The overall leadership of decision-making assumes that the decision-making process is in the hands of one linear (general) leader, who in turn is subordinate to a superior leader (Felder & Mayrhofer, 2017). Here a hierarchy is created in the decision-making on linear positions. Each leader solves his problems with his immediate supervisor, rather than with higher-level managers, bypassing his immediate supervisor. Such a mechanism is typical for American management.

In American firms, line managers bear personal responsibility for their work, gaining the right to dispose of the material and labor resources necessary to obtain the intended results. Here, the rights and responsibilities should be equal. Heads of functional units provide assistance to line managers as experts and report to them, not entitled to the rights and responsibilities that the line manager has (Felder & Mayrhofer, 2017). The general manager, before taking a decision, usually accepts the proposals and listens to the opinion of not only the immediate subordinates, but also individual employees who usually express it when concluding collective agreements in which the interests of workers are represented by trade unions.

2) Rules of decision-making or standards usually developed and published by the firms themselves. They formulate the actions necessary to implement the decisions taken in certain conditions. These rules are designed to coordinate between different units and are divided into operational, strategic, and organizational (Project Management Methodologies, 2015). Operational rules are usually formed in the middle control link in the form of various instructions.

Strategic rules, or business policy, include such types of decisions as determining the type of products and services to be produced, the type of customers, the organization of the sales network, the methods for setting prices, conditions and guarantees for the sale of company products, etc. (Felder & Mayrhofer, 2017). Strategic rules are usually formed at the top management level with the participation middle management level and do not have time limits.

Organizational rules are based on local or state legislation. They deal with such matters as determining the purpose and nature of the firm's activities, its relations with state institutions, the legal form and charter of the firm (Turner, 2017). These rules establish the owners of the company, their rights and responsibilities, as well as the number of dividends, payment of top managers and bonus payments, salary schemes, investment limits, within which managers can manage the company's financial resources (Felder & Mayrhofer, 2017).

3) Plans are a means of coordinating the activities of various divisions in making managerial decisions. The plans determine the available resources necessary to achieve the intended goals within a specific period. Plans cover the activities of production departments; therefore, management decisions are made within the framework of their plans. The advantage of plans before the rules is that they are more flexible and easier to adapt to the changed conditions. In American companies, plans are an important tool for coordinating activities at large enterprises in order to link strategic and operational management. The usual annual planning cycle in large US firms begins with the definition by the top management of the benchmarks of the plan for the production department or strategic business center, which is the profit center.

Production department or SCC is the lower level of responsibility in the firm for the completed cycle of economic activity, i.e. for the development, production, sale of the relevant products and services. The planned indicators for them are sales volume, profit, and capital investments. Each production department or SCC then prepares a detailed annual plan that contains a forecast for such indicators as sales volume of each product type, income from new products, production costs, profit, employment level, capital investment (Felder & Mayrhofer, 2017).

The variant of the plan is discussed by the head of the production department with the superior head (vice-president), after which a final decision is made, which becomes mandatory for execution. The results of the plan are periodically evaluated by the head of the production department (Best, 2016). Based on the results of the assessment, decisions are made on the need to make adjustments to the planned indicators or the application of specific measures. On any significant deviations from the plan, the management of the production department is required to inform the top management of the firm who can make its own decisions that are binding.

4) Adoption of bilateral decisions by leaders of the same level on the basis of individual interaction is carried out without agreement with their general managers. Here, a horizontal method of coordination in decision-making within the framework of approved rules and plans is implemented (Best, 2016).

For the purposes of coordination, quite often-special persons are allocated in the production departments located at the same level of the management structure. In some firms, the coordinator is the project manager who is responsible for the implementation of a specific set of work and who receives the authority to take appropriate decisions (Best, 2016). Quite often in the production offices, the managers responsible for producing a particular product are appointed as coordinators for decision-making. Most often this refers to the development of new products or the development and production of products, parts and components of which are manufactured in different production departments. In such cases, the coordinator performs the functions of the head responsible for the production of the final product, and has the right to make decisions on technology, organization of production and marketing (Felder & Mayrhofer, 2017).

The coordinator-manager has the right to discuss draft decisions with the heads of other production departments and functional units, but he does not have the administrative authority that line managers receive (Best, 2016).

5) The target groups act on the basis of group interaction and make decisions concerning specific issues of joint activities in order to achieve the set goals. Target groups can be created on a temporary or permanent basis and include representatives of different functional units and specialized production departments. At the head of the group, sometimes created in the form of a committee or commission, a head (chairman) is appointed, who is given the right to take decisions without agreement with the company's top management or general manager. At the same time, the members of the group continue to be subordinate to their leader (Felder & Mayrhofer, 2017).

6) In matrix structures, unlike the previous two horizontal mechanisms, the project manager is granted linear rights similar to those given to the heads of functional units. A network structure is emerging that makes it possible to make decisions in ever more complicated conditions, concerning increasingly complex problems (Galli, 2018a; Grover, 2016).

Economic models

To make any economic decision, economic models are necessary. Economic modeling can apply either deterministic or stochastic model in trying to estimate the influence of various

factors on the economy (Fox, 2016). Deterministic models are simple to work with but require more assumption since probability is not attached to them. Stochastic models assign the probability to various possible outcomes and are therefore more accurate but difficult to solve. It is, however, possible to run simulations on computers to obtain a more realistic outcome (Grover, 2016).

Economic models occur both at microeconomic and macroeconomic level. At the microeconomic level, the models can be used to test the effect of changes in prices of commodities on the economy (Haji, Afzali, & Karnon, 2015). Such a model may, for example, estimate the impact of the change in the price of energy. The inputs to the model must be however credible to safeguard the accuracy of the output. More complex patterns in economics analyze the aspects of microeconomics such as inflation, unemployment rates and balance of trade. Macroeconomic models are such as new Keynesian and computable general equilibrium model (Haji et al., 2015). This type of models is used by the central banks of the various countries to estimate economic growth and the effect of the different changes in the economy. The usefulness of economic models in forecasting supports financial decisions in project management by enabling an analysis of the future situation (Cuéllar & Mashaw, 2017).

Risks and Uncertainty in Project Management

The project is primarily affected by external, concentrated in the local external environment, and internal factors, and then - factors of the global environment. Exogenous factors, it is customary to refer to objective, uncontrollable human (Desai & Ganatra, 2015). The change of endogenous, on the contrary, is due to its actions and decisions. Their influence can be either positive or negative. Not all factors are manageable by the project team. This does not mean refusing to monitor and monitor their dynamics. On the contrary, it is monitoring of environmental factors, control of their actions that allows to expand or to narrow the scope of project management capabilities, to neutralize their negative influence for achieving planned results and set goals (Desai & Ganatra, 2015). Consequently, a project must entail management of risk and uncertainty. The risks and uncertainty management must be addressed from a long-term perspective. Through projections, a project can ably take advantage of the opportunities and also avoid unfavorable twists in the economy (Grover, 2016). The risk profile of a project must be well analyzed to facilitate its success. Fluctuations in the level of the economy are one risk that must be factored in and carefully explained. The project must be structured such that its risk appetite is proportional to the risk involved. The costs must be risk weighted to trigger reasonable confidence in the expectations of a project outcome (Felder & Mayrhofer, 2017).

The risk is the measure of the probability of failing to achieve the desired outcome of a project. The amount of damaged derived from the risk undertaken must be measured and factored in through probability. The likelihood of occurrence of an event is analyzed through probability and not direct parameters (Felder & Mayrhofer, 2017). The probability increases with the consequences considered in risk management. Despite the fact that the outcomes of a project are predetermined through appropriate planning and managing of resources, it is possible that the results may not be achieved due to challenges along the way. Risk analysis evaluates the challenges that may arise in the course of implementation of a project (Grover, 2016).

Uncertainty may be measurable or not measurable depending on the mode of occurrences. Uncertainty refers to the probability of failing to achieve the goals of a project. The measurable uncertainty is called risk while the immeasurable part is called doubt. No probability can be attached to the occurrence of the uncertain and thus ambiguity (Felder & Mayrhofer, 2017). Uncertainty is caused by the randomness of events and unpredictable behavior and

beliefs. This lack of sufficient knowledge creates a gap in the analysis of the future. Project management must, however, avoid uncertainties as much as possible to stabilize the expected outcomes. Smithson, 2008 suggest three methods of response to uncertainty which include; seeking knowledge, maximizing certainty and applying intuitive statistics (Fox, 2016)

Factors that influence the success of a project

Size of the management team

A good choice of a management team size is critical to the success of a project. A management team may fail to reach the goals of the projects if it is too small. On the other hand, a tremendous management team may trigger the law of diminishing returns. The management team must be the string and composed of compatible parties to facilitate teamwork and ability to brainstorm and analyze conditions (Desai & Ganatra, 2015). Huge groups make it difficult for the members to agree on individual decisions. The qualifications of the people involved must also be of interest to ensure their productivity. Cost of the project manager must also be maintained at a beneficial level that provides value for money. The proximity of the member and the requirement closeness required during the working period is important to consider. In the same respect, the task of the project should be widely considered in the choice of the project management team (Grover, 2016).

Innovativeness

Plans are meant to solve problems that are imminent or already facing the community. The need to be creative in coming up with solutions for problems is necessitated by the fact that problems are dynamic (Grover, 2016). Challenges facing the society or an institution develop their complexity and have to be managed in an exceptional way for them to be eliminated (Desai & Ganatra, 2015). The need creative methods necessitate that the dedicated team carries out an analysis of the gravity of the problems to allow them to figure out the immensity of the problem and be able to curb the situation using a bunch of plausible solutions. The solutions developed through creativity must also be critically tested to ensure the reality aspect of the methods. (Felder & Mayrhofer, 2017).

Economic decisions

The success of a project is dependent on the understanding of the situation to be dealt with. Since the problems involved have far-reaching consequences, it is important that a comprehensive analysis is made to understand issues clearly (Desai & Ganatra, 2015). The analysis is done through quantifying the risks involved. One of the factors that must be understood is the trend of the economy. Because of the complexity and the interdependence of the global economy, it is important that the trend is studied carefully using economic models that can forecast the future prevailing conditions (Grover, 2016). The effect and accuracy of the decisions made are largely dependent on the ability to accurately predict the future. Plans to deal with the future conditions can only be prescribed if the future is rightly understood (Hair et al., 2014).

Risk profile

Risk refers to the probability of failure. It is the element of uncertainty that is quantifiable. This is done through attaching probabilities to the various adverse effects. The risk-adjusted factors then become inputs in models that are meant to forecast the future (Grover, 2016). This ensures that the future predicted is risk adjusted. The results of the model express the expected future. Once the future is understood, the creativity sets into come up with plans that would adequately handle the future. Proper analysis of the future allows for proper adjustments in the project's plan, and therefore the success rate of the project is high.

RESEARCH METHODOLOGY

The literature review was organized in two approaches. The first approach was simple search where its main focus was to find useful information about economic decision-making and project management. The second approach was organized search. In this step, we got all the helpful information from databases.

Simple Search for Literature Review

This step was based on searching for papers that show useful information about economic decision-making and project management. Important areas such as economic decision-making tools, uncertainty, and types of economic decision-making methods, project management concepts, and principles and key components of project management were identified. 15 articles were found. After that, we excluded some of papers in an organized search.

Organized Search for Literature Review

In this search, three steps were used. Explanation for the three steps is:

(1) Planning the search: all continuous improvement and risk management papers were identified. One of these topics had to be the major concentration. The goal was to successfully get papers that add valuable information to this study.

(2) Conceptualizing the review: we defined new terms to support the knowledge of our study by looking for other concepts showing relevance to the two concepts. For example, economic decision-making tools, uncertainty, and types of economic decision-making methods, project management concepts, and principles and key components. Elimination of some specific terms was done, such as sustainment and optimization, because they are not helpful to our study.

(3) Searching, evaluating, and selecting the literature: several databases were used to have these results, such as ABI/Inform Global, ProQuest, and ScienceDirect. Then, we evaluated the papers by looking to the abstract, introduction, and conclusion to make sure any relevant study with valuable information was considered. Finally, we selected the most relevant papers to be 80 papers. Figure 1 shows the process we used in the search and selection.

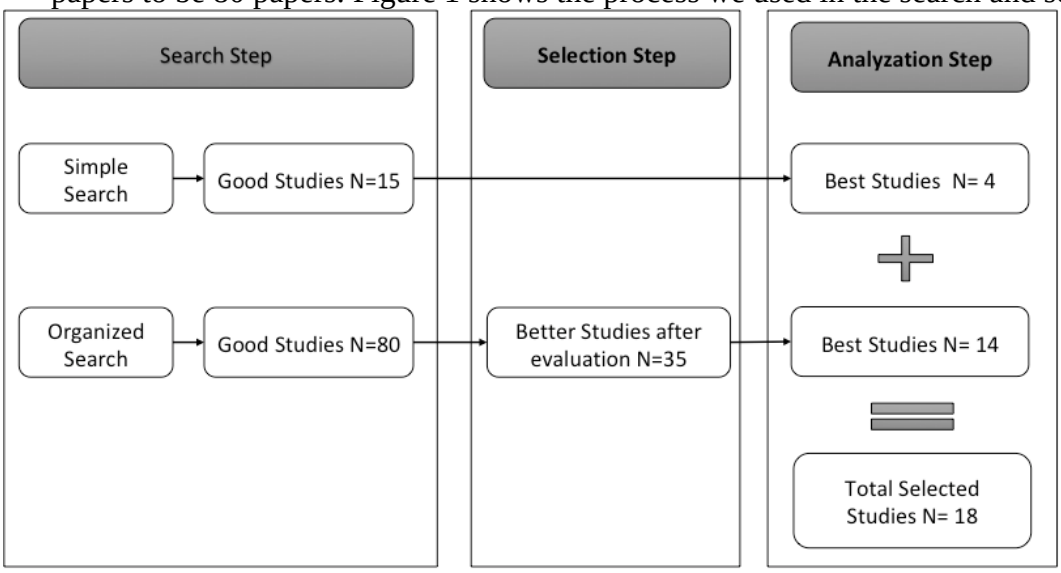

Figure 1 : Research approach for literature review.

The three steps are summarized in figure 1, and the final total selected studies were 18 papers. In the selection step, we selected 35 studies. Papers were eliminated because of title, abstract, or duplication. Also, our goal was to focus on the peer reviewed articles, academic articles, and

literature reviews. In the analyzation step, we narrowed down the selected studies to be N= 4 and N=14. We finally appraised each paper to have N=18 articles.

STUDY FINDINGS

From the systematic literature search, it was found that indeed the economic decision-making is evolving significantly. It is apparent that the future decision making approaches is likely to be systematic, evidenced-based and more objective than the past and current decision making. The future decision-making will be done based on the models designed for a particular system (Fung, 2015).

How future economic modeling may change

There are several views on the classification of managerial decisions. According to one of them, management decisions are divided into general and private. In general decisions, as a rule, the further development of the subject is provided (Grover, 2016). They affect the entire organization of production and financial and economic activities. The need for private solutions arises in current and operational activities, for example, in matters of discipline, layoffs, changes in the work schedule (Galli, 2018c; Virine & Trumper, 2017).

In another classification, management decisions are distinguished for influencing the external and internal environment. The first concern the near environment, partners, customers, creditors (for example, the need to obtain a loan in a bank) (Grau-Moya, Ortega & Braun, 2016). The second ones are associated with a managed system (for example, changing the staffing schedule, performing production tasks) (Galli, 2018a; Grover, 2016).

Management decisions can be classified according to the hierarchy level, which depends on the nature of the issue on which decisions are made, and on the competence and right of each level of the hierarchy (Virine & Trumper, 2017).

Management decisions are divided into rational decisions or based on judgments or intuitions. The former are justified with the help of an objective analytical process. The latter are based on past experience and on the sense of its correctness (Grau-Moya et al., 2016). A person uses knowledge about what happened in similar situations before, and predicts the result of an alternative choice. Intuition is a premonition, imagination, insight, or thoughts that often spontaneously manifest themselves in the conscious comprehension of the problem and in subsequent decision-making (Virine & Trumper, 2017).

The main role in conducting decision-making procedures is usually assigned to the use of modern information technologies with the help of computerized programs (Grover, 2016). For today, expert systems are actively developing, the purpose of which is to accumulate professional knowledge in situations of various types that require competent assessments (Virine & Trumper, 2017).

The application of economic and mathematical methods in solving management problems allows us to use as a criterion of choice the objective function, which usually needs to be maximized or minimized (Grau-Moya et al., 2016). Such a path is called optimization. The optimal solution is chosen on the basis of a comparison of the quantitative value of the objective function for all possible variants; the best of them is that which provides the most desirable value of the target criterion, for example maximizing profits, revenues or minimizing costs (Grover, 2016).

So, the management decision is the choice of an acceptable alternative among the possible ones, the choice of effective actions to achieve the goal of the activity. In modern conditions, time plays an important role in decision-making procedures, information asymmetry, and transaction costs (Grover, 2016).

Mathematical models is likely to dominate the future

The future modeling is likely to change significantly. The future models will be specific. It is important to note that modeling as a method of cognition is based on the fact that all models in one way or another reflect reality (Stewart, Cao, Nedic, Tomlin, & Ehrich, 2012). Depending on how and by what means, under what conditions, in relation to which objects of cognition is realized this is their property, a great variety of models arises (Galli, 2018b; Stewart, et al. 2012). There are a number of principles for classifying models of different natures, of which the most significant are the following:

- By the method of mapping reality, and consequently, by the apparatus of construction (form);
- By the nature of the objects being modeled (content).

By the method of mapping or the apparatus of construction, there are two types of models: material and mental, or ideal (Hair et al., 2014).

Material models are models that are constructed or selected by a person and exist objectively, being embodied in metal, wood, glass, electrical elements, biological organizations and other material structures (Galli, 2018c; Grau-Moya et al., 2016). Material models are divided into three categories. Spatially similar models are constructions designed to display spatial properties or object relationships (layouts of houses, factories, city districts, transport network, equipment location in the workshop, etc.). An obligatory condition for such models is a geometric similarity (Stewart, et al. 2012).

Physically, such models are material models aimed at reproducing various kinds of physical connections and dependencies of the studied object (models of power plant, ship and aircraft dams). The basis for constructing such models is the physical similarity - the identity of the physical nature and the identity of the laws of motion (Stewart, et al. 2012). Mathematically, similar models are models that have, to varying degrees, the same mathematical formalism describing the behavior of the object and model (analog computers, cybernetic functional models) (Grau-Moya et al., 2016). Mathematically, such material models are the real or physical shells of some mathematical relationships, but not the relationships themselves.

Mental (or ideal) models are divided into three subspecies:

1. Descriptive (conceptual) models, in which relations are expressed in images of the language;
2. Visual-figurative models, the images of which in consciousness are constructed from sensory-visual elements (Grau-Moya et al., 2016).
3. Signed (including mathematical) models in which the elements of the object and their relations are expressed by means of signs (including mathematical symbols and formulas) (Grau-Moya et al., 2016).

Modeling as a method of scientific cognition is based on a person's ability to abstract the initial signs or properties of various phenomena (processes) and establish a certain relationship between them (Miles, 2014). Thanks to this, it is possible to investigate phenomena or processes indirectly, namely by studying models analogous to them in some strictly defined relation.

When modeling production and economic systems, along with formalized, mathematical analysis methods used for individual subsystems or particular processes, heuristic methods of analysis of production in those elements and connections that cannot be formalized have to be used (Grover, 2016). And when using mathematical methods due to multiple variables, one often has to resort to simplifications, use decomposition methods and aggregate variables (Stewart, et al. 2012). As a result, decisions acquire an approximate, qualitative character.

Due to the presence in large complex systems of organizational and production management links and connections that are difficult or not formalized at all, for their research, it

is necessary to use mainly descriptive models, subjecting the decomposition system to separate functional subsystems; then look for those subsystems that are amenable to mathematical formalization, thereby modeling the individual elements of the overall production process (Grover, 2016).

Depending on the tasks (functions) of management, the models of calendar planning, enterprise development management, product quality control, etc. are distinguished. Models of this subdivision are focused on specific socio-economic tasks and, as a rule, should ensure the receipt of results in numerical form (Grau-Moya et al., 2016). Depending on the stage (procedure) of automation management, models can be informational, mathematical, software (Stewart, et al. 2012). Models of this unit are aimed at the relevant stages of the movement and processing of information.

Depending on the mathematical model used, the models can be divided into five large groups: extreme, mathematical programming (planning), probabilistic, statistical and game theoretic (The New Economic Diplomacy, 2016). Extreme models include models that give the possibility of finding an extreme of a function or a functional. This includes models built using graphical methods, Newton's method and its modifications, methods of the calculus of variations, the Pontryagin maximum principle, etc (Grover, 2016). Based on the capabilities of these methods, they are used primarily for solving operational control problems.

Models of mathematical programming (planning) include models of linear programming, nonlinear programming, and dynamic programming (Stewart, et al. 2012). This is also commonly referred to as network planning models. Mathematical programming combines a number of mathematical methods designed to best distribute available limited resources - raw materials, fuel, labor, time, and to draw up appropriate best (optimal) action plans (Grau-Moya et al., 2016).

Probabilistic models include models constructed using the apparatus of probability theory, random Markov type models (Markov chains), queuing theory models, and others (Grover, 2016). Probabilistic models describe phenomena and processes of a random nature, for example, those associated with all kinds of non-systematic deviations and errors (industrial marriages, etc.), the impact of natural spontaneous phenomena, possible equipment malfunctions, etc (Virine & Trumper, 2017).

Statistical models include models of sequential analysis, the method of statistical tests, Monte-Carlo, etc (Grau-Moya, Ortega & Braun, 2016). The method of statistical tests consists in the fact that the course of an operation is played, copied by a computer, with all the inherent randomness's, for example, in modeling organizational tasks, complex forms of cooperation between different enterprises, etc. The application of this method is called imitation modeling (Tatić & Činjarević, 2016).

Random search methods are used to find extreme values of complex functions that depend on a large number of arguments (Grau-Moya, Ortega & Braun, 2016). At the heart of these methods is the use of the mechanism of random choice of arguments, on which the minimization is carried out. Methods of random search are used, for example, in modeling organizational management structures (Virine & Trumper, 2017).

Game-theoretic models are designed to justify decisions in conditions of uncertainty, ambiguity (incompleteness of information) of the situation and the associated risk (Blokhuis, Snijders, Han & Schaefer, 2012). Game-theoretic methods include game theory and the theory of statistical solutions. Game theory is a theory of conflict situations. It is used in cases where the uncertainty of the situation is caused by the possible actions of the conflicting parties. Game-

theoretic models can find application in the substantiation of administrative decisions in the conditions of political, social, industrial, labor and other conflicts, when choosing the optimal line of behavior in them (Grau-Moya et al., 2016). The theory of statistical decisions is applied when the uncertainty of the situation is caused by objective circumstances that are either unknown (for example, certain characteristics of new materials, the quality of new equipment, etc.) or are random (weather conditions, possible time of failure of individual parts of the product etc.) (Blokhuis et al., 2012). Game-theoretic models should be used in the preparation, conduct and evaluation of the results of business games.

All mathematical models can also be subdivided into the efficiency assessment model and the optimization model (Grover, 2016). Efficiency evaluation models are designed to develop the characteristics of organization and management. All probabilistic models belong to this group. Models of performance evaluation are "input" with respect to optimization models (Virine & Trumper, 2017). The optimization models are designed to select the best methods of action or behavior in the given conditions (Project Management Methodologies, 2015) this group includes extreme and statistical models, models of mathematical programming, as well as game-theoretic models.

Models of technical and economic planning are based on methods of mathematical programming (planning). As the main criterion of efficiency (objective function) in the development of the optimal plan, the final results of production, for example, the magnitude of profit, are usually chosen (Grau-Moya et al., 2016). As restrictions, restrictions are taken on the complexity of products, the time of operation of equipment, resources, etc. Since the value of some of these restrictions is random (for example, the operating time of equipment), a probabilistic approach is used to solve such optimization problems (Haji & Karnon., 2015). Typical optimization models of technical and economic planning are the models for calculating the optimal plan, the distribution of the production program for calendar periods, the optimal loading of equipment.

Models of operational control. The main tasks of operational management are operational-calendar production planning, systematic accounting and control over the implementation of calendar plans, as well as the operational control of the production process (Grau-Moya et al., 2016). Typical models of operational management are models for calculating the optimal lot size and calculating the optimal schedule for launching and releasing lots of parts (calendar planning) (Virine & Trumper, 2017).

Models for calculating the optimal lot size can be created for both simple and complete formulation of the problem. In a simple formulation, determining the size of production or purchasing a batch of parts, in which annual costs are minimal, reduces to the usual task of finding the minimum of a function (Turner, 2017). In the full formulation, such a set of lot sizes is found that corresponds to the minimum total costs for equipment reconfiguration and deductions for work in progress, with restrictions on the length of adjustment, equipment resources, and the interdependence of lot sizes on related operations and employment of the worker. The solution of this problem is achieved with the help of mathematical optimization methods (Grover, 2016).

Heuristic, used in cases where it is impossible to create strict algorithms, but there is a need to use information and evaluate facts that do not have quantitative expression (Virine & Trumper, 2017). Models of operational control (Haji & Karnon, 2015). These models are designed to ensure that the deviation of the results of production activity from planned targets is

kept within predetermined limits. In this case, two types of models are used: optimization models by the criterion of optimality, models of regulation by deviation.

Models of regulation by the criterion of optimality are based on the fact that after a concrete measurement of the actual state of the production process, a plan is drawn up that optimally leads the process to a predetermined state at the end of the planning period (Haji & Karnon, 2015). Models of management of material and technical supply of production. As a central problem in the management of the material and technical supply of production, the task is to determine the necessary volume of stocks of all types of supply (Grau-Moya, Ortega & Braun, 2016). In this case, two fundamentally different models of inventory management can be built- with a fixed order size and a fixed stock level. There is also an intermediate model, in which both the upper level of stocks and the lower order level are fixed (Best, 2016).

Models of sales management of finished products. The main problem of managing the sales of finished products is the task of calculating the annual plan for the supply of finished products. To solve this problem with the help of mathematical optimization methods, an optimization model of the annual plan of deliveries of finished products is being built (Haji & Karnon, 2015). As the objective function, the cost of the products sold is used, as a restriction - the requirement that the total volume of products shipped at a certain time interval to all consumers does not exceed the volume of output for the same time, and the total volume of deliveries to the consumer for all time intervals is not exceeded the monthly application (Virine & Trumper, 2017).

Models of management of technical preparation of production. Technical preparation of production includes the stages of design and technological preparation (Grau-Moya et al., 2016). With the help of mathematical modeling, three main tasks of technical management, production preparation can be solved:

1. Definition of the minimum term for the implementation of a set of measures for the technical preparation of production, with restrictions on the level of available resources (Cuéllar & Mashaw 2017);
2. Determination of the minimum cost of the implementation of a set of measures for the technical preparation of production, with restrictions on the timing of its implementation and on the level of available resources (Grau-Moya et al., 2016);
3. Determination of the minimum level of consumption of scarce resources, with restrictions on the cost and on the timing of the implementation of technical training activities (Cuéllar & Mashaw 2017).

The process of technical preparation of production most fully and conveniently reproduces the network model (Haji & Karnon, 2015). The network model makes it possible to take into account the probabilistic nature of such basic parameters of operations of technical preparation of production, as the duration of work and the intensity of resource consumption. Optimization is achieved using the methods of mathematical programming (in particular, the simplex method) and random (statistical) search (Fox, 2016).

Along with the individual models considered that implement the basic functions of managing the production process, there is also a system of interrelated production and management models. The essence of this system of models, constructed with the help of the mathematical apparatus of set theory, graph theory and vector calculus, is as follows (Haji & Karnon, 2015). As sets, many products manufactured by the enterprise are considered, and many resources are used. The production process that provides the output of a variety of products is described by the cumulative graph, and the technological process for the production of a single

product is its structural and technological graph (Haji & Karnon, 2015). Many of the resources that support production consist of subsets of labor resources, equipment and scarce components and materials. The state of production at any point in time can be described by a vector, which is a set of finished products, semi-finished products and de-aliasing units produced at that time (Cuéllar & Mashaw, 2017). Similarly, using the vector, the state of the resources at any time is determined. In this case, the planned trajectory of the production process will be described by a vector function (Steimer & Douglas, 2013).

Modeling of organizational management structures is aimed at improving and optimizing the enterprise management system. It is a necessary preliminary step in automating the management of production and economic systems, which requires serious preparatory work (Cuéllar & Mashaw, 2017). The theory of mass service is used as a mathematical device for modeling organizational management structures (Haji & Karnon, 2015). At the same time, the elements of the queuing system are taken as elements of the management system, each of which is designed to solve a specific management task. For all task-elements, a system of priorities is planned in the order of the solution. For each task, the characteristics of the incoming flows of maintenance requirements are also known - the solution of the corresponding control tasks (Haji & Karnon, 2015).

The statistical model allows us to put a mathematical experiment, similar to the actual one, to simulate the organizational structure of management in the cheapest way and at an acceptable time (Fung, 2015). At the same time, it is necessary to take into account the specific shortcomings of the statistical test method, of which the main are the relatively long simulation time and the particular nature of the solutions obtained, determined by fixed values of the parameters of the queuing system (Haji & Karnon, 2015). When modeling with the help of the mathematical appetite of the theory of mass service, the structure of the enterprise management system is viewed as a set of interrelated functioning elements (Grau-Moya et al., 2016). These elements in the real system are management and functional management departments: production and technical, planning, etc (Cuéllar & Mashaw, 2017).

Along with modeling of organizational management structures with the help of chains of elements, there is a method of mathematical description of the organizational structure of the control system using linear stochastic networks, which are one of the classes of multiphase queuing systems (Haji & Karnon, 2015). In this model, information also passes successively through a number of elements of the control system, each of which is described using the mathematical apparatus of queuing theory. When the information is passed through the network elements, transitions of the Markov type take place. The structure of such a network with the corresponding transitions is represented by a certain graph. A stochastic matrix of transitions is compiled (Cuéllar & Mashaw, 2017).

Since the objective function (the efficiency criterion) in the mathematical modeling of organizational management structures, as a rule, can only be described statistically, optimization is carried out mainly by numerical methods, of which the methods of dynamic programming and statistical search have been most widely used (Cuéllar & Mashaw, 2017). Optimization of organizational management structures with the help of the statistical search method, despite the less stringent restrictions imposed on the efficiency criteria and the assumptions describing the physics of the phenomenon in this method, has not yet received wide application in the context of the problem under consideration (Grover, 2016).

Game modeling occupies a special place among a number of methods used to automate the management of production and economic systems (Blokhuis et al., 2012). A distinctive

feature of this method is the involvement of people involved in the development and conduct of a business game to model the management process. Under the business game, this means imitating a group of individuals to solve individual tasks of economic or organizational activities of an enterprise, performed on the model of the object, in an environment as close to the real one (Blokhuis et al., 2012).

Introduction to the model of a person as an element of management organization makes it possible to take into account his behavior in those cases when it cannot be adequately described with the help of mathematical models known today (Warner & Méndez, 2012). This allows one to solve such managerial tasks that do not fit into the framework of existing formalized methods. Business game introduces psychological and emotional moments in the process of preparing and making managerial decisions, encouraging the use in this process of past experience of leaders, their intuition, developing the ability to heuristic decisions (Blokhuis et al., 2012). The business game is conducted in relation to a specific management task in accordance with a carefully designed scenario. The general game model is formed as a set of particular models created by participants - persons who prepare and make managerial decisions (Virine & Trumper, 2017).

The business game model includes both formalized and non-formalized parts (Warner & Méndez, 2012). The participants of the game act according to certain rules. They are guided by specially developed instructions for the conduct of the game, as well as the data of the situation entering into their disposal (Miles, 2014). In accordance with the scenario of the game, participants periodically receive introductory information about the changing of the situation. Preparing their decisions, participants in the business game evaluate the situation and make the necessary calculations manually or using a computer (Blokhuis et al., 2012).

Managing the course of a business game, its leader evaluates the decisions of the participants, sets the results of their actions and brings the latter to the players (Grau-Moya et al., 2016). If necessary, the head of the game can change the situation, bringing these changes to the participants in the form of introductory notes. Evaluation of the actions of the participants of the game is made by calculations, expert methods, and also based on the experience of the leader, his intuition and common sense (Cuéllar & Mashaw, 2017).

The main type of game simulation, held at enterprises, is a production business game. Its goal is to improve the existing and develop new forms of organization of production management, the development of guidance documents, the restructuring of production, and so on (Warner & Méndez, 2012). As methods for conducting business games, methods of network planning and management (SPM) based on network schedules are widely used. When solving planning problems, methods of dynamic programming are used, and when solving resource allocation problems, linear programming is used (Desai & Ganatra, 2015). To train management personnel, a production business game can be conducted in an educational version, that is, an educational business game. Its main task is to train employees, improve their management skills. If necessary, the educational business game is used to certify the executives of enterprises in the performance of their duties, as well as when they are nominated for the highest office (Blokhuis et al., 2012).

DISCUSSION

It is apparent that economic decision-making is part of humanity. In everyday life, individuals constantly make different decisions, often without thinking about why some of them are successful, and others – unsuccessful (Avram et al. 2010). When solving complex management tasks in the economy and social life, they turn not to intuition and everyday experience, but to accurate calculation and analysis of problems. How are specific economic decisions made?

Consider the fundamental principles of economic activity associated with the limited resources of society. The analysis revealed many models on economic decision-making. It shows that the traditional models are likely to be overtaken by mathematical models. Among the key findings is that decision makers are rational. Rational in the economy is considered a decision or action when the marginal utility, or the benefit derived from the use of an additional, marginal unit of consumption, will exceed the benefit of applying the marginal unit of the resource (Avram et al., 2010). Consequently, resources will be used for the production of benefits until each additional unit of theirs will be of greater benefit than the costs of acquiring them. The marginal benefits or costs are the lowest values economists work with when making decisions in specific circumstances.

Every rationally acting subject should follow this same practice. It can also be deduced that economic decision makers often consider future when making decisions. Since the future is always uncertain and unknown to anyone, only various assumptions can be made about it. The most important theoretical means of predicting the future are probabilistic methods (Avram et al., 2010). They are based on a statistical interpretation of past and present events and the likely evaluation of their implementation in the future. On the same assumption, all probabilistic forecasts are constructed. When making economic decisions about the future, business entities should compare their probabilistic assumptions with those real results that actually arose. Such an analysis will help them to learn from the divergence of their assumptions with reality, and thereby learn from their own mistakes. Probabilistic assessments of the future, in turn, rely on adaptive expectations, when the economic entity assumes that in the future the same features and development tendencies that occurred in the past will remain (Avram et al., 2010). He and their influence on future events can base such assessments on rational expectations, when the subject can to some extent take into account the consequences of decisions made.

A critical analysis of such consequences will enable him to make adjustments to the decisions made. In practice, the uncertainty of future events is taken into account by creating insurance stocks that allow reduce or even eliminate damage in the event of unfavorable developments. The same purpose is subject to the activities of numerous insurance companies and societies that commit themselves to paying certain amounts for the incurred damage to insured persons, businesses and firms through insurance premiums (Nelyubin & Podinovski, 2014). Another way to address uncertainty is to avoid risk, when the probability of occurrence of unfavorable development of events becomes quite high. This trend is clearly evident when investing capital, when foreign companies refuse to invest it in the economies of developing countries. The third way to account for uncertainty is to maximize resource savings and minimize costs, which are commonly referred to as the economy mode. Such savings make it possible to save resources for unforeseen events in the future.

Implication of the study in EM/PM

The major implication of the current study in EM/PM is that the future of decision-making in PM will be relatively more specific, evidence-based and free from bias. To understand this, it is important to reflect back on how decision-making has been. Econometric and statistical methods are related both to mathematical methods of research, and to economics and management (Nelyubin & Podinovski, 2014). They are used in forecasting scientific and technological progress, especially statistics of non-numerical data and expert estimates without modern statistical methods, individuals cannot dispense with the solution of various problems of standardization. The findings from the study imply that if the proposed mathematical models are adopted, the future decision making processes would be better than the present.

Another implication is that with proper adoption of economic decision-making models, it is possible to address most of the economic problems. This is because the economic activity of each country is made up of the work of numerous economic entities, which include individuals, enterprises, firms, companies, etc (Nelyubin & Podinovski, 2014). Therefore, the decisions taken by them, together with economic policies and concrete government decisions, ultimately determine successes and failures in achieving the overall welfare and living standards in the country.

Application of the findings in EM/PM

The proposed models can be applied in risk management. Unexpected situations arising in management activities quite often require urgent and often extraordinary actions associated with risk. Emerging problems and the risk associated with their decision can have an explicit and implicit nature (Nelyubin & Podinovski, 2014). Everything depends on the incoming information. In the first case, it is more definite, in the second case it weakly signals the impending danger. It is very important not to ignore the signals, but to strengthen the monitoring of the course of events. If the decision is made in conditions of certainty (reliability), then the speed of development increases, and the costs of choosing an appropriate option are reduced. The advantage of this situation is that all variables for calculations are entered by the management entity itself under the same state of objective conditions (object). In practical work, cases of the absence of complete certainty of the situation are not uncommon. Then its elements are extracted from the general context in terms of their degree of certainty. If the decision is made under risk (measurable uncertainty), then by introducing probabilistic estimates, the uncertainty is greatly reduced. Variations in the variables characterizing the state of objective conditions can be anticipated. The risk consists in possible errors in assessing the probability of occurrence of conditions (events). Therefore, they rely not only on calculations, but also on the experience, intuition and art of the leader. These qualities are especially needed when developing solutions in conditions of uncertainty, when to determine the probability of occurrence of events (Nelyubin & Podinovski, 2014)

CONCLUSIONS

General Implications

Based on the acquired skill and management strategies from the research, there is a need to make use economic decision-making and project management in conducting business projects and project management. This can be achieved by ensuring an economic decision-making and project management approach that utilizes distinct skills to create a team that sees the company or projects ultimate goals. In this case, there is a need to invest substantially in understanding economic decision-making and project management before thinking of the mode of technology to use in the project or management. More specifically, these results highlight the importance of a top-down and bottom-up approach to leadership and strategic planning especially when it comes to elements of economic decision-making and project management, operations management, and process improvement. The results of this study highlight the criticality of integrating economic decision-making and risk management into the leadership styles and tools leaders use to manage their economic decision-making and project management.

The findings from this study also highlight the importance of economic decision-making and project management throughout all aspects of an organization; obviously, economic decision-making and project management is one element in an organization’s business model, but this study shows that the economic decision-making and project management relationship element directly impacts many other elements of an organization. Management and leadership of

any organization need to have the training and skill sets, to not only manage their economic decision-making and project management, but to effectively manage their overall organizational maturity. This study has shown that many of the current-state issues seen within an organization's economic decision-making and project management stemmed from the leadership's lack of effectively leading and managing their employees and operational issues. If the leadership has the tools and knowledge to effectively manage their economic decision-making and project management instead of focusing on the bottom line (i.e., profits and costs), then the performance of an organization will improve and, as a result, the profits and costs will also improve.

Most importantly, this study highlights that business leaders tend to focus mainly on the financial elements of their business while ignoring or minimizing the economic decision-making and project management elements; this might work in the short-term, but the research shows that it is not a good long-term strategy. Over the long-term, leadership must have a multi-faceted approach where they manage all elements of the business, including: continuous improvement, economic decision-making and project management, operations, HR, financials, performance, and strategy from one overarching understanding that all of these elements are critical and they are all related. By understanding this view, a business leader will be better equipped to lead a successful company in both the short- and long-term.

Contribution & Relevance

Though extant literature has been devoted to the studying these variables, attention has not been paid to different economic decision-making and project management elements and the relationships these models have. Review of the literature showed that there is limited amount of research that explored the variables and there relationships. Therefore, this study sought to further analyze different elements of the economic decision-making and project management relationship. This study sought to fill a void in the research that was identified earlier on this study; previously, this void has left some risk and uncertainty when studying the variables and these relationships, but this study sought to alleviate that.

The results of this research study contribute to several different bodies of knowledge, including: economic decision-making and project management, leadership, team dynamics, capability levels, and risk. By performing this study, the results help to enhance and evolve these bodies of knowledge since this study not only build on existing research but it attempted to expand and fill a gap in the research that was identified earlier on this study. By more thoroughly understanding these variables and their relationships, we can understand the advantages and disadvantages of the variables and their relationships, which in turn should help improve the effectiveness of these variables.

This study also contributes since it introduces new ideas and avenues for future research in each of these bodies of knowledge. Not only did this study seek to explore different variables and their relationships, but it also sought to understand the relationships and identify new ways of thinking about the factors under study. The results of this study were also valuable from a practitioner perspective since the understanding of these variables and relationships helped to introduce ideas and strategies that a practitioner can deploy to be more effective in their profession. The results from this study help a practitioner to understand the relationships and variables but also the implications related to these variables and relationships.

Limitations

The research relied mainly on secondary data. It is difficult to represent the real situation. The research should analyze the entirety of projects that have historical occurred. Another major limitation is that the systematic literature search focused on broad areas of economic decision-making. This means that it is impossible to determine which proposed economic decision-making model should be applied in a particular firm or industry.

The study and results are somewhat limited due to a few research limitations that should be discussed. The main limitation was the fact that the study had a limited sample size and it only studied key factors from this limited sample size. The limitation of sample size introduces some potential bias and validity behind the findings and conclusions identified in the study, all of which could be alleviated by executing the study with a larger sample. Another limitation was that this study only examined the key factors and their relationship in terms of a project environment; therefore, the conclusions and analysis are specific to project environments and the findings cannot necessarily be extrapolated to other arenas such as supply chain management, operations management, or strategic management. This is a limitation since the conclusions and analysis are specific; this limitation makes it difficult to argue that the findings from this study could be deployed and used in other industries or managerial settings.

Future research

It should be noted that the current research is more of proposal or predictive in nature. The current study explored the possibility of mathematical models replacing the classical decision making theories or models. In process, the paper proposes different ways in which such models can be applied. The future research should evaluate each of the proposed model and determine its effectiveness in any particular industry. In addition, the current research is more general because different decision making approaches are covered. The future studies should cover individual approaches identified in current research.

Future research should explore a few different arenas. For example, future research could investigate these factors and the relationship but in the context of other industries and managerial settings. In these settings or contexts, it would be interesting to study the strength of these variables and the relationship as well as the factors that impact these factors and their relationship. Another avenue of research could be to explore these factors and their relationship but from different perspectives, such as from an organizational, strategic, or cultural point of view. This would shed further light into the how this relationship is perceived across many different views and further understand the degree of impact that factors such as culture, strategy, human resources, operations have on the key variables and their relationship.

General Conclusions

Innovativeness and the economic decision-making have not been prioritized in project management in the past. This is the primary cause of low success rate given the tremendous influence of the economy on any project that involves transactions (Haji & Karnon, 2015). The negative skew of innovativeness and economic decision-making in the data used shows the disregard of innovativeness in projects of the past. This is the cause of low success rate of the projects. Innovativeness is key in steering a project; this is as a result of competition and dynamic nature of problems. New ideas are more effective in transforming the current condition or improving the future (Grau-Moya et al., 2016).

Appropriate economic decisions require an analysis of the economic conditions through the use of economic models to understand the normal prevailing economic conditions. Prior knowledge of the economic situation allows for proper planning that addresses the weakness of what may arise and seize emerging opportunities (Turner, 2017). Predictability of the conditions thus allows more flexibility and preparedness within the project strategies. This is what leads to a conclusion that appropriate economic decisions that are based on the proper analysis boost the success of the project (Haji & Karnon, 2015).

Economic decision-making is positively significantly related to the success of the project. The significant relationship between the success rate of a project and the quality of economic decisions made further proves the contribution of accurate analysis on the success of a project. Change is inevitable making proper forecast must, therefore, be done to ensure the accuracy of prior economic knowledge (Blokhuis et al., 2012). Predictability of the conditions allows for conformity, accuracy, and relevance of the project strategies. The economic decisions made in a project management must seek to counter the future predicted situation to ensure the success of the entire process (Haji & Karnon, 2015).

Innovation in dealing with the problem that a project aims to remedy is paramount. Change creates plausible solutions that are able to manage the dynamic nature of challenges. Also, addresses the problems in a manner that is most effective (Blokhuis et al., 2012). Effectiveness may be regarding cost or ease. It is therefore crucial that innovativeness is prioritized in any research. The project management team should be able to brainstorm and critically analyze the methods to come up with possible applicable solutions (Haji & Karnon, 2015).

The problems of risk and size of the directorate are not significant since they can be eliminated. Risk can be removed through proper analysis and quantify of risks (Grau-Moya et al., 2016). The risk is therefore not significantly related to the success of projects. The relationship between the risk and success largely depend on the measures put in place to combat the limitation created by the risks (Blokhuis et al., 2012). The mitigation of risk also depends on innovation and the level of economic analysis done before making economic decisions. Ensuring that appropriate economic analysis can therefore, immensely reduce the influence of risk on the success of a project and right economic decisions are made (Haji & Karnon, 2015). The decision made must also be innovative with new methods of dealing with the arising challenges. The extent of risk does not matter, but instead, the concern should be on the methods used to mitigate the risk. It is, therefore, a noble role for project managers to ensure that the uncertainties are reduced as much as possible by assigning probabilities so that their effect is analyzed and taken care of in the plans. (Project Management Methodologies, 2015).

The qualifications, experience, and exposure of individuals should be considered more than the numbers. The results prove that quality and not quantity should only drive a project, a project should be steered by a few individuals who have the right qualifications, attitude and ability to work as a team to receive more regarding success (Virine & Trumper, 2017). The size of the management team must be dealt with caution given the involved costs. A small number of experts given an enabling environment would ably deliver as compared to a large number of non-experts in the field (Haji & Karnon, 2015).

The relationship between the success of a project as the dependent variables and the value of economic decision and innovativeness as the independent variables (Blokhuis, Snijders, Han & Schaefer, 2012). The model contains innovativeness and economic decision made as independent variables. The high prediction ability of the model means that the success of a

project is mainly dependent on innovativeness and the financial decision made. This emphasizes that the success of a project is dependent on the level of innovativeness and accuracy of the economic decisions made (Haji & Karnon, 2015). The value of R squared in the condensed regression model is 0.809885, which means that innovativeness, and the economic decision made explains approximately 81% of the success of the project. The importance of prudent economic decision in project management cannot, therefore, be underestimated. ("Value-Driven Project Management," 2015).

In conclusion, research finds out that proper economic decision is paramount in any project management. It is, therefore, the role of all project managers to ensure that appropriate economic decisions are made. The research also concludes that economic decisions must be involved in any project that wishes to succeed. The decisions made must also be innovative to ensure that they capture the expected future (Haji & Karnon, 2015). Projection of the future must be conducted comprehensively to avoid recommendation for a non-existent condition. Probabilities may be attached to uncertainties facing the project to ensure that that the research factors in all the aspects of the project (Blokhuis et al., 2012). Quantifying of risks reduces the risk of the project of failure. Economic decision-making in projects will receive more focus in the future as all projects will be forced to make an economic decision based on the proper evaluation of the future to ensure the success of the project. Innovation also key to tackling existing and emerging problems. All project management must make sure innovativeness and plausibility of findings for success (Turner, 2017).

REFERENCES

Agrawal, A. B., Barker, K., & Haimes, Y. Y. (2014). Adaptive multiplayer approach for risk-based decision-making: 2006 Virginia Gubernatorial Inauguration. *Systems Engineering*, *14*(4), 455-470. doi:10.1002/sys.20189

Avram, E. L., Savu, L. D., & Avram, C. (2010). Investment decision making with economic and mathematic model. *Annals Of DAAAM & Proceedings*, *4*(1), 343-344.

Best, E. (2016). Economic Governance. *Understanding EU Decision-Making*, *4*(1), 93-110. doi:10.1007/978-3-319-22374-2_7

Blokhuis, E. J., Snijders, C. P., Han, Q., & Schaefer, W. F. (2012). Conflicts and cooperation in brownfield redevelopment projects: Application of conjoint analysis and game theory to model strategic decision-making. *Journal Of Urban Planning & Development*, *138*(3), 195-205. doi:10.1061/(ASCE)UP.1943-5444.0000122

Caro J.J., Briggs A.H., & Siebert U., (2012). Modeling good research practices—overview: a report of the ISPOR-SMDM Modeling Good Research Practices Task Force—1. *Med Decius Making, 32(2),* 667–77.

Cuéllar, M., &Mashaw, J. L. (2017). Regulatory Decision-Making and Economic Analysis. *Oxford Handbooks Online*. doi:10.1093/oxfordhb/9780199684250.013.016

Desai, N. K., & Ganatra, A. (2015). Efficient constraint-based sequential pattern mining (SPM) algorithm to understand customers' buying behavior from time stamp-based sequence dataset. *Cogent Engineering, 2*(1), 1-20. doi:10.1080/23311916.2015.1072292

Fatfouta, R., Schulreich, S., Meshi, D., & Heekeren, H. (2015). So close to a deal: Spatial-distance cues influence economic decision-making in a social context. *Plos ONE, 10*(8), 1-9. doi:10.1371/journal.pone.0135968

Felder, S., & Mayrhofer, T. (2017). *Medical decision-making: A health economic primer*. Los Angeles: Sage.

Fox, J., (2016). *Applied regression analysis and generalized linear models*. Los Angeles: Sage.

Fung, H. (2015). Moderating Effects of project management experience, project team size, project duration and project value size on the relationship between project manager's leadership roles and project team effectiveness in Malaysia. *Journal of Empirical Studies*, *2*(1), 17-33. Doi: 10.18488/journal.66/2015.2.1/66.1.17.33

Galli, B. (2018a). What risks does lean six sigma introduce? *IEEE Engineering Management Review*, *46*(1), 80-90.
Galli, B. (2018b). Effective decision-making in project based environments: A reflection of best practices. *International Journal of Applied Industrial Engineering, 5*(1), 50-62.
Galli, B. (2018c). How economic decisions are made in public vs private sectors: a comparison of methods. *International Journal of Strategic Engineering, 1*(1), 38-47.

Grau-Moya, J., Ortega, P. A., & Braun, D. A. (2016). Decision-Making under ambiguity is modulated by visual framing, but not by motor vs. non-motor context. Experiments and an Information-Theoretic Ambiguity Model. *Plos ONE, 11*(4), 1-21. doi:10.1371/journal.pone.0153179

Grover, J. (2016). 2-Node BBN. *The Manual of Strategic Economic Decision Making, 4*(1), 115-117. doi:10.1007/978-3-319-48414-3_7

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2014). *Multivariate data analysis*. . Los Angeles: Sage.

Haji Ali Afzali, H., & Karnon, J. (2015). Exploring Structural Uncertainty in Model-Based Economic Evaluations. *Pharmacoeconomics, 33*(5), 435-443. doi:10.1007/s40273-015-0256-0

Locatelli, G. & Mancini, M. (2012). A framework for the selection of the right nuclear power plant. *International Journal of Production Research*. *50*(17): 4753–4766.

Miles, J. (2014). R Squared, Adjusted R Squared. *Wiley StatsRef: Statistics Reference Online*. doi:10.1002/9781118445112.stat06627

Nelyubin, A., & Podinovski, V. (2014). Analytic decision rules for importance-ordered criteria with a first ordered metric scale in the general form. *Automation & Remote Control, 75*(9), 1618-1625. doi:10.1134/S0005117914090070

Project Management Methodologies: 1.0 versus 2.0. (2015). *Project Management 2.0, 4*(1), 105-140.doi:10.1002/9781119020042.ch6

Steimer A., & Douglas R (2013). Spike-based probabilistic inference in analog graphical models using interspike-interval coding. *Neural computation, 25*(2), 2303–2354. pmid:23663144

Stewart, A., Cao, M., Nedic, A., Tomlin, D., & Ehrich Leonard N. (2012). Towards human–robot teams: Model-based analysis of human decision making in two-alternative choice tasks with social feedback. *Proceedings of the IEEE, 99*(1), 1–25.

Tatić, K., & Činjarević, M. (2016). "When Going Gets Tough, The Tough Go Shopping": A Case Of Young Female Consumers. *Transylvanian Journal Of Psychology*, (2), 137-149.
The New Economic Diplomacy. (2016). doi:10.4324/9781315555188

Turner, J. R. (2017). The management of the project-based organization: A personal reflection. *International Journal of Project Management*. doi:10.1016/j.ijproman.2017.08.002

Value-Driven Project Management. (2015). *Project Management 2.0*, *2*(2) 53-76. doi:10.1002/9781119020042.ch4

Virine, L.& Trumper, M. (2017). Project Decision Analysis Process. *Proceedings of the IEEE, 99*(1), 1–25.

Warner KE, Méndez D. (2012). Accuracy and importance of projections from a dynamic simulation model of smoking prevalence in the United States. *Am J Public Health, 102 (2),* 2045–2048