

# The Diamond Framework Model as an Effective Tool for Project Management

Azad Abdulhafedh

University of Missouri, USA

**Abstract:** Project management has become a robust discipline with many competent practitioners. But despite the professionalism of project managers and the best efforts of project team members, many projects still fail. Even when managers deliver projects on time and on budget, they may still not meet the needs of their customers. Managers also sometimes misunderstand the common elements in their projects and try to reinvent the wheel. This might be too long, too costly and requires a big amount of expertise. This article addresses the Diamond Framework as an effective tool for analyzing the benefits and risks of different projects and offers project managers a way to distinguish and classify the type of project they are dealing with through a diamond-shaped framework, which provides a graphical illustration of a project according to its levels of novelty, technology, complexity, and pace.

**Keywords:** Project Management, Diamond Framework Model, NTCP Model, Business Innovation, Benefits and Risks.

## 1. INTRODUCTION

Shenhar and Dvir (2007) presented an approach for successful management of projects by introducing the Diamond Framework Model, an approach consisting of four dimensional aspects: novelty, technology, complexity, and pace [1]. The model was developed to provide a tool for analyzing the expected benefits and risks of a project by a set of rules and behaviors for each project type. The Diamond Framework uses four bases to analyze projects. If we place these four bases on a four-axis graph, we can get the Diamond Framework. If each factor is in the moderate range, the graph will be shaped like a perfect diamond. The purpose of the graph is to figure out the structure of the project compared with the present capabilities you have on hand to execute the project. The differences between the two will show the gaps that have to be filled to make the project a real success. Project managers can use the diamond framework model when making decisions regarding the selection of the right projects and their managers, allocating resources, planning, assessing risk, selecting the project management style, selecting the project's structure, building processes, and choosing tools [1]. Figure 1 below shows the Diamond model with its dimensions.

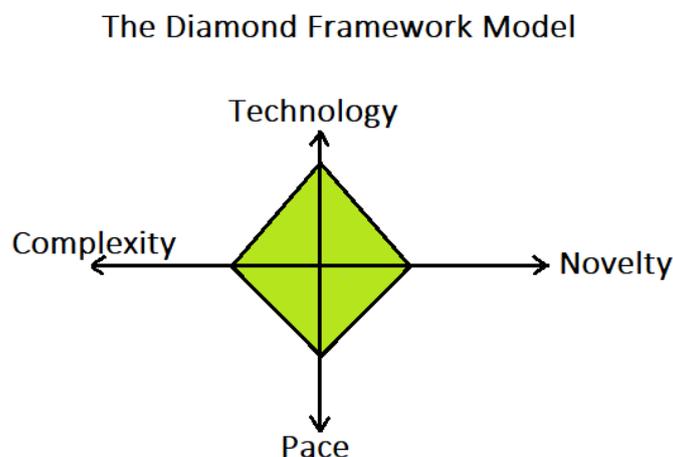


Figure 1: Dimensions of the Diamond Framework Model

**Novelty:** is defined by how new the product is to its markets and potential users. This dimension represents the extent to which customers are familiar with this kind of product, the way to use it, and its benefits. It also represents the uncertainty of your project goal—that is, how clearly you can define the requirements and customer needs up front. Product novelty includes three types: derivative, platform, and breakthrough 9. These categories determine which marketing approach is best and how much impact the product will have on project management. In essence, product novelty will affect three major issues: the reliability of marketing research, the time it takes to define and freeze product requirements, and the specific marketing strategies for the product.

**Technology:** The major source of task uncertainty is technological uncertainty. (Other sources might be the lack of team experience or tight budget constraints). Technological uncertainty has an impact on, among other things, design and testing, communication and interaction, the timing of design freeze, and the needed number of design cycles. It also affects the technical competence needed by the project manager and project team members. Four levels comprise technological uncertainty:

- Low-tech projects rely on existing and well-established technologies. The most typical examples are construction projects.
- Medium-tech projects use mainly existing or base technologies but incorporate a new technology or a new feature that did not exist in previous products. Examples include products in stable industries, such as appliances, automobiles, or heavy equipment.
- High-tech projects represent situations in which most of the technologies employed are new to the firm but already exist and are available at project initiation. Most computer and defense development projects belong to this category.
- Super-high-tech projects are based on new technologies that do not exist at project initiation. Although the mission is clear, the solution is not, and new technologies must be developed during the project. A good example is the moon-landing program.

**Complexity:** Project complexity is directly related to system scope and affects project organization and the formality of project management. Three typical levels of complexity are used to distinguish among project management practices: assembly, system, and array:

- Assembly projects involve creating a collection of elements, components, and modules combined into a single unit or entity that performs single function. Assembly projects may produce a simple stand-alone product (such as a CD player or a coffee machine) or build a subsystem of a larger system (such as an automobile transmission). They may also involve building a new organization that is responsible for a single function (such as payroll).
- System projects involve a complex collection of interactive elements and subsystems, jointly performing multiple functions to meet a specific operational need. System projects may build products such as cars, computers, or buildings, or they may deal with the creation of entire new businesses that include several functions.
- Array projects deal with a large, widely dispersed collection of systems that function together to achieve a common purpose (some-times they are called “systems of systems” or “super systems”). Examples of arrays include national communications networks, a mass transit infrastructure, or regional power distribution networks, as well as entire corporations.

**Pace:** Pace impacts the autonomy of project teams, the bureaucracy, the speed of decision making, and the intensity of top management involvement. There are four levels of pace: regular; fast/competitive; time-critical; and blitz

- Regular projects are those efforts where time is not critical to immediate organizational success.
- Fast/competitive projects are the most common projects carried out by industrial and profit-driven organizations. They are typically conceived to address market opportunities, create a strategic positioning, or form new business lines.
- Time-critical projects must be completed by a specific date, which is constrained by a definite event or a window of opportunity. Missing the deadline means project failure. Examples might be the launch of a space vehicle based on a specific cosmic constellation, or the Y2K project.
- Blitz projects are the most urgent, most time-critical. These are crisis projects. Solving the crisis as fast as possible is the criterion for success.

## 2. THE ADAPTIVE DIAMOND MODEL

Combining the specific project categories on each dimension creates the adaptive diamond model. The diamond shape provides a graphical illustration of a project according to its levels of novelty, technology, complexity, and pace [1]. Figure 2 below shows the Diamond shaped Framework model.

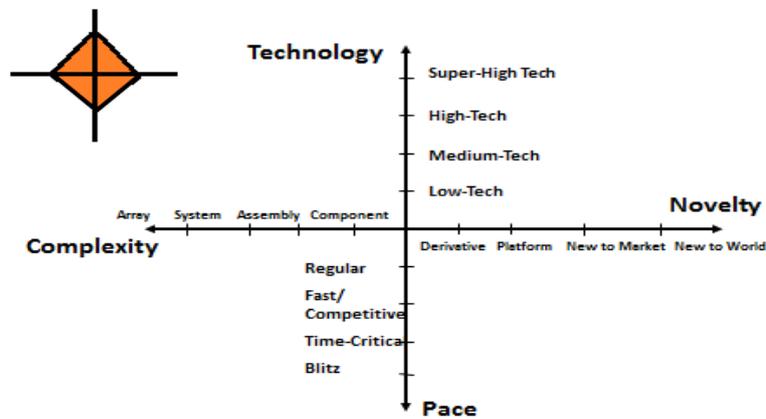


Figure 2: The Diamond shaped Framework

### The Required and Actual Project Management Style

The level of fit between the required and the actual management style often provides an explanation for project troubles or failure. It also gives you an opportunity to analyze the problem and offer recommendations for getting a project back on track [2] – [14]. Thus, the diamond can be used as a graphical tool to demonstrate gaps between how a project should be managed and how it was actually managed. As everyone knows, risk and opportunity go together. The greater the opportunity, the higher the risk. Balancing Benefit and Risk with the diamond model, managers can select the right project manager, assign team members, and identify how much management attention is needed. Thus, as managers make decisions on project selection, initiation, and resource allocation, they can look at the diamond as a tool for discussing the potential benefits and risks of each project proposal [1]. Figure 3 below shows the required and actual project management style for projects.

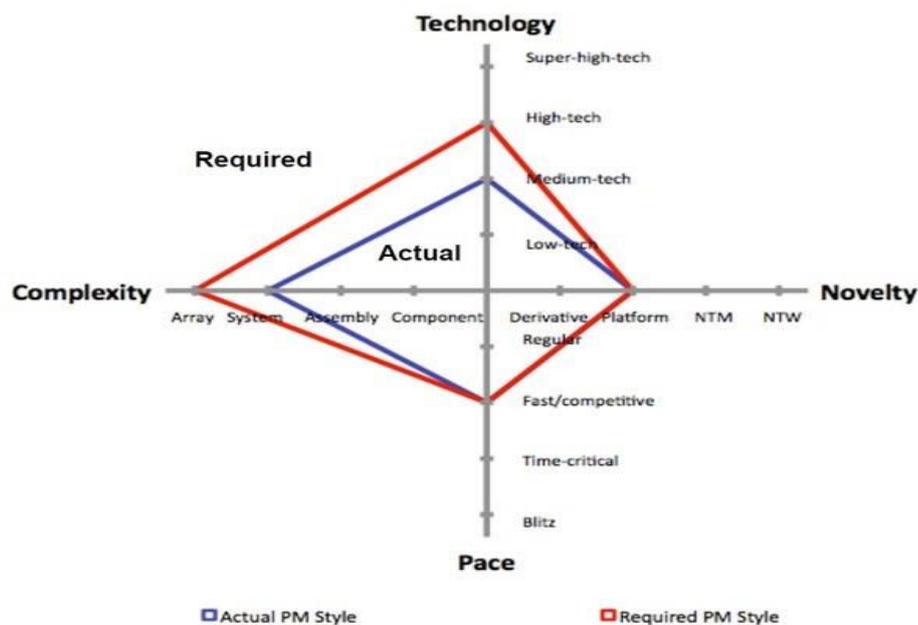
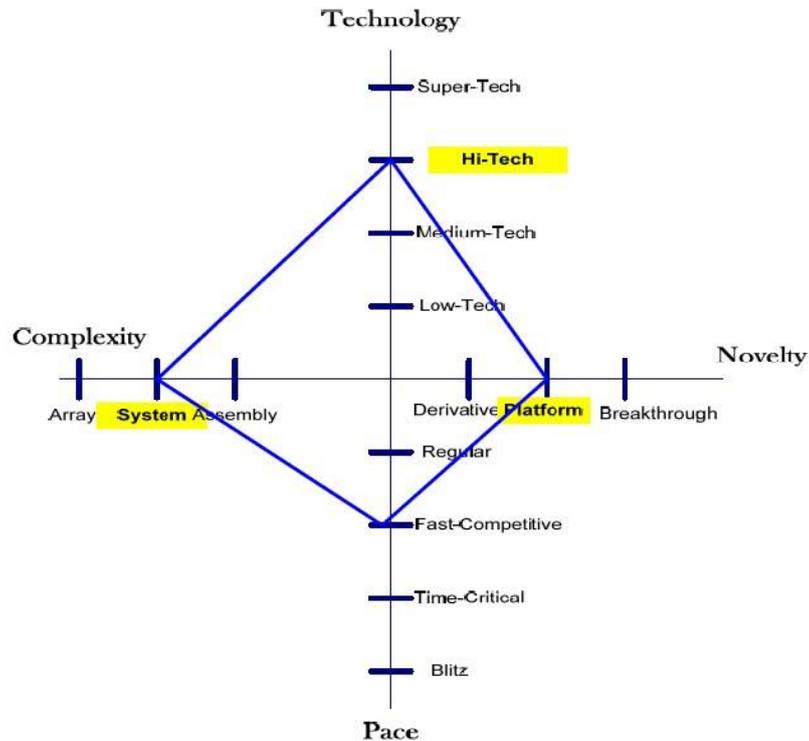


Figure 3: The required and actual PM style (Source: Shenhar, A.J. & Dvir, D. (2007))

**The Business Analytical Measures of the Diamond Framework Model**

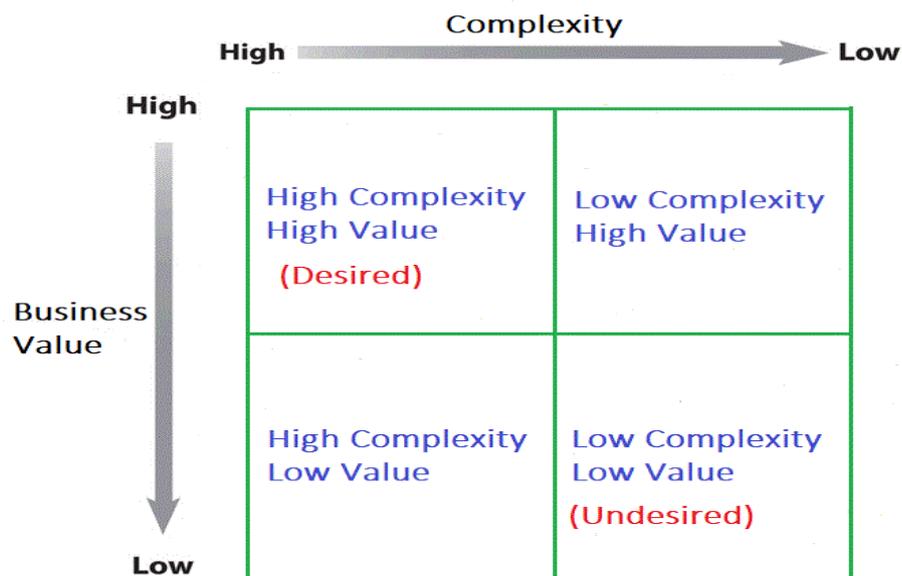
There are many business success measures that can be explained by the Diamond Framework model, as follows [1] [3] [5]:

1- The diamond framework model can explain the project management improvement, as shown in Figure 4 below:



**Figure 4: The Project Management Improvement using the diamond framework model**

2- The project complexity can be classified using the diamond framework model as shown in Figure 5 below:



**Figure 5: The Project Complexity Assessment**

3- The likelihood and impact matrix of the project can be classified by the diamond framework model as shown in Figure 6:

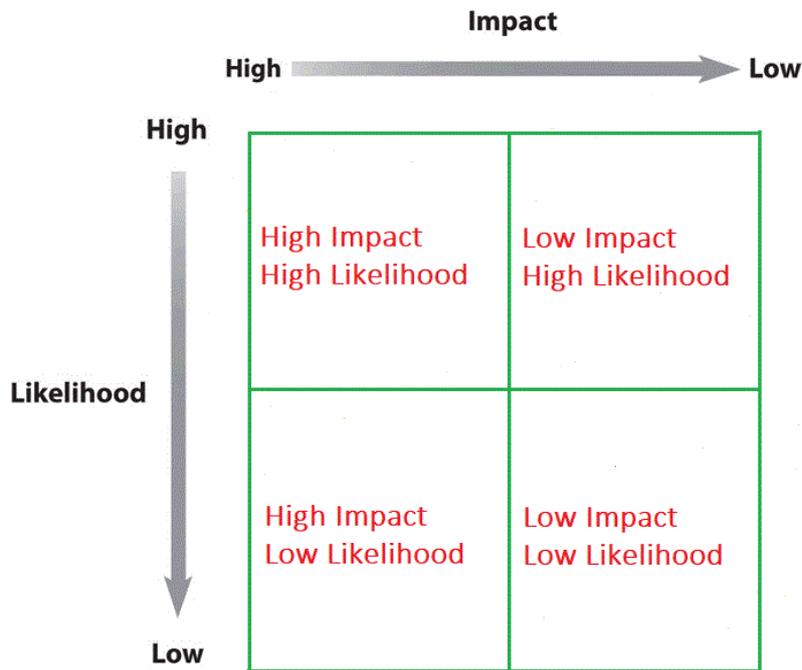


Figure 6: The likelihood and impact Assessment Matrix of the project by the diamond framework model

4- The Risk assessment can be shown by using the diamond framework model as shown in Figure 7 below:

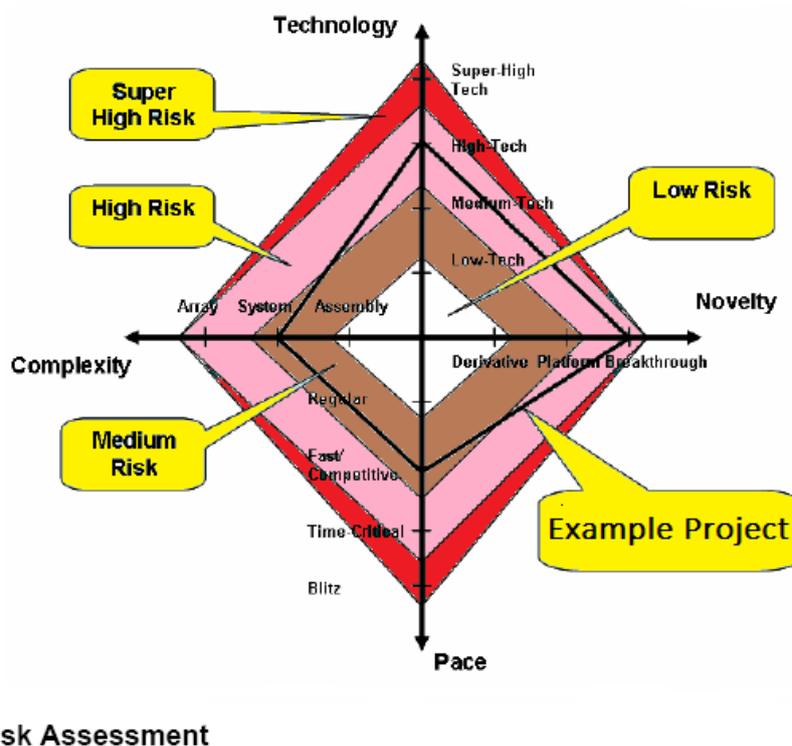


Figure 7: Risk Assessment using the diamond framework model (Source: Shenhar, A.J. & Dvir, D. (2007))

### **3. THE IMPACT OF THE DIAMOND FRAMEWORK DIMENSIONS ON PROJECT MANAGEMENT**

Each of the diamond framework dimensions affects project management in a different way, as follows [1]:

- Novelty affects the accuracy of market predictions, the ability to determine requirements, and the timing of requirements freeze. The higher the novelty, the less you can depend on marketing research.
- A higher technology level requires increased design and development activities, more design cycles, later design freeze, and better interaction among team members. A high technology level also requires that team members have higher technical skills.
- Complexity affects the organization and its procedures. The greater the complexity of a project, the more complex the organization will be and the more formal the procedures you will need.
- Pace requires increased attention to time deadlines. The faster the pace, the greater the autonomy you need to give the project teams and the more support they will need from top management.
- However, that no model can apply to all situations. Organizations may therefore need to develop their own way of classifying projects. For example, organizations may face other kinds of uncertainty, not only in the market or technology. They may need to pay specific attention to uncertainties associated with politics, economics, geography, and funding. Each of these uncertainties may have its own impact on project management. Similarly, some projects may face other types of complexity, regarding everything from vendor groups and customers to local or global network complexity.

### **4. THE IMPACT OF THE DIAMOND FRAMEWORK ON BUSINESS INNOVATION**

Project managers can use the diamond framework to foster business innovation. Map proposals on a matrix to show low-to-high benefit opportunity and low-to-high risk difficulty. They can approve projects with high opportunity and low risk and drop those with high risk and low opportunity. The kind of innovation embodied in the project will change the shape of the diamond and indicate the style of management the project needs [15] – [24]. An innovative product needs to bridge the gap between the early adopters and the early majority, buyers who accept the product as its technology becomes widely understood. The diamond framework can help management distinguish between the platform products that customers will ask for, and the breakthrough products the company can pursue to disrupt the marketplace and capture great rewards. Most established businesses have an existing project plan, most often based on the classic project model of define, plan, execute and termination. The problem is that almost no projects are so linear. Once project execution starts, reality will push some aspects back to the planning or definition stages. The diamond framework can predict the likelihood of these iterations by showing how far out on each axis the project is. With any given increment, the closer each of the four bases is to the center, the more likely it is that you can outsource that element. The further out on an axis an element goes the higher the risk and the greater the talent required making it work. Handle these risky aspects in-house or manage them internally if you hire outside expertise. Each industry has a different profile when mapped on the framework. Heavy equipment is different from pharmaceuticals, which is different from consumer goods and so on. Within each industry, any given customer has a different value proposition than any other customer. Customers' requirements will differ, as will their demands for features, support, and availability. Understanding your customers is the beginning of developing and running a successful project. The adaptive project management approach embedded in the diamond framework is more suited to the demands of the modern competitive environment than the traditional linear project management model. Meeting schedules, budgets and performance requirements remains important, but the larger goal of a project is to serve customer needs and generate good business results.

### **5. CONCLUSION**

The Diamond Framework Model, as presented by Shenhar and Dvir (2007), offers a four-dimensional model to analyze a project and apply the most appropriate management style. It is important to identify the correct level of the project in every one of the dimensions in order to adapt the fitting leadership form, managerial activities, and operational processes and procedures. The Diamond Framework (also called, the NTCP model) provides a graphical illustration of a project according to its levels of novelty, technology, complexity, and pace. The diamond model serves the following purposes:

- It shows clearly what type of project is at hand.
- It is an effective tool for analyzing the fit between the required and the actual project management styles. It is also useful for two-way communication between management and project teams.
- It can identify the major benefits and risks associated with the project.
- It can select the right project manager, assign team members.
- Its matrix can be used to find and approve projects with high benefit and low risk.
- It can enhance the project efficiency through meeting time and budget goals.
- It can improve the team satisfaction, retention, and personal growth.
- It can increase return on investment, market share and growth.
- It can enhance the opportunities for the future through new technologies, new markets, and new capabilities.

### REFERENCES

- [1] Shenhar, A.J. & Dvir, D. (2007). *Reinventing project management: The diamond approach to successful growth and innovation*, Boston, Massachusetts: Harvard Business School Press.
- [2] Aaron J. Shenhar, Dov Dvir, & Shlomo Alkaber. (2003). From a Single Discipline Product to a Multidisciplinary System: Adapting the Right Style to the Right Project, *System Engineering* 6, no. 3, 123–134.
- [3] Aaron J. Shenhar & Dov Dvir. (1996). Toward a Typological Theory of Project Management, *Research Policy* 25 (1996): 607–632;
- [4] Aaron J. Shenhar. (2001). One Size Does Not Fit All Projects: Exploring Classical Contingency Domains, *Management Science* 47, no. 3 (2001): 394–414;
- [5] Andersen, E.S. & Jessen, S.A. (2003). Project maturity in organizations, *International Journal of Project Management*, 21(6) 457-461.
- [6] Brockhoff, K. (2006). On the novelty dimension in project management, *Project Management Journal*, 37(3) 26-36.
- [7] Brun, E. & Saetre, A.S. (2009). Managing ambiguity in New Product Development Projects, *Creativity, and Innovation Management*, 18(1) 24-34.
- [8] Cavaleri, S. & Reed, F. (2008). Leading dynamically complex projects, *International Journal of Managing Projects in Business*, 1(1) 71-87.
- [9] Collyer, S. & Warren, C.M.J. (2009). Project management approaches for dynamic environments, *International Journal of Project Management*, 27(4) 355-364.
- [10] Dvir, D., Sadeh, A., & Malach-Pines, A. (2006). Projects and project managers: the relationship between project managers' responsibility, project types, and project success, *Project Management Journal*, 37(5) 36-48.
- [11] Kerzner, H. (2006). *Project Management: A System Approach to Planning, Scheduling, and Controlling*, 9th ed. Hoboken, NJ: John Wiley & Sons.
- [12] Leybourne, S.A. (2008). Improvisation and agile project management: a comparative consideration, *International Journal of Managing Projects in Business*, 2(4) 519-535.
- [13] Olausson, D. & Berggen, C. (2010). Managing uncertain, complex product development in high-tech firms: in search of controlled flexibility, *R&D Management*, 40(4), 383-399.
- [14] Naveh, E. (2007). Formality and discretion in successful R&D projects, *Journal of Operations Management*, 25(1) 110-125.
- [15] Rietsema, K.W. & Watkins, D.V. (2012). Beyond leadership, *International Journal of Business and Social Science*, 3(4) 22-30.

- [16] Scott-Young, C. & Samson, D. (2009). Team management for fast projects: an empirical study of process industries, *International Journal of Operations & Production*, 29(6) 612-635.
- [17] Abdulhafedh, Azad. (2017). Financing Public Transit in the US, Sweden, and the UK. *International Journal of Scientific & Engineering Research*, Volume 8, Issue 3. ISSN 2229-5518.
- [18] Shenhar, A., Dvir, D., Milosevic, D., Mullenburg, J., Patanakul, P., Reilly, R., & ... Thamhain, H. (2005). Toward a NASA-Specific Project Management Framework, *Engineering Management Journal*, 17(4), 8-16.
- [19] Shtub, A., Bard, J.F., and Globerson, S. (2004). *Project Management: Processes, Methodologies, and Economics* (2nd Ed.), Prentice Hall: Englewood Cliffs, N.J.
- [20] Van Aken, E.M., Farris, J., A., Glover, W.J., & Letens, G. (2010). A framework for designing, managing, and improving Kaizen event programs, *International Journal of Productivity and Performance Management*, 59(7), 641-667.
- [21] Abdulhafedh, Azad. (2021). "The Analysis of a Corporate Sustainability." *Journal of City and Development*, vol. 3, no. 1 (2021): 6-11. doi: 10.12691/jcd-3-1-2.
- [22] Demirkesen, S., & Ozorhon, B. (2017). Impact of integration management on construction project management performance. *International Journal of Project Management*, 35(8), 1639-1654.
- [23] Abdulhafedh, Azad. (2016). Prototype Road Surface Management System. *World Journal of Engineering and Technology*, 4, 325-334.
- [24] Silvius, A. G., Kampinga, M., Paniagua, S., & Mooi, H. (2017). Considering sustainability in project management decision making: An investigation using Q-methodology. *International Journal of Project Management*, 35(6), 1133-1150.