THE POSSIBILITY OF APPLYING THE INTERNATIONAL STANDARD ISO 21500:2012 IN PROJECT MANAGEMENT (A CASE STUDY IN THE MINISTRY OF CONSTRUCTION, HOUSING AND MUNICIPALITIES)

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ABSTRACT

This research seeks to review the requirements of project management in accordance with the standard (ISO 21500:2012) and to identify the possibility of its application in project management for a construction company. The Seventh Likert scale is used to calculate the size of the gap between the actual application and the requirements of the specification. Also, the (fish bone) diagram has been adopted as a quality control tool to show the reasons that led to the emergence of requirements with high gaps, and through the analysis, the researcher reached several conclusions, the most important of which is that the percentage of conformity It is (70.29%), which indicates the possibility of applying this specification in the company, as it indicates the equivalent of (5) levels out of (7) and this reflects an acceptable level for the application of the standard. Also, the researcher concluded that the percentage of requirements for areas with large gaps was(29.71 %) and includes three areas included (risk, communication, time) and by identifying weaknesses, it was concluded there is a weakness in the documentation and application of the main plans for project management and sub-plans such as (the communication plan), in addition to the lack of Paying attention to opportunities and threats in the required form and adopting them in updating timetables when implementing projects, which leads to increased risks and the presence of wasted times. Priorities have to avoid their occurrence during any stage of the project.

Keywords: *Construction project management, ISO 21500:2012, procurement, communication, cost, time.*

INTRODUCTION

This research shows an attempt to apply the international standard specification in project management (ISO21500:2012)) in a scientific and practical way, by analyzing and evaluating the gap between the standard standards for the application and documentation of the project management system according to the methodology of the requirements of the specification and the system adopted by the company, as finding a methodology Specific to project management for production and service organizations in general is a contribution to achieving the efficiency and effectiveness of the level of performance of project management provided by these organizations to their beneficiaries. The fourth topic deals with conclusions and recommendations.

Research Methodology

This topic explains the research methodology, which includes (the research problem, its objectives, the importance of the approach that will be adopted in its preparation and clarification of the methods of collecting data and information and how to address them).

Research problem

The rapid changes and developments in the business environment have imposed many challenges on organizations, so it has become necessary to use modern means and methods in line with these changes, from these modern methods of methodology of the International Standard on Project Management (ISO21500:2012) and the problem of research is to answer about the following questions?

1 -Is it possible to apply the international standard ISO21500 in the company?

2 -What are the weaknesses in implementing and documenting a project management methodology, working on diagnosing them, and then proposing corrective measures to address them?

3 -What are the opportunities to improve the project management methodology used in the company that increases the efficiency of the application?

Through this research, an attempt will be made to find acceptable answers to the questions mentioned above, and accordingly, suggestions will be made.

Research importance

The importance of research is to try to employ positive results in improving the company's performance by developing appropriate treatments to reduce the gap between the actual reality and the requirements of the international standard. The importance of the research can be determined as follows:

1 -Explaining and highlighting the importance of the international standard ISO 21500 in project management.

2 -Working on developing administrative and engineering capabilities, in addition to technical skills within the company, because this contributes to the implementation of projects in a more accurate manner, as well

as providing a work system that contributes to avoiding and addressing errors, which will reflect positively on the implementation of projects, which increases the level of customer satisfaction.

Research aims

The research seeks to achieve the following objectives:

1 -Establishing corrective and preventive measures in case there is any gap that appears by comparing the actual application with the requirements of the specification.

2 -Identifying and knowing the main reasons that led to the emergence of the gaps accurately to diagnose the reasons that formed weaknesses and thus caused shortcomings in work and seek to address them.

3 -Suggesting a project management methodology that the company can adopt to avoid any work problems and try to work according to a standard system.

Data collection methods and analysis tools

The check list, which is the basic tool for data collection and analysis, has been adopted. It was designed in accordance with the requirements of the standard, based on the ten knowledge areas of the standard, interspersed with the 39 processes, to determine the level of conformity between the actual and the standard. The Likert Scale was also used and a relative weight was placed for each requirement of The requirements of the specification, as relative weights were given to the requirements of the specification in order to assess the extent to which the company satisfies the application of the project management approach, the weight was placed (6) for the case of application and total documentation, and weight was placed (0) for the case of non-application and documentation, as for the quality control tool, a scheme was used Fish bone (Ishikawa)

The following statistical tools were used: (Al-Tamimi, 5:2010), (Al-Baldawi, 2008:71)

1. Calculate the arithmetic mean or the total average through the following relationship:

$$\bar{x} = \frac{\sum xifi}{\sum fi} \text{.....(1)}$$

Since:

x : ¯expresses the arithmetic mean or average

xi: expresses weights

fi: expresses repetitions

2. The percentage is found based on the following mathematical relationship

$$\textbf{Percentage} = \frac{\sum xifi}{\sum fi \times 6} \textbf{ X 100 .....(2)}$$

Since:

xi: represents weights

fi: represents the frequencies

6: The highest weight in the scale (indicating the complete state of the application and documentation)

3. Calculate the size of the gap through the following relationship

Gap size for each requirement checked = 1- Percentage of match……..(3)
Then the quality tools represented by the cause-and-effect diagram (Ishikawa) for the domains with high gaps are used for the purpose of analyzing the causes of these gaps.

THEORETICAL PART

Project Definition

Definitions of the project have varied, according to the purpose for which the project is established. They differ according to the views of researchers, scholars, specialists and international bodies concerned in the field of project management (Khair El-Din, 2012:27), and some of these definitions will be presented as follows:
The International Organization for Standardization (ISO) defined a project as "a unique process that contains a set (or set) of coordinated and controlled activities with a start and end date and directed towards the achievement of a specific goal in accordance with the specified requirements and includes time, cost and resources (Al-Ali, 2009: 23).
It is "a series of tasks that begin and end in a clear manner with the aim of creating a unique product or service, as the project must have clear goals and visions" (Brewer & Dittman, 2010: 14).
The American Institute of Project Management defined a project as a temporary endeavor to find a single service or product (Najm, 2013: 16).

Project management

Project management has many definitions, including:
It is the art of directing and coordinating financial and human resources during the project life cycle by using modern technologies to achieve the goals set for the purpose of completing the project, taking into account all of the quality, cost and time" (Slack, 2010: 466).
It is also defined as the application of specific knowledge, tools, techniques, and skills to create a unique product or service (Kenny, 2003:43).
Also, project management was defined according to the international standard ISO 21500:2012 in the third item in paragraph (3.3) as the application of methods, tools, techniques and competencies to the project, to achieve integration in the different stages of the project life cycle.

The importance of project management

There are many reasons that explain the importance of project management to help organizations achieve the goals they seek, and these reasons are (Kerzner, 2009:3):

1 .Defining functional responsibilities to ensure that all necessary activities are accounted for. The project management approach can provide organizations with the opportunity to assign responsibilities to a particular task and remove unnecessary activities and tasks.

2 .Measuring the planned completion of the project.

3 .Reduces the need for continuous reporting because it clarifies the tasks and responsibilities of all administrative levels.

4 .Determining the duration of the activities in a more easy way, as this can help in focusing the resources on the appropriate paths and using them efficiently.

5 .It helps to create a broader awareness of the business environment.

6 .It helps to anticipate problems and work to avoid them.

7 .It helps to define a methodology for analyzing the trade-off between standards and objectives.

Concept and definition of ISO21500:2012

The ISO 21500:2012 standard was developed as an answer to the growing globalization of projects, due to the need to develop common principles and bring them into line with the most applicable standards and management systems in the world. On this basis, a common vocabulary and terminology has been created about the basics of project management to create a common understanding and perception about the basic project management processes and similarly, it is requested to apply to any type of organization, including public or private organizations, and any type of project regardless of Complexity, size, or duration (Brioso, 2015: 77).

The standard specification (ISO 21500:2012) is defined as the latest standard developed by the International Organization for Standardization in the field of project management, as project management metrics in general are one of the important tools in improving project management performance (Papke, 2010:650).

Reasons for the emergence of a standard specification for project management

In the past decades, many processes and technologies have been developed, covering all aspects of project management from inception to closure. However, project management remains a very problematic endeavor, projects continue to fail to meet the expectations of stakeholders because they are still disappointed with the results of projects, projects continue to show lower levels of success due to several reasons (Varajão et.al, 2016:1):

1 .Underestimating the importance of the project by the relevant parties.

2 .The project does not conform to the agreed specifications.

3 .Risks that are not reassessed, controlled or managed by the project
4 .Weakness in physical and temporal planning.
5 .Inappropriate implementation methods.
6 .Lack of effective project management and this is a common feature of failed projects.

The appropriate implementation of what is agreed upon in the project reference document will improve the performance of the project management, which leads to improved speed, quality, reduced errors, lower cost due to less rework, reduced delays and obstacles, better use of time, and customer satisfaction.

Advantages of ISO 21500

This specification is characterized as providing guidance in project management with a high level of description of procedures and concepts, as it is one of the best guidelines within project management applications, and the specification can be used by any type of organization because it is (Calderon, A., Ruiz, M. & O'Connor, RV, 2017: 400-401:

1 -It can be prepared as a reference for checking.
2 -It represents a relationship to link the various operations of project management and business.
3 -They can be prepared as checklists to test the knowledge and skills of project managers and workers when implementing and supervising projects.
4 -It is a common reference between the different methods, applications and models.
5 -It is considered a common language of understanding in project management.

The ISO 21500 standard has been formulated in four items represented in scope, terms and definitions, project management concepts, project management processes, and an informative facility. These four items define the recommended project management processes, in a general and purposeful manner and can be used for any type of project in any organization. Or entity, and it defines five groups of operations related to the project management perspective, which are (initiation - planning - implementation - control - closing) and on the other hand related to project management applications, it identifies 39 operations divided into ten areas in project management called field totals.

Practical part and field survey

Through the results of the checklists for the ten knowledge domains, a final table can be organized to obtain the percentage of the level of application and the total gap, as in Table (1) below:

The total percentage of conformity with the requirements of the standard	The total percentage of the gap when conforming to the requirements of the standard	Total	10	9	8	7	6	5	4	3	2	1	No.
29.71%	**%70.29**	**10 groups**	**communications**	**Purchases**	**quality**	**Risks**	**Cost**	**time**	**Resources**	**scope**	**Stakeholder**	**Integration**	**Areas of project management operations according to the specification**
		39	**3**	**3**	**3**	**4**	**3**	**4**	**6**	**4**	**2**	**7**	**The number of operations for each field according to the specifications**

		206	**13**	**21**	**16**	**14**	**16**	**20**	**40**	**19**	**6**	**41**	**The number of main input and output paragraphs (requirements) for each field according to the specification**
			3	**4**	**5**	**3**	**5**	**3**	**4**	**5**	**5**	**4**	**average**
			%55.1	**%70.6**	**%77**	**41.6 %**	**85.4 %**	**55.8 %**	**%73.7**	**88.5 %**	**80.5 %**	**%74.7**	**Percentage of application for each field**
			%44.9	**%29.4**	**%23**	**58.4 %**	**14.6 %**	**44.2 %**	**%26.3**	**11.5 %**	**19.5 %**	**%25.3**	**Gap percentage for each field**

It is evident from Table (1) the three areas (time, risk, and communication) have the lowest application rates, which is 3 of the Seven Likert scale, and the highest gap rates, which range from (44.2 to 58.4) in the application of the standard items, and it includes eleven processes Of the main processes in project management consisting of 47 paragraphs of the main inputs and outputs as requirements for those processes whose application was examined, while the other seven areas (integration, resources, procurement, cost, scope, stakeholders, quality) were their application rates ranging from 4 to 5 of the Seven Likert scale, and gaps ranging from (11.5 to 29.4), which include 28 major processes in project management consisting of (159) paragraphs of the main inputs and outputs as requirements for those processes, and to clarify the percentage of areas with high gaps and the percentage of areas with The few gaps relative to the total number of requirements amounting to 206 paragraphs of the main inputs and outputs for project management processes according to the requirements of ISO 21500, the researcher intended to make the simplified diagram of Figure (1) below:

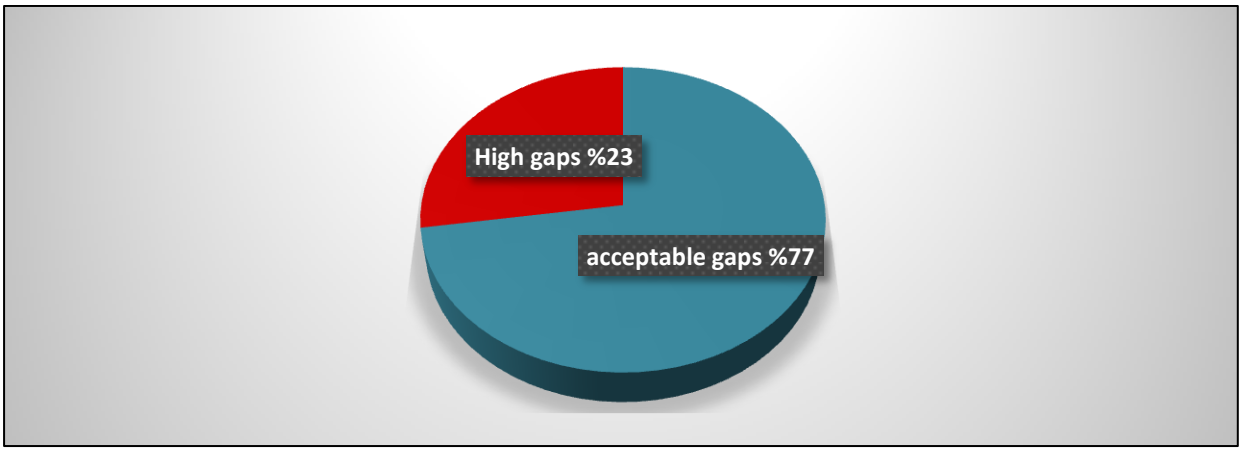

Figure 1 High gaps and acceptable gaps for cognitive domains

Depending on the results in Table (1), a chart was made to illustrate the differences between the percentages of the gaps in the extent of application of the ten domain aggregates in the ISO 21500 standard, as shown in Figure (2).

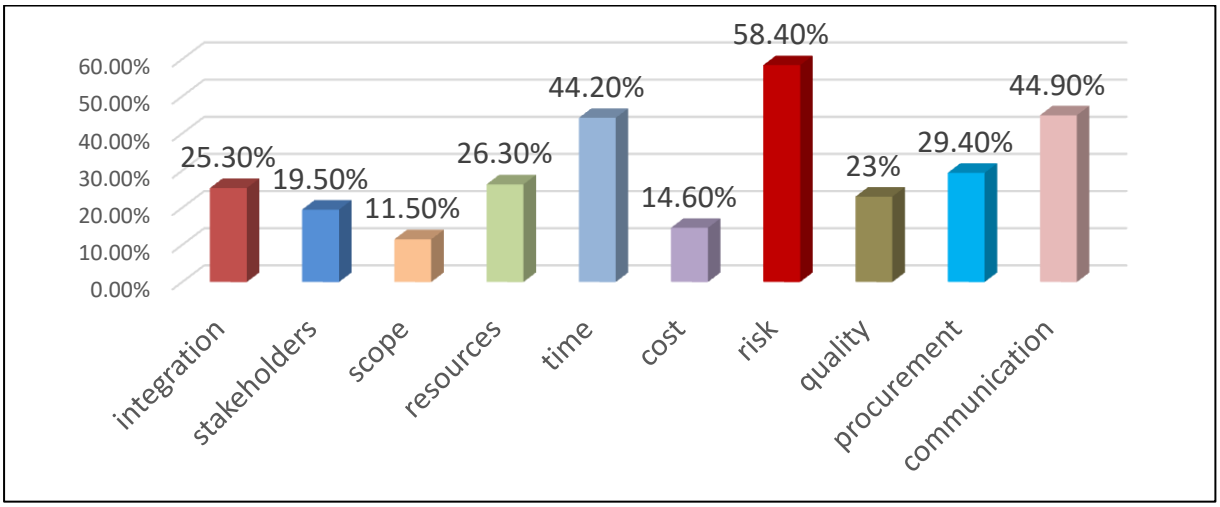

Figure 2 the percentages of the gaps

High gap analysis

The cause and effect diagram or what is known as the fishbone diagram (Ishikawa) will be adopted for the purpose of identifying the sub-causes leading to the emergence of high gaps in the knowledge areas, as in Figure (3), based on the brainstorming process as shown in Table (3) below:

Table 3 Sub-reasons for the emergence of the high gap for the application of the requirements of the areas (risk, time, communication)

No.	requirement	Sub causes	Gap
1	Risks	1. Weakness in updating the risk register 2. Failure to prioritize risks 3. Lack of effective and realistic response to risks 4. Weakness in developing emergency plans to be used in the event of danger	58.4%
2	communications	1. Weak job description, which led to weakness in the distribution of roles and information in project plans 2. Delay in distributing information 3. The record of stakeholders is not relied upon in the distribution of information and communications. 4. Weakness in updating the communication plan 5. Adopting routine procedures in communications	44.9%
3	time	1. Lack of attention to opportunities, threats and their effects 2. Weakness in updating schedules 3. Delayed response in making adjustments to time plans 4. There is no update to describe the reciprocal relations according to the changes that occur 5. Lack of interest in describing activities and their relationship 6. Late material processing	44.2%

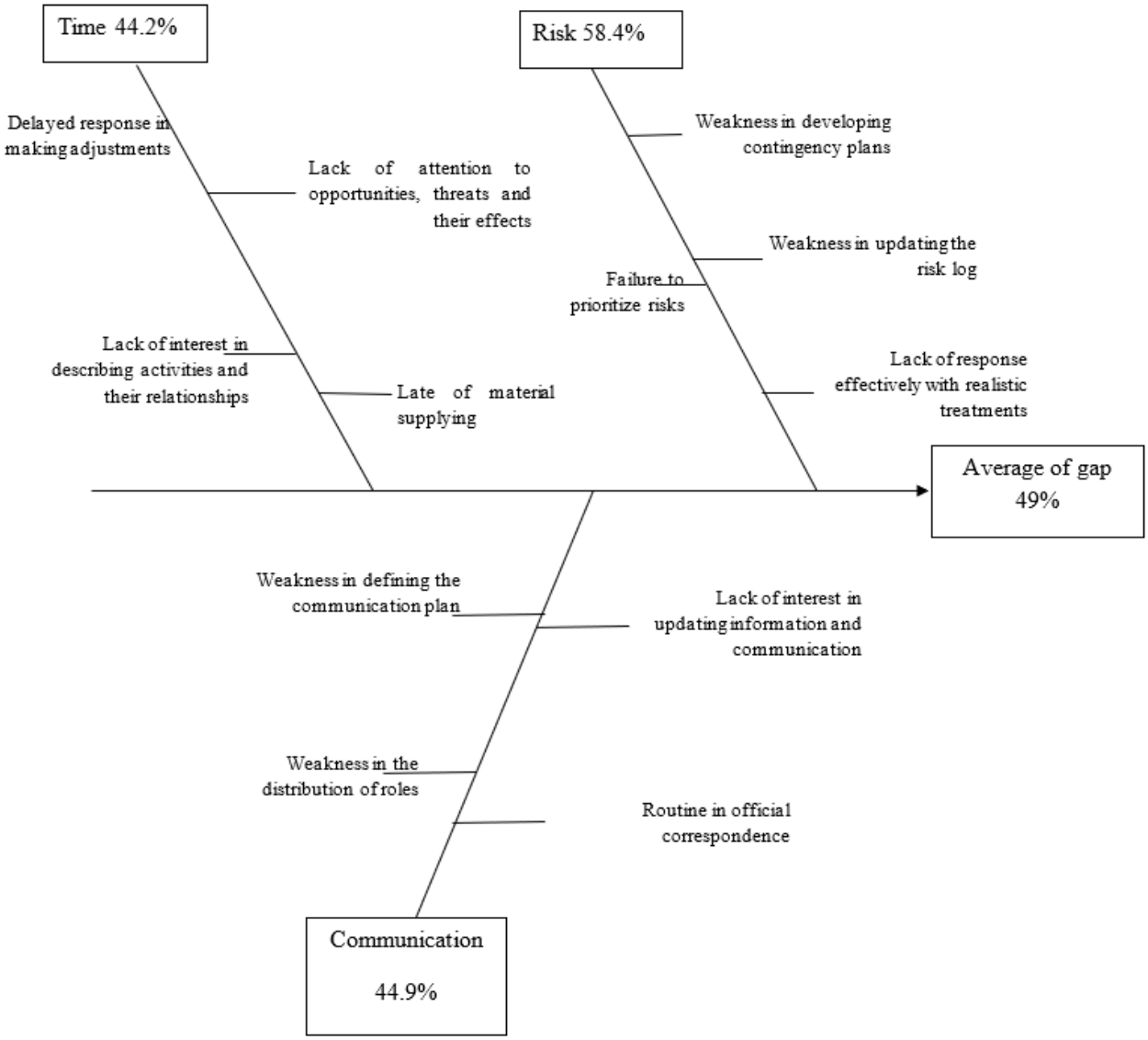

Figure 3 reasons of the high gap

CONCLUSIONS

After addressing the theoretical aspect of project management and the international standard ISO 21500, and reviewing the practical aspect through the results of the standard checklists, analyzing them and knowing the reasons for the high gaps in them, many conclusions were reached, the most important of which are:

1 .The company suffers from a significant weakness in communications as a result of the lack of clear distribution of roles and responsibilities, which leads to overlap between tasks

2 .Weakness in documenting the procedures and instructions for evaluating suppliers from all financial, administrative and technical aspects to identify the preferred among them in a documented manner, as the senior management retains the powers of purchasing and contracting with suppliers without granting them to the Engineering Department.

3 .After the areas with high gaps were analyzed using the (Ishikawa) diagram, it appears within the field of communications that there is a weakness in the distribution of roles, and a lack of reliance on the record of stakeholders in the distribution of information and communications. Weak job description, and with regard to the time domain, the reason for the gap is the delay in responding in making adjustments to the time plans, as well as the lack of interest in describing the activities and their relationship. As for the risks, the lack of interest in the risk register and the lack of prioritization, which leads to increased exposure to them during the project life cycle and thus the occurrence of delays at work and difficult to treat.

4 .The percentage of requirements for knowledge domains with high gaps was 47 items within the domains of (risk, communication and time), which is equivalent to 23% of the total number of requirements for all 206 domains, which is a good indicator of the extent of application after overcoming the weaknesses that cause these gaps.

5 .Through the percentage of conformity with the requirements for the application of the standard (ISO 21500:2012) for the research sample, which amounted to (70.29%), we conclude the possibility of application as this percentage is equivalent to the value (5) as an average out of (7) levels, which indicates a level Acceptable by the application and documentation of the requirements of the specification in the project.

RECOMMENDATIONS

Many recommendations have been addressed, as the researcher sees their relevance with the conclusions obtained, in order to achieve the possibility of applying the requirements of the standard specification (ISO 21500:2012 and as follows:

1 .The senior management should seek to commit to spreading the culture of international methodologies used globally in project management at various administrative levels, with the aim of informing workers about the objectives and concepts of project management, and to start preparing and documenting a manual of instructions, procedures and methods of work and project implementation, with the participation of functional departments in That's all.

2 .Paying attention to evaluating, documenting and controlling the risk register with prioritizing them to avoid their occurrence during any stage of the project

3 .Seeking to accurately distribute roles and responsibilities and update the stakeholders' register to rely on it in developing the communications plan and raising its efficiency.

4 .Through the conclusions within the previous studies, specifically the conclusions in this research, the researcher recommends the possibility of adopting the ISO 21500 standard as a basic methodology in project management because it adds requirements that enhance typical project management processes to reach final delivery outputs as required, and raise performance levels in project management.

REFERENCES

1. Al-Ali, Abdul-Sattar (2009), “Public Projects Administration”, first edition, Al-Masira House for Publishing, Distribution and Printing, Amman, Jordan.
2. Al-Baldawi, Abdel Hamid Abdel Majid (2008), "Applied Statistical Methods", first edition, Dar Al-Shorouk for Publishing and Distribution, Amman, Jordan.
3. Al-Tamimi, Aseel Musa Jassim (2010) “Examination of the requirements of project quality management according to the specification (ISO, 1000, 2003)”, Master of Science in Business Administration, College of Administration and Economics / Al-Mustansiriya University
4. Brioso,X. Integrating ISO 21500 Guidance on Project Management, LeanConstruction and PMBOK,2015, Procedia Engineering 123 (2015) 76 – 84
5. Calderon, A., Ruiz, M. & O'Connor , R.V,(2017) Coverage of ISO 21500 Standard in the Context of Software Project Management by a Simulation-Based Serious Game, PP.400-401
6. ISO 21500, (2012) (Guidance on project management, first edition)
7. Kenny , John , “Effective Project Management For Strategies Innovation and Change in an Organizational Context ” , Project Management journal , March 2003 , pp 43-53.
8. Kerzner,H,” Project Management: A Systems Approach to Planning, Scheduling, and Controlling” ,10th Edition , Wiley,(2009).
9. Khair El-Din, Musa Ahmed (2012), "Contemporary Project Management", first edition, Dar Wael for Publishing and Distribution, Amman, Jordan.
10. Najm, Najm Abboud (2013), "An Introduction to Project Management", first edition, Al-Warraq Publishing and Distribution Corporation, Amman, Jordan.
11. Papke-Shields,k., Beise,C.& Quan,J, Do project managers practice what they preach, and does it matter to project success?, International Journal of Project Management 28 (2010) 650–662
12. Slack Nigel & Chambers , Stuart & Johnston , Robert. , "**Operations Management**" , 3rd edition, An imprint of Pearson Education , England , 2004
13. Varajao,j,…etc,2017,"ISO 21500:2012 and PMBoK 5 processes in information systems project management" journal homepage p: (216-222).