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Knowledge Management in Projects

Leandro Pereira, PhD, PMP, ROI, António F Gonçalves, MSc
Business Research Unit – BRU-IUL
ISCTE - Instituto Universitário de Lisboa
Lisbon, Portugal
Leandro.Pereira@iscte-iul.pt
agoncalves.email@gmail.com

Abstract— **Knowledge Transfer in Project-based Organizations has been recognized as productivity and economic growth promoters that are currently not properly managed. Therefore, it is critical to investigate the importance of knowledge regarding its acquisition, use and transfer across all departments of an organization. The main objective of this work was to evaluate how modern organizations from different business sectors manage and share their knowledge by following the Knowledge Management and Transfer Life-Cycles when developing their projects. Organizational surveys were performed to employees working in project management within Portuguese organizations (or with representation in Portugal,) from multiple business sectors and holding different hierarchical positions. The present study revealed that most Companies can identify, capture and retain the relevant knowledge, and apply it to the development of other projects. However, the steps corresponding to the transfer of knowledge between collaborators within the organization and to the evaluation/review of the benefit generated by the transferred knowledge are not being followed. The inexistence of a Project department or a team dedicated to projects within the organization seems to be limiting the effectiveness of knowledge management and transfer.**

Keywords— knowledge; projects; knowledge management; project management; knowledge transfer.

I. INTRODUCTION

Knowledge transfer in project management is increasingly recognized as a promoter of economic growth and productivity but at present is managed inefficiently [1][2].

This work aims at highlighting the importance of knowledge, how it is acquired, used and shared across all departments of a modern organization. It is fundamental to use tools in knowledge management that facilitate the way projects success is reached, making it efficient and thus boosting customer satisfaction. With globalization and market competitiveness, modern organizations need to adapt their internal policies and procedures to this new Era called Knowledge Economy. Therefore, organizations are now focused on understanding and managing the knowledge of people so they can increase their competitiveness in the markets. Today organizations face an overflow of information that, in most cases they don't know how to integrate or even understand the importance of the knowledge management and transfer.

Knowledge management has been recognized by many authors as a lever for growth and development of organizations, nothing is more competitive than its ability to produce innovation and this component will always be connected with management of intellectual capital [3]. In this way, knowledge management arise to manage this intellectual capital, which allows to create an organization of people's ideas, transforming a tacit knowledge in a tangible asset for the organization. This tacit knowledge is powered by the experience acquired over time that allows an individual to confront new challenges and create several solutions. Fialho et al., 2006 argues that the main purpose of knowledge management is to boost and evaluate the ability of an organization in dealing with the abundant flow of information and the ability to adapt to changes [4].

The Knowledge management strategy is also defined by its life cycle, in the existence of several processes that are assumed, to have a role in organizations. Different models have been introduced by several authors and have been reviewed [5].

Due to the diversity of models created, the latest and referred as an advanced life cycle model of knowledge management was taken into consideration in the present work. This model reflects an evolution over time presented by Evans, and Dalkir Bidian [6], involving seven stages: identify, create, store, share, use, learn and improve.

The knowledge transfer is one of the elements of the knowledge management process. Argote and Ingram have defined knowledge transfer as the process through which a group, department or division is affected by the experience of others. The organizational knowledge transfer can be observed through changes in knowledge or in the performance of the receiver. Knowledge transfer occurs at various levels, including between individuals, from individuals to the explicit sources, from individuals to groups, between groups, across groups, and from group to the Organization [7].

According to the report of PMI-Pulse of the profession, successful organizations are distinguished by the ability to turn ideas into actions providing the competitive advantage they need, recognizing as main formula and effective knowledge transfer [2]. With the experience gained over the years, the most effective organizations in knowledge transfer, tended to improve the project results. Organizations wishing to acquire skills and capabilities to create a good knowledge transfer, must comply with accuracy the following steps of the life cycle of knowledge transfer:

1. **Identifying:** Determine what knowledge needs to be transferred

2. **Capturing:** Accumulate the essential knowledge that needs to be transferred

3. **Sharing:** Establish methods for transferring the knowledge

4. **Applying:** Use the knowledge that is transferred

5. **Assessing:** Evaluate the benefits of the knowledge that is transferred

According to several authors, despite extensive literature on knowledge transfer, little is known about how individuals share knowledge within the framework of project management [8–10]. There are some studies that relate the influence of knowledge management on projects performance [8–10].

The positive influence of knowledge management on the performance of projects was evidenced in studies conducted and published [8–10]. The influence of learning on the performance of the projects was also presented in studies of quality management and operational management, based on tools like Six Sigma [11]. A study highlights the importance of knowledge management from projects to create added value for customers [12].

Effective knowledge management in organizations is an increasingly essential tool to achieve success, productive and successful results. Following this concept is essential to develop and apply efficient and effective methodologies to enhance the success of projects, enabling the development of a strategy to meet the client needs.

According to a study conducted and reported recently by the Project Management Institute [2], about project management performed through knowledge transfer, there are few companies that manage and implement the last two phases of the Knowledge Transfer life cycle. This study presented at the PMI report focused on regions of North America, EMEA (Europe, Middle East and Africa), Asia and the Pacific Islands, Latin America and the Caribbean).

This work aimed to investigate how modern Portuguese organizations from different business sectors generate and share the knowledge management and transfer life cycle phases for the development of their projects for best performance and efficiency.

II. RESEARCH OBJECTIVES

A. Method

1) Sample and context of data collection

Organizational environment surveys targeting business sectors and resources with diversified hierarchical positioning were carried out to obtain a collection of real and accurate information that could assist in understanding how organizations currently look at the management and knowledge transfer topic and whether they intend to potentiate it in the future. The unit of analysis in this study was people working within organizations that manage projects.

2) Measuring instrument

This study was based on a qualitative strategy using surveys (via website) to obtain a rapid collection of data. The survey was outlined according to the four-point Likert scale, which includes as optional answers: Strongly disagree, partially disagree,

Agree, Strongly Agree. The survey was designed in a positive format to ensure homogeneous interpretation of the text. The survey included 38 statements which were divided into 9 sections.

The first part of the survey identifies the General data regarding the individual and his/her company (company type; name; department; hierarchical positioning; number of years). The second part includes two general questions and the third part provides a query that was outlined according to the phases of the management and knowledge transfer life cycles. Before launching the investigation, we conducted a run trial using 7 people, to get their opinion about the clarity and objectivity of affirmations, size and structure of the survey.

3) Data collection procedure

After improvement and validation, the survey was released via Google forms to several e-mail contacts and disseminated through LinkedIn platform. The survey was accessible for 3 weeks.

III. RESULTS AND DISCUSSION

This section includes the presentation and discussion of the results collected from the Survey which aimed to investigate how the modern Portuguese organizations of various business sectors generate and share, in an effective manner, the five stages of the transfer of knowledge to develop their projects, in search of a better performance and efficiency. From 170 contacts made, 51 responses were obtained, corresponding to a response rate of 30% (Fig. 1).

Most respondent (68%) belong to medium and large enterprises, differing in its typology as multinational (41%), international (16%) and national (43%) companies (Fig. 1).
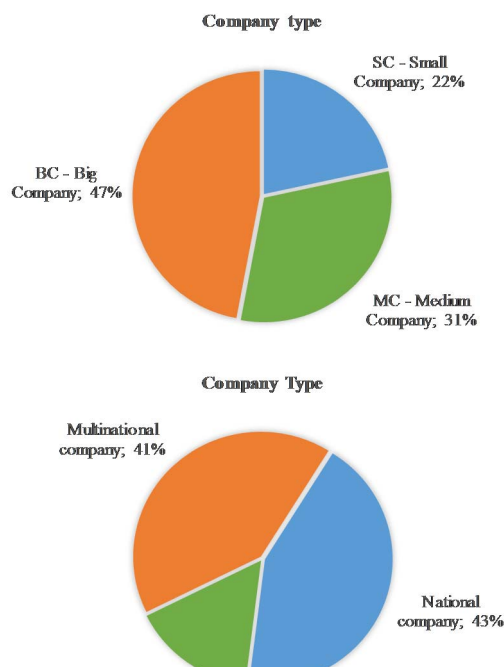

Fig.1. Answers relating to general data of the company/respondent.

Each individual was asked to indicate his/her hierarchical position and the number of years of activity in the company by setting the following intervals: less than one year (<1); one to three years (1-3) and more than three years (>3). The results showed that 49% of individuals are middle managers, 35% are technical project managers and only 16% are top managers. It should be noted that the large majority (82%) belongs to the Organization for more than three years (Fig. 2). From the 51 individuals, 65% work in organizations that have a Department or a team dedicated to projects (Fig. 3).
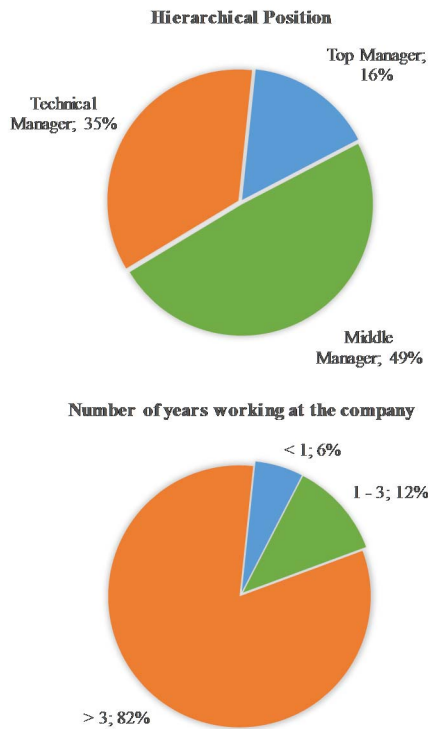
recognize the Knowledge as a valuable asset for the development of projects in their organization.

In phase 1 of the knowledge management life cycle (Identify and/or Create), one can see that the majority of respondents agrees that the identification and creation of knowledge are key elements for project development, through teams and project managers (Fig. 5). It was also observed that most respondents (87%) are able to identify the knowledge of the project team and direct it to each project type.

Fig. 2. Answers relating to General data of the company/respondent.
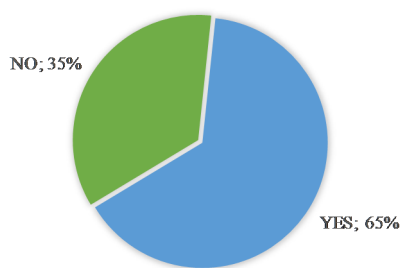
Fig. 3. Answers relating to section 2 of the investigation data.
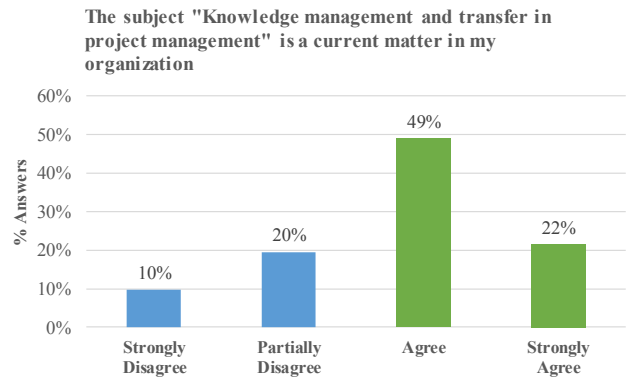
Fig. 4. Responses of general scope concerning the knowledge management life cycle.
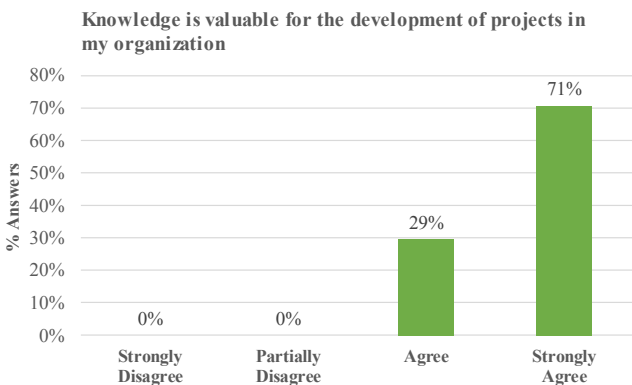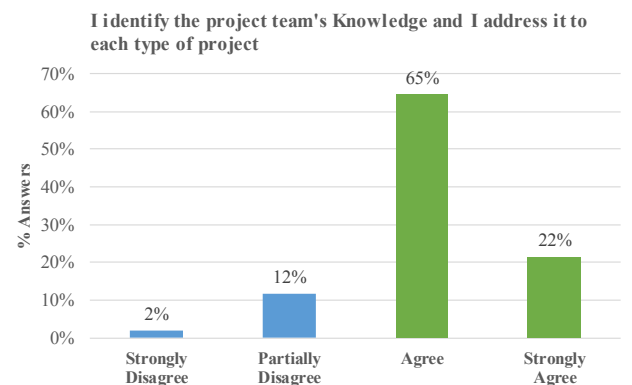

Fig. 5. Responses concerning the knowledge management life cycle – Phase 1: identify and/or Create.

According to the results shown in Fig. 4, one can see that management and transfer of knowledge in project management is a present/actual theme in most organizations. On the other hand, it is essential to highlight that the unanimity of respondents

The frequent participation of project teams and managers in group meetings and brainstorming's are invaluable for troubleshooting and development of projects, and this is

reflected by the unanimous opinion of respondents agreeing with these statements (Fig. 6).

Most respondents believe that the quality of information extracted from knowledge, contributes to problem-solving and decision-making, as well as, for the development of projects (Fig. 7).

Regarding phase 2 of knowledge management life cycle (Store), as expected, the clear majority of respondents (92%) believes that the acquired knowledge is critical to their organization. A small percentage partially disagreed (8%). Analyzing this fraction in more detail, the disagreement is not dependent on the size, type of business and department but rather on the number of activity years in the company. Three out of four respondents who disagreed partially are in the company for less than three years. In addition, two of the four respondents mentioned that the organization where they work does not hold a department or a team dedicated to projects (Fig. 8).

A clear majority of respondents (86%) revealed that knowledge is stored on paper and/or digital format. This seems to be related with the absence of a team or department dedicated to projects since five of the six respondents do not store the knowledge, mentioning their absence, regardless of the type and size of company, department, hierarchical position and number of years of activity at the company (Fig. 8).

I participate in/ conduct constant brainstormings and group meetings within each project

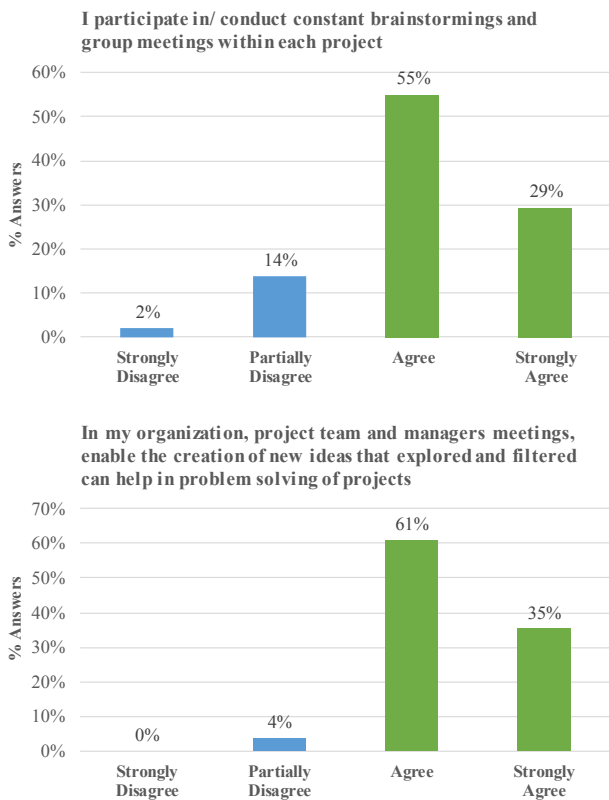**In my organization, project team and managers meetings, enable the creation of new ideas that explored and filtered can help in problem solving of projects**

Fig. 6. Responses concerning the knowledge management life cycle – Phase 1: identify and/or Create.

I identify the information extracted from Knowledge in order to solve problems/decision making that arise in the course of projects

In my organization, the quality and relevance of the information extracted from Knowledge contributes to the development of the projects

Fig. 7. Responses concerning the knowledge management life cycle – Phase 1: identify and/or Create.

The storage of the acquired Knowledge is fundamental to my organization

In my organization, the storage of Knowledge is done in paper and/or digital format
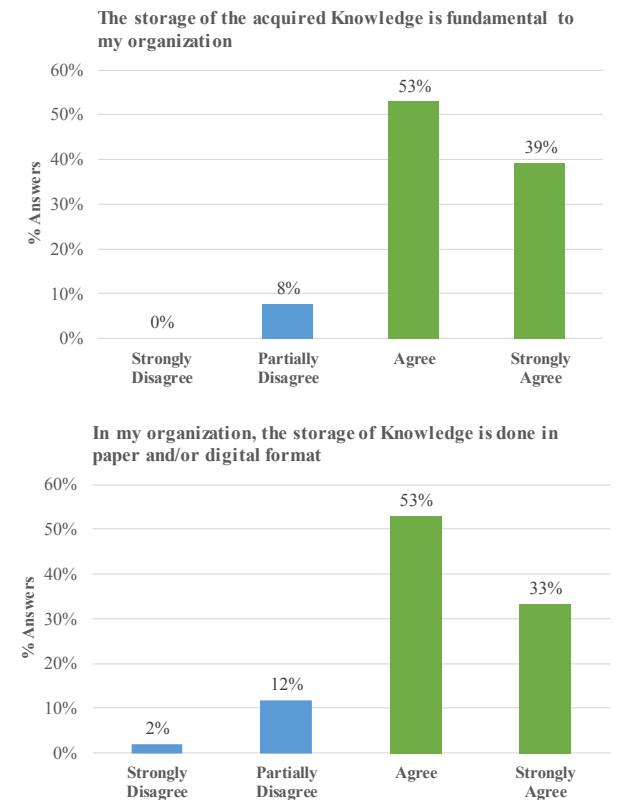

Fig. 8. Responses concerning the knowledge management life cycle – Phase 2: Storing.

Regarding the knowledge that is stored, only 61% of respondents agreed that this knowledge is used on future projects (Fig. 9). Eleven of the twenty respondents who disagreed (39%) have no department of projects in their organization. Most respondents (67%) registers knowledge in databases for their use in future projects. Ten of seventeen respondents do not have a Department or a team dedicated to projects in their organization.

This study revealed that 67% of respondents perform the registration and storage of knowledge transferred by stakeholders (Fig. 10). Eleven of the seventeen respondents who disagreed do not have department or team dedicated to projects in their organization. It should be noted that 73% of respondents answered that there is a repository for records of knowledge in their organization (Fig. 10).

The results regarding phase 3 of the knowledge management life cycle (Sharing) can be found in Fig. 11-14.

In Fig. 11, only 55% of the respondents agree and 45% disagree with the statement, of which 37% disagree partially and 8% totally disagree. It is important to highlight that surveys replies were provided by technical project managers and intermediate managers, which may indicate that such network sharing can be accomplished mostly by top managers.

Regarding the existence of sharing and transfer of knowledge between managers and the project team, 98% of respondents answered positively (Fig. 12).
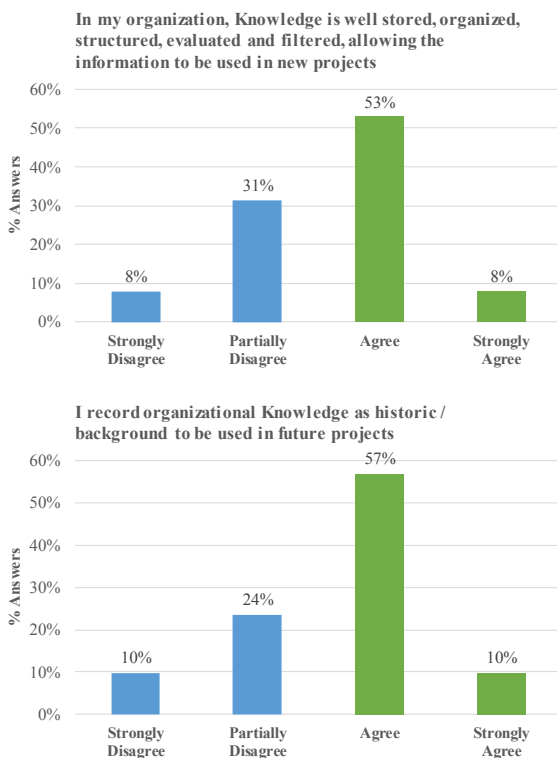
In my organization, Knowledge is well stored, organized, structured, evaluated and filtered, allowing the information to be used in new projects

Strongly Disagree 8%, Partially Disagree 31%, Agree 53%, Strongly Agree 8%

I record organizational Knowledge as historic / background to be used in future projects

Strongly Disagree 10%, Partially Disagree 24%, Agree 57%, Strongly Agree 10%

Fig. 9. Responses concerning the knowledge management life cycle – Phase 2: Storing.

I record and store the Knowledge transferred by Stakeholders

Strongly Disagree 4%, Partially Disagree 29%, Agree 53%, Strongly Agree 14%

In my organization, there is repository to consult the records of knowledge

Strongly Disagree 12%, Partially Disagree 16%, Agree 57%, Strongly Agree 16%

Fig. 10. Responses concerning the knowledge management life cycle – Phase 2: Storing.

There is a knowledge-sharing network among different departments of my organization in order to enrich the development of projects

Strongly Disagree 8%, Partially Disagree 37%, Agree 43%, Strongly Agree 12%

Fig. 11. Responses concerning the knowledge management life cycle – Phase 3: Sharing.

I share and transfer the Knowledge between the Manager and the Project team

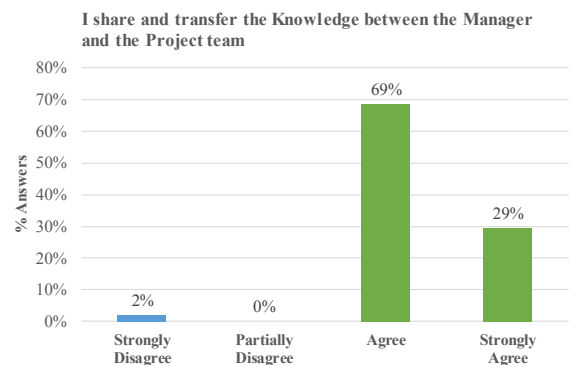Strongly Disagree 2%, Partially Disagree 0%, Agree 69%, Strongly Agree 29%

Fig. 12. Responses concerning the knowledge management life cycle – Phase 3: Sharing.

Although most organizations encourage employees to share and transfer knowledge (79% of respondents answered positively to this statement), there are still 22% who disagreed. It is important to stress that 7 out of the 11 respondents replying negatively to the statement are inserted in organizations that do not have a department or team dedicated to projects (Fig. 13).

In Fig. 14 it is possible to observe that 81% of respondents agree that project managers are open to knowledge transfer from their teams for project's success. Noteworthy, the 20% of respondents in disagreement are inserted in organizations that do not have a team dedicated to projects or a Department.

Fig. 15 relates to statements classified by the respondents based on the five phases of the knowledge transfer life cycle and that are integrated into the phase Share of knowledge management life cycle. Contrarily to the data presented in the report of the Project Management Institute carried out in the regions of North America, EMEA (Europe, Middle East and Africa), Asia and the Pacific Islands, Latin America and the Caribbean [2], this study revealed that the majority of Portuguese companies or with representation in Portugal follow steps 1, 2 and 4 (with 74.5%, 74.5% and 86.3% of positive replies, respectively) of the Knowledge Transfer life cycle, corresponding to the identification of the relevant and valued knowledge, its capture and retention, and finally its application. Steps 3 and 5 corresponding to the transfer of knowledge with others and to the evaluation of the value or benefit of knowledge transfer are following behind with percentages of 62.7% and 60.8%, respectively. Further studies will be needed to identify the reason why organizations are not so effective in these two steps.

Regarding phase 4 of the knowledge management life cycle (Use), i.e. the use of knowledge stored and shared, 79% respondents replied that they use this knowledge in problem-solving and decision-making during the course of a project. Half of the respondents answering negatively, do not have a Department or project team organization. The majority of respondents (83%) agreed that the application of knowledge allows the improvement of managers and project teams skills (Fig. 16).
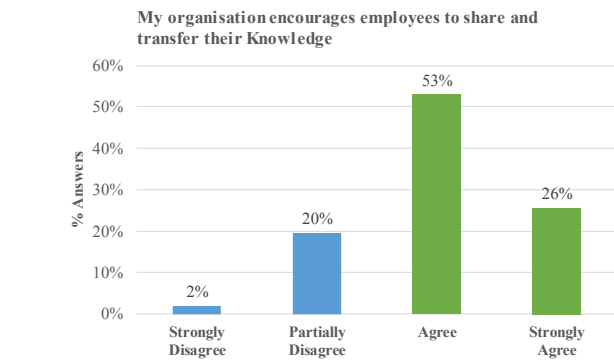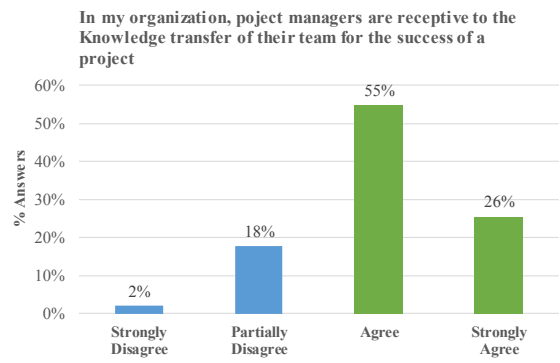

Fig. 14. Responses concerning the knowledge management life cycle – Phase 3: Sharing.
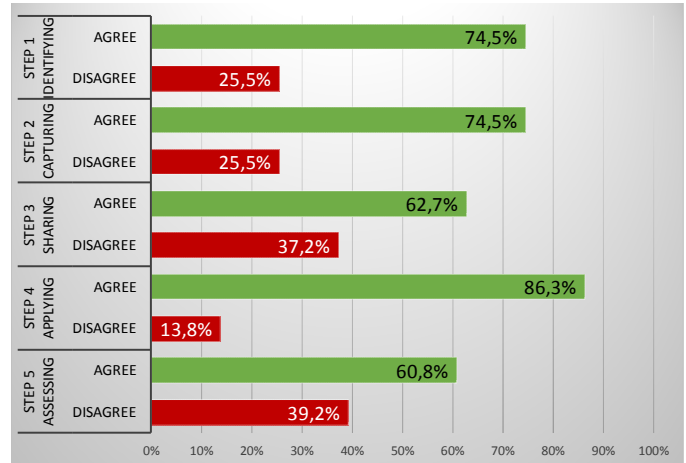

Fig. 15. Statements which were classified by the respondents based on the five steps of the knowledge transfer life cycle.

Fig. 13. Responses concerning the knowledge management life cycle – Phase 3: Sharing.
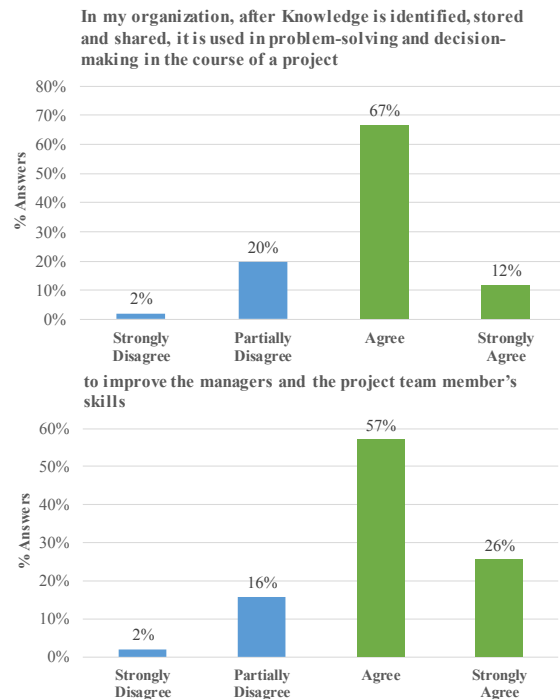

Fig. 16. Responses concerning the knowledge management life cycle - Phase 4: Use

With regard to phase 5 of the knowledge management life cycle (Learn), 61% of respondents agree that the knowledge used and shared in previous phases, is subsequently reviewed and improved for the benefit of new projects. It should be highlighted that the high percentage of discordant replies (39%) was given by top managers, middle managers and technical project managers, most of which belonging to multinational organizations (Fig. 17). The vast majority (94%) agree that the learned knowledge contributes positively to the professional maturity of employees.

The majority of respondents (90%) believe that learning improves managers and project teams' knowledge for the benefit of future projects (Fig. 18). Regarding the knowledge learned, 69% agree that it allows employees to strengthen their experience and professional maturity; the 31% disagreeing are in the Organization for more than 3 years (Fig. 18).

Results in Fig. 19 show that 61% of respondents consider that their organizations refine and improve the knowledge, registering it for future use in projects. Noteworthy, 39% of respondents do not the practice it, the reason being impossible to know from this study. However, the majority (94%) considers relevant to improve the knowledge for the development of projects in their organization.

Data presented in Fig. 20 shows that 63% of respondents perform the registration of lessons learned to improve the positive points and minimize/eliminate the negative ones.
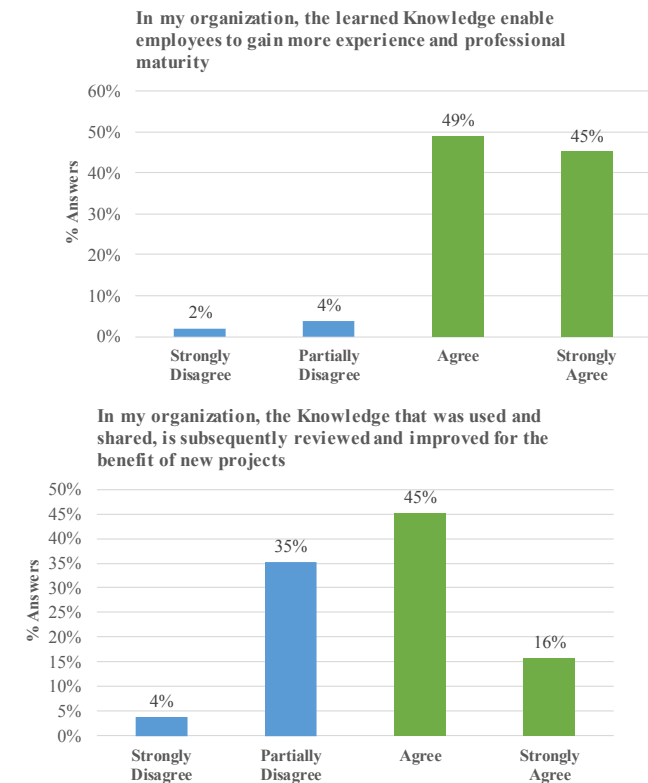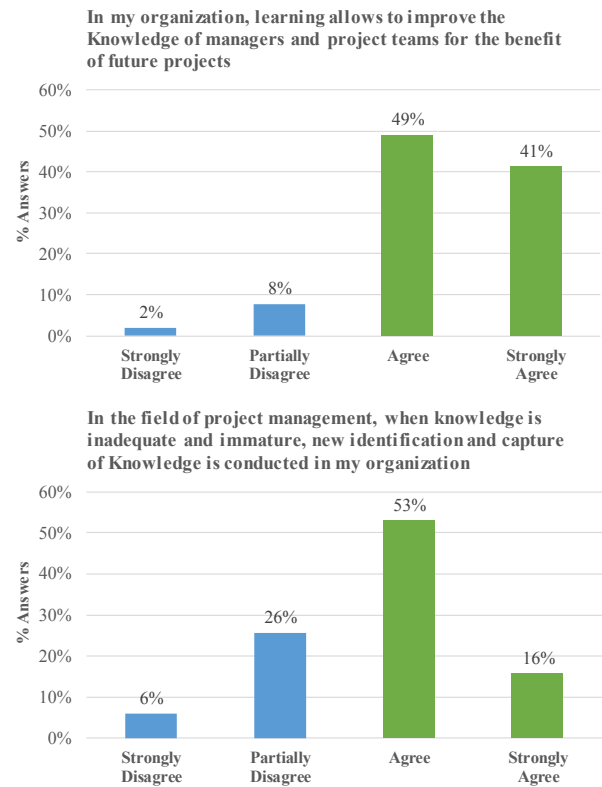

Fig. 18. Responses concerning the knowledge management life cycle - Phase 5: learning.

Fig. 17. Responses concerning the knowledge management life cycle - Phase 5: learning.
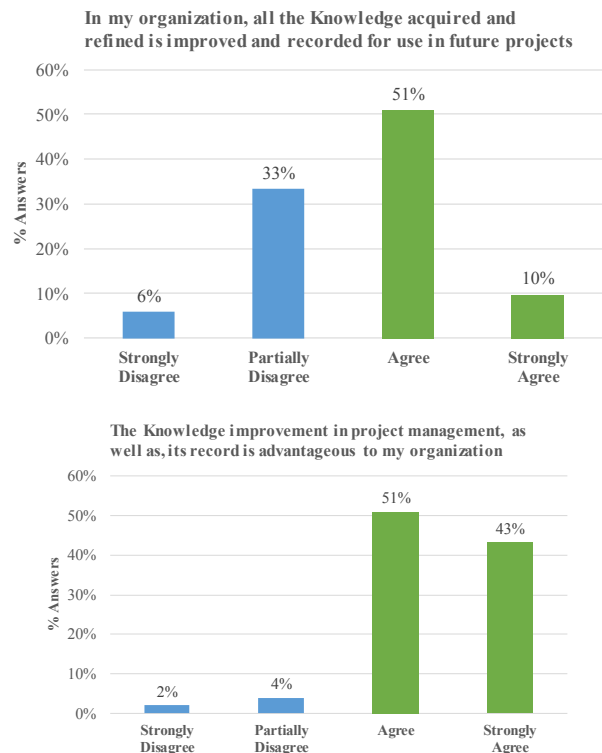

Fig. 19. Responses concerning the knowledge management life cycle - Phase 6: Improve.

In my organization, the lessons learned are recorded to improve the positives aspects and minimize/eliminate the negative aspects

In my organization, there are tools for the record of the entire historic of lessons learned while managing a project
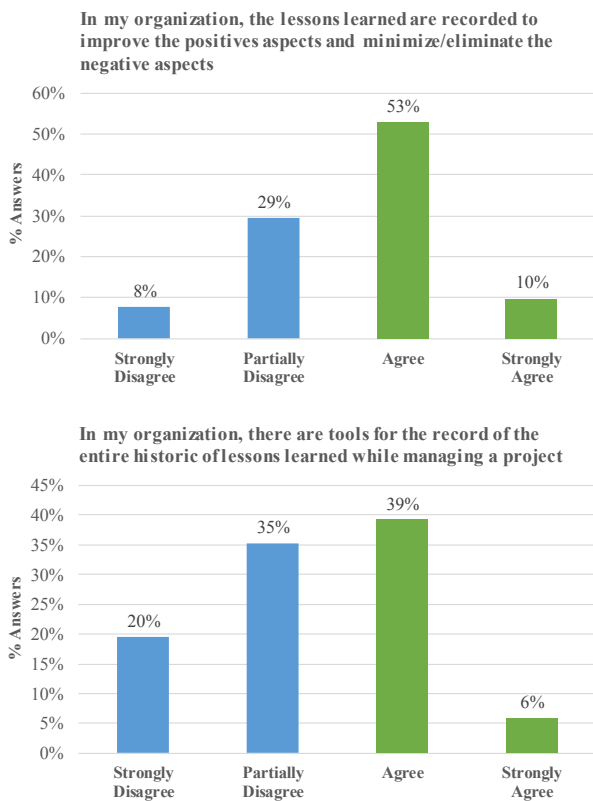

Fig. 20. Responses concerning the knowledge management life cycle - Phase 6: Improve.

The remaining respondents (37%) do not do it. These negative responses are correlated not with the existence of a Department or team dedicated to projects in the organization, but rather with the lack of tools for recording the lessons learned in the field of project management (55%).

IV. CONCLUSION

This study investigated how modern Portuguese organizations from different business sectors generate and share the life cycle phases of the management and transfer knowledge. The results generated from organizational climate surveys revealed that most Portuguese companies or with representation in Portugal perform the identification of relevant and valuable knowledge, its capture and retention, as well as, its application in other projects. However, the stages corresponding to i) knowledge transfer among employees within the Organization (Share), and ii) the evaluation of value or benefit of the knowledge transferred (Evaluation), are not being practiced. The lack of a project department or a team dedicated to projects within the organization seems to be limiting the effectiveness of knowledge management and transfer. Future studies will be needed to understand the reasons for the inefficiency management of knowledge transfer.

It is important that organizations create conditions that promote the knowledge transfer within employees from different hierarchical positions, through informal meetings, brainstorming's, workshops, team building, allowing them to define suitable strategies for developing future projects successfully. For this, it is essential the implementation of simple and effective tools, internal sharing networks across all departments of the Organization, covering all stakeholders, for registration and management of knowledge and lessons learned.

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