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Assessing the role of knowledge and project management in the competitiveness of manufacturing firms in Baja California

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Abstract. This article analyses the Knowledge Management (KM) and Project Management (PM) practices of manufacturing firms based in Baja California to determine their level of importance in generating competitive advantage in the manufacturing sector in Baja California. Key questions researched in this paper are: 1) How is KM managed through information technologies and organisational systems, ensuring empirical and industrial success? and 2) How do PM strategies increase competitiveness in the Baja California manufacturing sector? The research analyses currently-implemented management systems used for improved KM and PM, based on knowledge and new advantage orientation. One of the limitations found in this research is that several firms do not adopt standardised policies relating to knowledge procurement and development. Although competitiveness is perceived as vital for organisations, the combination of KM and PM are not yet fully developed and integrated into organisational processes to increase competitiveness. It is found that KM and PM have influence and correlations with competitiveness.

Keywords. Knowledge management, knowledge management strategies, project management, competitiveness, manufacturing success, Mexico case study.

1. Introduction

Throughout history, knowledge has been handed down from generation to generation using various mechanisms, including scripture, storytelling and, more recently, the capturing of lessons learnt through electronic means. However, with the passage of time, this has changed and, although it is essential that the communication of knowledge from employee to employee exists during every day business activities, it is commonly not achieved in different business situations. Knowledge sharing is the most complex and demanding activity in the KM process, as it is often voluntary on the part of the knowledge provider [1], meaning that individual knowledge is regularly not useful to the entire organisation and may only be useful to the knowledge recipient. In this sense, KM becomes necessary at all levels of the organisation because it allows for the formalisation and accessibility of experience and knowledge, combined with information and data which generates the new skills of employees, increasing organisational performance and developing innovation and creativity throughout departments and processes [2, 3].

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However, in complex industrial environments, such as experienced in the Baja California manufacturing industry, where technology has evolved significantly and the need for information is increasing every moment, the constant demand to increase competitiveness has been studied and examined from both KM and PM perspectives. For example, researchers and industrialists have examined the complex infrastructures, processes, techniques and tools needed for the strategic management of people, using collaborative technologies and processes that optimise the action of knowledge sharing [4, 5]. Research has also been completed into the use of electronic databases and applications that allow for the transfer of information and its use in the most appropriate way, simplifying the work of companies and generating value through management information and specific activities during projects.

This research aims to analyse and determine the influence of knowledge management and project management to the perceived competitiveness by employees operating in manufacturing firms in Baja California. This will focus on the procedures, tools and strategies used by firms in implementing knowledge and project management controls to improve competitiveness, based on the assumption that it is part of the organisational process.

2. Literature review

2.1. Knowledge management

In the 1980s, organisations began to appreciate the importance of employee and organisational knowledge. However, it wasn't until 1987, when the concept of knowledge management was first explicitly introduced, with the first book on the topic entitled 'Managing Know-How' [6]. Since then, the topic has been widely researched by academics and industrialists in different industries. It is widely acknowledged that KM is the formalisation, dispersion and acquisition of experience and knowledge, used to generate new skills, increase performance and innovation [2], where workers are motivated to use collected knowledge by interpreting data and information to develop skills and achieve the common goal(s) of an organisation.

In the complex manufacturing industry where organisations are increasingly dependent on technology, it is essential to have highly trained employees (human capital), adopting effective strategic management of people, using specific technologies and processes that optimise the action of knowledge sharing [7]. This has become a fundamental aspect of all manufacturing firms operating in the region. Knowledge sharing has contributed to the increased use and development of user-contributed knowledge-based databases [8], making it more simplified for organisations and their employees to innovative and use collective intelligence towards common objectives. For KM processes to be successful, the voluntary exchange of knowledge by employees is the most demanding part of the process and, with it being voluntary [1] in nature, the exchanged knowledge is often individual and may not be useful for the entire organisation. Therefore, it is imperative to keep knowledge up-to-date and eliminate obsolete knowledge, thereby applying the knowledge built and shared to generate new added value to the organisation with the human resource as a business base.

2.2. Project management

Although the management of knowledge, mentioned above, is based on effective information management, PM is directly related, because when using the above elements, it is possible to properly manage the knowledge and give sense to a project.

In recent years, project management has evolved, becoming more complex and knowledge-dependent than it has been in recent years [9]. From a traditional PM approach, project managers and teams were typically focused on efficiency, operational performance and meeting time and budget goals. In today's dynamic environment, increased global competitiveness requires finding new ways to make projects more powerful, employing competitive strategies. In this paper, we describe the importance of these activities perceived by employees based in manufacturing firms in Baja California, Mexico, by identifying the relationship between project management and competitiveness.

2.3. Competitiveness

Competitiveness refers to the ability of a company or industry to produce goods with specific quality patterns, efficiently using resources that similar industries use during a certain period [10] and designing strategies and methods to increase the ability to enhance and improve economic results. The human, economic and natural resources related to the productivity of a region or country are those that define its competitiveness. There are several concepts and approaches appropriate to implement the analysis of competitiveness, such as:

- Competitive advantage;
- Productivity;
- Comparative advantage;
- Resources and sustained advantage;
- Model of 5 forces of competition; and
- Systemic competitiveness.

3. Methodology

3.1. Research approach

The approach taken to complete this research is quantitative, since data has been collected to test the hypotheses raised on the 3 existing variables, based on numerical measurement and statistical analysis. To establish patterns in behaviour of firms in the manufacturing industry, questionnaires were applied with the purpose of deducting whether efficient knowledge management and project management applied to firms increases competitiveness, as shown in Figure 1.

The scope of this article is correlational, since variables are applied together to obtain a successful result. Knowledge management and project management practices are investigated to explore their ability to generate competitiveness within the manufacturing industry in Baja California.

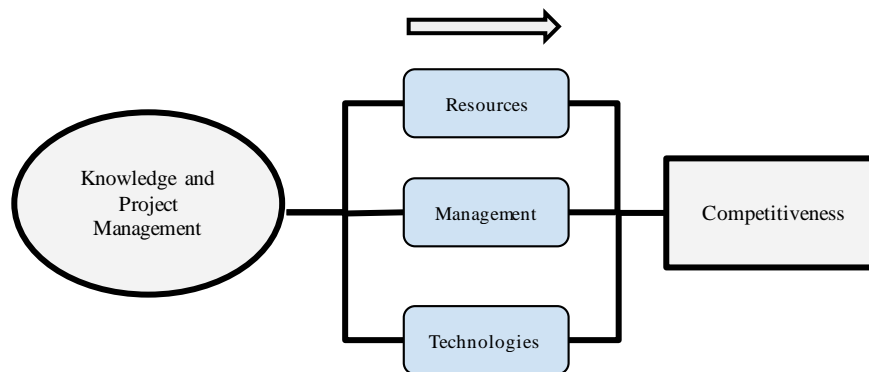


Figure 1. Research definition.

3.2. Research questions and goals

- How does the use of knowledge management influence competitiveness in manufacturing industries based in Baja California?
- How does the use of project management influence competitiveness in the manufacturing industries based in Baja California?

4. Results

4.1. Structural Equations Model

To carry out adequate validation of the assumptions raised from the theory, the analysis of structural equations was carried out using SPSS AMOS 21 software [11]. For this, it was previously determined that the answers to the questionnaires were aligned to a Likert scale with seven elements ranging from "Totally Agree" to "Totally Disagree" [12]. Figure 2 shows the model of structural equations that describe the theoretical appreciation of the relation of variables.

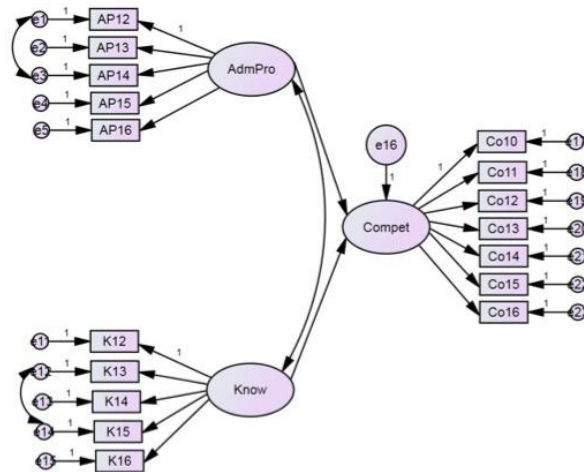


Figure 2. Structural Equations Model.

The model integrates twenty observable variables, three latent variables, of which two are exogenous and one is endogenous [13]. In this sense, five observable variables define the construct and exogenous latent variable of *AdmProy*; five observable variables define the construct and exogenous latent variable of *Know*; and finally, seven observable variables define the constructs and endogenous latent variable of *Compet*.

Table 1. Statistical goodness of fit and benchmarks

	Statistical	Abbreviation	Criterion	Results
Absolute adjustment	Chi square	χ^2	>0.05	0.071
	Chi square (gl)	CMIN / gl	< 2	136/114= 1.19
	Mean squared approximation error	RMSEA	<0.08	0.045
	Goodness of Fit Index	GFI	> 0.90	0.837
	Adjusted Goodness of Fit Index	AGFI	> 0.90	0.782
Comparative adjustment	Expected of cross validation index	ECVI	< a saturated model and independence	Def. 2.170 Sat.: 3.091 Ind. 2.873
Parsimonious adjustment	Parsimonia	PRATIO	> 0.5	0.838
Sample size	N Critic (CN)	HOELTER 0.05	Proposed by AMOS	102

As can be seen in Table 1, several of the recommended statistics validate the proposed model to study the relationship between the latent variables of this research. It is observed that the Chi Square value is higher than the acceptance criterion (> 0.05, 0.071), RMSEA (<0.08, 0.045) and PRATIO (>0.5, 0.838). Statisticians who do not validate the model optimally are GFI (>0.90, 0.837) and AGFI (>0.90, 0.782). However, the results are sufficient to validate an acceptance of the proposed theoretical model and adjust the relationships that were generated by the model.

5. Conclusions

It is concluded that a system to manage knowledge within manufacturing firms in Baja California must be created to provide employees with access to structured and unstructured information, assisting with the coordination, communication and collaboration during projects. The KM system must assist employees navigate knowledge, tailoring information to people to enable them to work more efficiently and effectively [14]. This would take advantage of information and communications technologies. However, there are certain factors that would influence its success, which, while human resource is indispensable for the growth of an organisation, it is also the method of knowledge management that is used between these elements.

Previous studies [5, 9] show that KM and PM go hand in hand due to the correct management of knowledge leading to effective project management, which generates an advantage between companies, increasing their competitiveness. We answer the research questions raised at the beginning of this article about the application of KM and PM to create competitive advantage. Through an enhanced literature review, it will help us base the hypotheses and identify the results of the study, including structural equations. By using KM and PM strategies within work process, it is possible to create competitive advantages to increase competitiveness. Another relevant aspect as a line of future research is the use of quality systems while conducting an investigative process to determine their role in generating competitive advantages between organisations.

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