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The Standardization of Supporting Tools: Advantage Competitive for Collaborative Networks

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Abstract

Traditionally, manufacturing companies, the gateway for information technology (IT) have been implementing business management tools, tools typically enterprise resource planning (ERP) focused exclusively on internal processes manufacturing and remaining largely isolated from the rest of the elements of the value chain (suppliers, customers, etc.). The objective of this paper is to propose action lines to solve the problems inherent in collaborative knowledge management related technological barrier by implementation project business management tools. As mist relevant contribution are both the search for standardization and the application of techniques in Project Management to try to achieve success in the implementation and establishing of collaborative networks.
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1. Introduction

Nowadays the majority of manufacturing companies carries out their activities in a global cultural and economic environment, and has to build up collaboration networks between providers and customers within the shortest time possible, P.M. Horn (2005). ERP systems are elements that should be considered when it comes to developing such communication channels, A. Pastor (2009), since poor communication may lead to delays within the supply chain, as well as a loss of competitive advantage in relation to competitors. Information and Communication Technologies (ICTs) stopped being a competitive advantage and have become a need, S.N. Singh and C. Woo

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(2009), since, taking the most fledgling Enterprise Resource Planning (ERPs) tools as a starting point, ICTs have extended to the various areas that are not closely connected to the organisation's internal manufacturing processes (supply, marketing, purchase, distribution, etc.), K. Ramamurthy and G. Premkumar (1995), giving rise to such new integration software solutions within the company as Supply Chain Management (SCM), Product Lifecycle Management (PLM) and Customer Relationship Management (CRM). However, when it comes to large organisations, they are subjugated by their own developed software, which is created by the company's staff internally.

Staff is key in Knowledge Management (KM), since people are an essential tool for an organisation's economic growth, development and quest for competitiveness. In KM there should always be a balance between good practices and production processes, J. Brown, P. Duguid (2005). Therefore, gaining the knowledge (generating ideas and opportunities), as well as its application to processes is of great importance, J.C. Coetzee et al (2012) & D. Karagiannis et al (2008).

KM has evolved in such a way that it has extended beyond the organizational boundaries, to be part of external stakeholders, thus generating formal and informal collaborative networks and giving rise to Collaborative Knowledge Management (CKM), D.G. Vequist & M.S. Teachout (2008).

Notwithstanding, CKM often has to face numerous barriers. Broadly speaking, these are barriers that have to do with human, technological and organisational aspects which complicate and, in many cases, hinder KM itself and the collaborative knowledge that is shared with other individuals, K.D. Thoben et al (2009).

KM barriers have been categorized according to the following three components known as TOP (Technology, Organization and People) classification, D. Brandt and E. Hartmann (1999), and their main characteristics are, R. Sanchis and R. Poler (2009):

- People: Exploitation of knowledge among people to achieve the organisation's strategic goals and meet the needs of the people who take part in the process.
- Technology: Systems that identify, collect, generate, distribute, structure, store and make available the pieces that carry information to support decision-making.
- Organisation: Corporate assets, culture, business strategy, hierarchy and role-modelling.

There are several solutions available in KM to overcome the aforementioned barriers. One of the solutions is that provided by the CWA 14924 (European Guide to good Practice in Knowledge Management, 1-5:March 2012), which was later reviewed and adapted to UNE 412001:2008 IN, AENOR, by a team of Spanish professionals to provide guidelines and help to organisations that aim to improve competitiveness and productivity through KM.

To create value, effective KM must rely on several dimensions: Processes, Customers, People, Finance and Innovation; all of them closely connected to the aforementioned TOP classification (see Fig. 1).

Business management needs therefore continuous adaptation to new environments and the stakeholders' requests; a process in which ERPs has become the main tools that support management of its business processes. Organisations may adapt or customise ERP to best meet their needs. But besides to being complex and expensive, bigger changes may also hinder implementation of new versions greatly, Ll. Cuenca (2008).

At this point standardisation or normalisation becomes key. Standardisation is a process of elaboration, implementation and improvement of the standards that are applied to the various industrial and economic activities. In the European Union, the European Commission's Directorate-General for Enterprise and Industry, commission European (2013), describes standardization as a process by which the UE seeks to establish high quality standards in all member states. The process is based on the consensus-based approval of the different areas involved:

industry, consumers and public bodies. The goal is to achieve interoperability and be up to date in terms of technology and business practices.

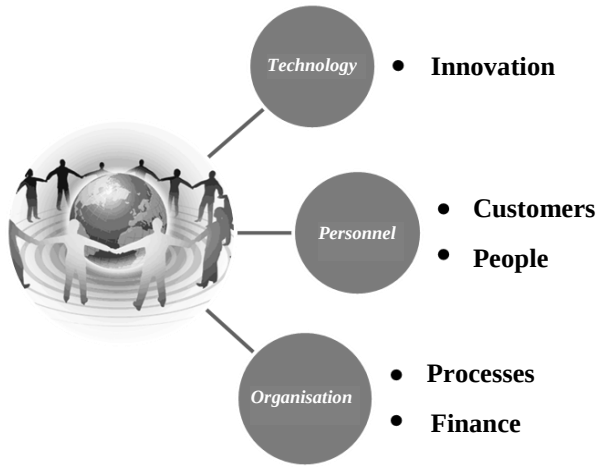

Fig. 1. Dimensions for value creation

Goals setting, participation, commitment and leadership of the stakeholders that participate in ERP implementation, methodology and ERP competence are all aspects that have to be taken into account if success at implementing an ERP system or similar is to be achieved, F. González, A.R. Torres (2002).

The present work describes a methodical solution to deal with the aforementioned problems in generating CKM. To this end, we focused on the technology barrier and the use of standardised management tools, and suggested courses of action for a large company in the agri-food sector.

2. Case Study

The agri-food company under study is located in the Bay of Cádiz (Spain) and has been a pioneer factory of business management tools both locally and nationwide.

The first challenge the company had to face was building up a large industrial estate in the late 80s, when computers were just beginning to make an impact in the home and Windows operating system was beginning to make its way (November 20, 1985). In industries, meanwhile, the first PLC (Programmable Logic Controller) – equipped with a terminal that enabled access to the PLC's internal memories, allowing monitoring of digital input/output – began to appear, as Fig. 2 shows.

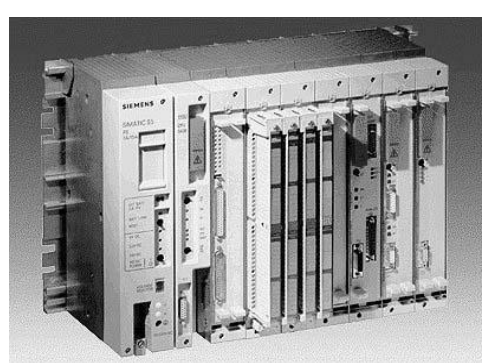

Fig. 2. Siemens S5 Programmable Logic Controller

The challenge of interconnecting the various PLCs to obtain data on production processes – digital signals in this case – was achieved by developing specific communication interfaces, cards with the capacity to emulate the terminal interconnection and were all connected at the same time via the RS-485 communication port to a PC that collected the information and made it available.

In this period, in the late 80s, when standard or packaged software solutions for data acquisition and management were non-existent in the market, the company hired specialized technical staff that was in charge of developing specific applications and maintaining the data on the network.

The second milestone took place in the 90s, with technology advances and the advent of ERPs, when implementation of such technologies at an organisational level relied once more on specialized technical teams. This time it was decided that the off-the-shelf SAP software should be used, without leaving aside the benefits of the in-house developed software created by the technical people on staff of the company's software Development Department.

SAP R/3, used in accounting and intervention areas, has had such great impact that it has established as a standard at corporate level – not only in the agri-food company but in many companies linked to the market segment.

It is worth pointing out that the following two trends of software development have been maintained since the 90s:

- In-house developed software: specific software for controlling production. Management of PLCs data (that migrate to state-of-the-art Siemens Simatic S7) is still carried out using the same applications developed in the 90s, which are exclusively maintained by the software development department's technical specialists
- Packaged software: software that is developed by outsourced companies. Packaged software includes mainly SAP software for enterprise management and SAP financial software for controller positions in financial and economic management of enterprises.

Notwithstanding, aspects relating to planning, emulation, execution and control of manufacturing systems have also been incorporated. However, since each of the systems is an independent database and the flow of information between them is very limited, intervention from the system's operator is greatly needed in order to enable information update and transfer.

At this point, considering the global nature of the producers-manufacturing companies-stakeholders relationship and that there is a need for integrating each of the parts, we are faced with the problem of establishing a turning point between the aforementioned two software development lines so that it enables the flow of information, which will generate a collaborative knowledge network among all stakeholders.

3. Methodology

As described in the introduction section, we will study an agri-food manufacturing company analysing the most significant milestones in the implementation of enterprise management tools, current problems the company faces and their solutions.

In the first stage, drawing from R. Sanchis y R. Poler's framework [11] and focusing on the technology component, we analysed the barriers relating to certainty, management, environment and collaborative knowledge means.

The various aspects taken into account in each of the dimensions are described in Table 1.

Table 1. Analysis of the Barriers in the Technology Component.

Barriers	**Levels**			
	Individual	**Intra-**	**Inter-**	**Extra-**
Certainty	Lack of technical support	Overrating of technological solutions	Unrealistic expectations about the role of technology systems	Uncertainty about technological solutions of the other companies
Management	Lack of technology training strategies	Lack of leadership and management in terms of communication systems	Lack of strategic technological initiatives in knowledge management	Culture of networking with no technological support to the process of collaborative knowledge
Environment	Gaps between users' needs and ICTs	Integration difficulties	Instability among the systems of the different companies	Absence of web-based systems for information exchange. Lack of integration
Means	Invisible dimension	Need for Chief Information Officer (CIO)	System obsolescence. Lack of interoperability	Lack of software applications and systems extra-operability

In the second stage, once the barriers in the technology domain were identified and classified, we applied the aforementioned classification table to our case study in order to see if such barriers existed indeed. We suggested guidelines and solutions to overcome each of the barriers identified and classified.

Two courses of actions that can help achieve successful implementation of corporate management tools (ERP, CRM, SCM, etc.) were suggested:

I. Analysis of current systems and implementation of standards: The use of standards or norms recognised by all of the stakeholders can facilitate implementation of enterprise management systems. Such a course of action involves keeping records of current enterprise management systems in the quest for establishing standards that can be assessed by all stakeholders. Standardisation will enable the interchange of information, establishment of common technology training strategies and knowledge management strategies at technological level, being the latter one of the barriers that we may encounter in the technology domain.
II. Implementation of Project Management approaches: In order to standardize criteria and achieve successful project implementation, there is a series of project management tools that can be applied. In fact, ISO 21500:2012standard not only provides guidance on Project Management but it is also a global benchmark in the field of project management that goes beyond project goals and deals with such project management-related aspects as people and organizations, A. Pastor et al.

Last but not least, in the final stage, once the project is executed, diagnosis of the implementation outputs has to be carried out, reporting on the goals achieved, as well as the problems that arose during implementation and the actions taken to overcome. One of the tools that can be applied in such cases is the "lessons learned" template, an instrument used in Project Management.

4. Results

After describing the suggested two courses of action to achieve successful implementation of an enterprise management system that integrates chain production including agriculture and farm input suppliers and customers, the following results were obtained:

4.1. Analysis of current systems and application of standards

Even though in-house developed software has its own advantages, namely greater know-how, better tailor-made products and no need to pay for software exploitation and maintenance, there are numerous drawbacks. Among them there is the reliance on technical specialists on staff, which can end up in a lack of technical support, problems with technological advances and no software update to the most current available and problems within the information flow between the software of the various companies.

In today's globalised world, packaged software is increasingly successful. In our study case, keeping both lines of software development leads to barriers, which do not favour high quality, to good communication networks among agriculture and farm suppliers, manufacturing company and stakeholders, traceability (due to the absence of a shared common technological basis), and high human reliance.

Problems in communication and application of a common standard shared by all stakeholders lead to unfeasibility, and packaged software becomes the preferred option, including as result every link in the production chain.

Besides to the aforementioned problems, there is the fact that most companies – and not only those in the agri-food sector – are subject to significant company restructuring, the company's software development are entirely outsourced. Therefore, software maintenance and the actions taken to deal with incidents as well as software development efforts to meet future demands from either the company or the customer reduce noticeably.

4.2. Application of Project Management Techniques

While some organisations have set standardisation policies for all their projects, others allow the project management team to select the most suitable policy for its individual project. In this respect, application of ISO 21500:2012 standard, a standard that describes processes that are considered to form good practice in project management, is a step forward in the quest for standardization in this field.

In the process of implementing enterprise management tools in the various organisations, special attention should be paid to the role of project managers as well as the project team, since there should be a collaboration network whose goal is to select the most suitable processes and a detailed description of each of the implementation phases of the project.

In order to bring down the aforementioned barriers, achieve successful implementation of enterprise management tools in the various companies, establishing thus a collaborative network that would go beyond the company's sphere of activity, the following management plans were carried out:

- Project Management Plan: A plan aimed at project management that integrates and consolidates the secondary management plans and the foundations underlying planning processes.
- Management Plan of Project Scope: A plan that includes all the processes needed to guarantee the project has included all (and only all) the necessary work to be done to achieve its successful completion. The main aim is to determine and monitor WHAT IS and WHAT IS NOT included in the project.
- Project Requirements Management Plan: A plan that outlines the way project requirements will be analysed, recorded and managed.
- Quality Management Plan: A plan that describes how the project management team will implement the executing organisation's quality policy.
- Communications Management Plan: A plan that includes the necessary processes to guarantee generation, collection, distribution, storage, retrieval and availability of project information are the most appropriate.

- Stakeholders Management Plan: A plan that describes the processes needed to identify the people, groups or organisations which are or may be affected by the project, examine their expectations and develop the stakeholders' management strategy in decision making and project execution.

4.3. Final Solution

When choosing a packaged solution robust packed software should be preferred, JB. Hill (2009). In the case of the manufacturing company under study, the alternative chosen was SAP Business Suite®, due to the high implementation impact on companies in the agri-food sector and the possibility of integrating within the same application all the constituents of the value chain: Supply Chain Management (SCM), Enterprise Resource Planning (ERP), Customer Relationship Management (CRM), Product Lifecycle Management (PLM) and Supplier Relationship Management (SRM), see Figure 3.

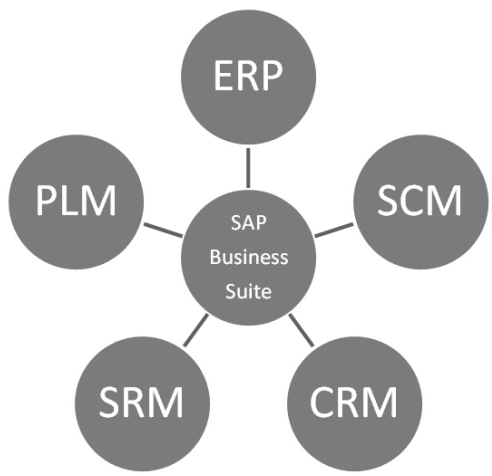

Fig. 3. SAP Business Suite®

5. Conclusions

The main conclusions drawn are as follows:

- The observations in this study helped us to conclude that standardisation of enterprise management tools bring down the barriers to good providers-company-customers communications boosting collaboration networks, both formal and informal.
- Integration of the different components of the value chain within a single financial suite can help enhance processes integration, corporate and ICT effectiveness, and therefore favour a collaborative environment inside and outside corporate borders, which results in enhanced operations.
- Moreover, standardisation of enterprise management tools leads to greater adaptability to changes, being improvements much easier to achieve due to the advances in technology, when selecting a responsive (in terms of people and technicians) off-the-shelf software company that can meet the needs of the manufacturing company under study. This can lead, in turn, to a long-term competitive advantage in relation to competitors.
- Application of a Stakeholders Management Plan, a Project Requirements Management Plan or a Project Scope Plan help bring down a good number of the barriers put forth in this work (lack of leadership, overrating of technological solutions, unrealistic expectations, uncertainty and lack of communication, etc.).

- Application of ISO 21500:2012 international standard on good practices in Project Management helps establish a framework for Project Managers that helps them manage key aspects such as deadlines, cost and deliverables, achieving stakeholders' satisfaction.

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