

IM2, a Maturity Model for Innovation in SMEs

IM2, un Modelo de Madurez para la innovación en PYMEs

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Abstract Abstract With the aim to discover and assess specific aspects of management and evaluate their 'maturity level', both practitioners and academics have developed a wide range of maturity assessment models over the last decades. In spite of its broad proliferation, their focus is very functional based and specialized, with a detailed approach that only suits big organizations and not small enterprises. On the other hand there is a need for small SMEs to develop practical approaches towards innovation, with clear and defined directions to develop structured innovation processes based on and integrated innovation management approach. Thus, this paper presents a tool to quickly assess the maturity of a firm's innovation approach.

A literature review on maturity models was carried out in order to build the structure of the Innovation Maturity Model tool (IM2), whereas the content of the tool is also based on a literature review on best practices in SMEs management and innovation. Application of maturity models to Innovation in SMEs is a first-step to focus innovation management in the strategically right areas, and will help organizations to integrate this methodology into their culture, fostering an organizational learning approach. The tool presented in this paper illustrates an agile way to assess the maturity of a firm's innovation approach and a practical first-step to focus innovation management in the strategically right areas, and to establish action plans in order to advance in the achievement of established objectives, fostering an organizational learning approach. The proposed IM2 maturity model has been applied in a specific region in Basque Country where small SMES, Local Development Agencies and the University through an action research project. Specifically, the pilot project was carried out using the practical application of IM2 scheme.

About the elements to be considered, the review of the literature has helped to identify different maturity models that could be considered in an integrated manner when developing this Innovation Maturity Model (IM2) approach for small SMEs. Thus, when building IM2 two main questions need to be answered, one related to the objects classification and another about the maturity scale to be used. Therefore some best practices were considered from the existing literature. Hence eleven categories were considered: Strategy, Competitiveness, Manufacturing Excellence, Innovation, Value propositions and business model, Internationalization, Advanced Management, Digitalization, Sustainability, People, and Territory.

We consider that this experience shows a practical method to foster innovation in small SMEs through the mastering of innovation management, the implementation of key factors and the promotion of a learning experience through a "step-by-step recipes". The assumption that organizational change and evolution occur in predictable patterns in SMEs is partially confirmed, although opportunity (as an appropriate or favourable time or occasion) is a key factor in SMEs approach towards innovation. Finally, we consider that further action research should be done in order to improve and adjust the factors, the levels, and levers. In addition, we consider that the relationship between the implementation of IM2 and innovation performance of participating companies could be a future research topic.

Keywords: SMEs; Innovation, Innovation Management, Strategy, Maturity Models

Resumen Este artículo presenta una herramienta para evaluar de una forma rápida los enfoques y prácticas de innovación de una PYME. Para el desarrollo del modelo de madurez propuesto (IM2), se ha realizado una revisión de la literatura que se ha centrado en las buenas prácticas relacionadas con la innovación y su gestión. La experiencia de implantación muestra la bondad de la herramienta a la hora de focalizar la innovación en áreas estratégicas de la empresa, así como un método práctico para el fomento de la innovación en las PYMEs a través de una "receta paso a paso".

Palabras clave: PYMEs; Innovación, Gestión de la innovación, Estrategia, Modelos de Madurez

1. Introduction

Micro-enterprises and small and medium-sized enterprises (SMEs) play a central role in the European economy. At the level of the Spanish state, the Small Business Act (SBA) report for the Spain 2016 (European Commission, 2015) stresses the need for SMEs to put more emphasis on product development and innovative and competitive services, with the ultimate aim of generating differentiation, added value and lasting competitive advantages, by boosting collaboration between companies and by transforming their value propositions and business models. All this requires logic guidance, starting from the assessment of companies' situation, as well as the definition of concrete actions that will help to shape business competitiveness transformation on a process based approach with stages, areas and levels. In this context it is where an innovation maturity model plays its role.

Maturity models have been developed within several areas, but only few models are targeting innovation (Khan, 2016). The purpose of this paper is to present a maturity model for innovation in small SMEs (IM2). The proposed model is based on a literature review on maturity models from a holistic managerial approach focused on innovation and competitiveness.

This paper is structured as follows: First, maturity models are reviewed. Second, the design and structure of IM2 is conceptualised, and the content of IM2 is defined. Third, the practical use of IM2 is briefly described. Finally, some conclusions are drawn.

2. Maturity Models

Maturity models (Röglinger et al., 2012) are tools used to evaluate the degree of progress of an organization in different issues and to establish action plans in order to advance in the achievement of established objectives, helping objectify the evidences of the implementation of the processes. From the earliest developed maturity models, they are widely recognized as tools that help in this role (Wendler, 2012).

These models assume that progress is developed at several different stages and thus that they are able to capture the maturity of a moment in time, placing an organization in comparison with defined best practices and helping with proposals and solutions for change (Becker et al., 2009, Randeree et al., 2012).

Regardless of the large number of application domains, the objectives of these models are very similar. Their general purpose is to assess the current situa-

tion in an organization, to facilitate benchmarking and to provide guidelines for improvement (Wendler, 2012). They are based on the assumption that organizational change and evolution occur in predictable patterns and, therefore, are structured hierarchically at discrete or sequential levels that represent the typical evolution of measureable objects that are evaluated according to some criteria.

Predominantly, its structure is very similar (Kohlegger et al., 2009a). However, although the number of levels may vary, the key requirement refers to the fact that those levels are distinct, well-defined and demonstrate a logical progression (de Bruin et al., 2005). Additionally, its simplicity makes maturity models very easy to understand and communicate, which is one of its greatest advantages (Klimko, 2001).

On the other hand, there is an abundance of research evidence that supports the statement that the implementation of a maturity model leads to organizational improvements and superior results, generally achieved through a more predictable performance (Brookes et al., 2014). Based on this evidence, maturity models have often been adapted and applied to complex concepts that cannot be improved at once (Khatibian et al., 2010). This approach is the one that inspires this article in relation to innovation in micro-enterprises and small SMEs.

Thus, although there are a large number of maturity models within specific management disciplines (see Table 1); there are few SME-oriented ones, and even fewer the ones that have integrated different innovation key approaches to maturity into a single maturity model. In addition, existing maturity models tend to focus on large organizations (Essmann and du Preez, 2010), and are therefore generally focused on processes, functions or departments that are highly defined and with a local optimum approach, which contrasts with the needs of small SMEs and micro-enterprises looking for a more inclusive management approach where functions are not so segregated and where organizational structures are much more concentrated (McDermott and Prajogo, 2012).

3 Developing a Maturity Model for Innovation in SMEs

From its beginnings maturity models have been criticized. They are often characterized as "step-by-step recipes" that oversimplify reality and lack empirical foundation (Mettler and Rohner, 2009).

To mitigate this criticism, management research in-

creasingly addresses maturity models from a product design process perspective. Thus, there are different methodologies for designing maturity models as established by certain authors (Becker et al., 2009, Mettler, 2011, Solli-Sæther and Gottschalk, 2010). Among those approaches, some authors (Pöppelbuß and Röglinger, 2011) propose a framework that aims to serve as a pragmatic but well-founded "checklist" for researchers and practitioners involved in the design, improvement or application of maturity models. This approach is the one that has been chosen when developing IM2 (see Figure 1).

3.1 Model conceptualization and structure

In order to guide the IM2 maturity model, several micro-enterprises and small and SMEs applicable maturity models approaches were considered from a holistic and integral perspective (innovation, competitiveness, people, processes, quality, supply chain, etc.). Focused in innovation in micro-enterprises and small and SMEs the following approaches have been considered as the most relevant ones (see Table 1).

In addition, based on the nine design principles (Figure 1), IM2 has also stressed the need for an agile maturity model aimed to the transformation of small SMEs in cooperation with Local Development Agencies and University around a knowledge triangle scheme. From the innovation perspective, IM2 has focused on strategic elements related to product development and innovative and competitive services, by considering elements referring to customer development, value propositions and business models. Besides, IM2 also stresses the learning process in small SMEs as well as the establishment of specific action plans to promote regional development, diversification strategies and entrepreneurship.

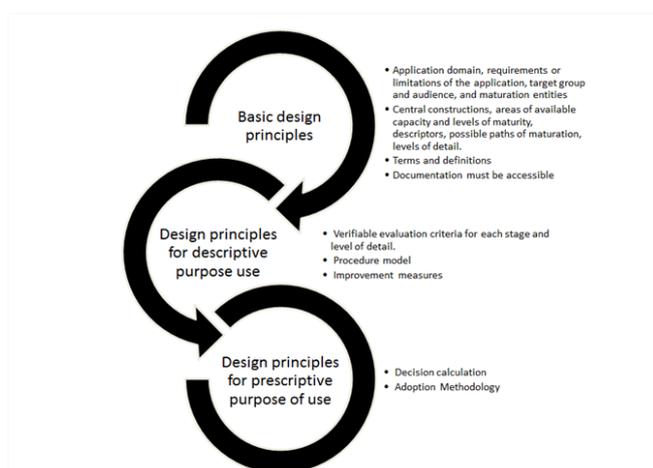


Figure 1. Design principles for IM2 (adapted from (Pöppelbuß and Röglinger, 2011))

Table 1. Examples of maturity models for small SMEs

EFQM (EFQM for innovation)	Advanced Management (EUSKALIT)	Process and enterprise maturity model (PEMM)
Leadership, Strategy People, Partnerships & Resources. Processes, Products & Services	Strategy, Clients, People Society, Innovation, Processes, Products & Services	Organizational structure, Global Presence, Products and methodologies, Operations, Investigation and development, Market Image, Growth strategy, Management
Strategy Management	Innovation	Network innovation
Leadership, Culture and values Strategic thinking and planning, Alignment, Performance measurement, Performance management, Process improvement, Sustainability of strategic management	Strategy, Processes, Portfolio Projects, Organization, People Resources, Culture, Leadership, Technology, Knowledge Market, Networking, Measurement	Change Management, Communication, Human Resources Technology, Cooperation
Knowledge Management	People Management	Internationalization
Knowledge Acquisition, Knowledge Sharing / Dissemination, Knowledge Reuse	People Management, Training Development, Evaluation, Management, Leadership	Management commitment, Exporting Activities, Exporting Experience

Lean manufacturing	Internationalization	Competitiveness
People, Facilities Management, Working Condition, Production Processes, Quality JIT, Leadership	Management commitment, Exporting Activities, Exporting Experience	Organizational structure, Global Presence, Products and methodologies, Operations, Investigation and development, Market Image, Growth strategy, Management

Based on the nine design principles presented (Figure 1), and with the focus in the development of an agile maturity model aimed for micro-SMEs in cooperation with Local Development Agents (LDA) and University (Knowledge triangle), seven approaches were considered for the design:

- The development of an agile maturity model,
- The design and development of a maturity model oriented to the business transformation of micro-SMEs (strategy, technology, innovation and people),
- The importance of cooperation in the maturity model, with special emphasis in the cooperation of micro-SMEs with Local Development Agencies and University,
- Focus the maturity model on strategic elements related to innovation, customer development and value propositions,
- The definition of a maturity model that will stress the interest of companies to explore and contrast customers' needs and wants as a key activity for the design and development of their value propositions,
- The development of a maturity model oriented towards the establishment of specific and pragmatic action plans,
- The enhancement of regional development and networking through the maturity model.

When defining the structure of the maturity model (Table 2), different design recommendations were taken into account (Röglinger et al., 2012). Therefore a small glossary defining terms properly was considered, as well a learning procedure (Kohlegger et al., 2009b) that assured the conscious evolution from one step to the other.

Table 2. IM2 Maturity model structure

Element	Description
Scope	Description of the scope (area) of maturity model
Approach	Explanation of the scope approach of the maturity model, its logic and origin.
Factors and levels	Description of the level for each of the factors of the maturity model.
Steps from level n to n+1	Description of the good practices, cooperative actions and questions to be considered when moving from level n to level n + 1.
Support mechanisms	Description of the existing support mechanisms to strengthen the areas and factors of the maturity model.
Support organizations	Description of the existing support organizations and the instruments they deploy to move onwards in the maturity model.

3.2 Description of the Maturity Model

About the elements to be considered, the review of the literature helped to identify different maturity models that could be considered in an integrated manner when developing this Innovation Maturity Model (IM2) approach for small SMEs. Thus, when building IM2 two main questions needed to be answered, one related to the objects classification and another about the maturity scale to be used.

Therefore some best practices were considered from the existing literature. Hence eleven categories were considered: (1) Strategy, (2) Competitiveness, (3) Manufacturing Excellence, (4) Innovation, (5) Value propositions and business model, (6) Internationalization, (7) Advanced Management, (8) Digitalization, (9) Sustainability, (10) People, and (11) Territory. Each of these eleven categories are explained in the next table (Table 3).

Table 3. IM2 Maturity model elements description

Category	Description
Strategy	An organization must have a developed vision of the future that will guide its more operative actions and allow the establishment of medium term action plans in order to increase its competitiveness.
Competitiveness	Key competitive factors related to the environment where companies operate should be well known and developed. Companies should actively manage the competitive advantages of their products and services, and their position in the value chain.
Manufacturing Excellence	An organization must manage efficiently all its key activities ensuring the management of all the means and processes that ensure products and services of quality as well as their delivery.
Innovation	A company should define their innovation objectives and strategy, as well as create the internal context that promotes innovation, manage innovation ideas and projects, and harness the potential for innovation of people and organizations in their innovation network.
Value propositions and business mode	Business models are crucial for the sustainability of a company, so their business proposal must define the products or services a company offers to a segment of customers, and emphasize the benefits they bring to customers as well as the factors that differentiate them from competition.

Internationalization	Internationalization plays a key role in the competitiveness of a company as well as in innovation. The main focus is that internationalization processes must be taken into account according to the activities and resources of the company, as well as their business and innovation strategy.
Advanced Management	Management is an asset of the company that ensures the development of processes focused on customers, people and resources to achieve satisfactory results in all stakeholders. Besides, the process of innovation is a key process in the implementation of innovations.
Digitalization	Digitization in SMEs should be geared towards responding in an agile and efficient way to socio-business changing realities. Companies need to take advantage from information and communication technologies by in an environment of connected networks with a global character.
Sustainability	Sustainability from the innovation approach should focus on the incorporation of new or improved materials, processes and means that achieve more sustainable and efficient environmental processes (eco-innovation), while at the same time developing products, processes and services with high added value.

People	Innovative organizations do need to deploy an innovation culture based on "sharing and cooperating" in projects both internally and among external organizations. Thus, participation and communication have to be fostered, what will reinforce people's enthusiasm and involvement in innovation projects.
Territory	Companies of all types must both be responsive to the needs and wealth of the communities in which they do business. Thus, the territory where companies operate should be considered both source and output for innovation and therefore companies should promote and support the social and territorial transformation as a formula to in-cardinate people, companies, society and territory, enabling shared social and territorial value.

To assess the maturity of each scope, five maturity levels were defined: (Unaware: Do not care or know, very weak situation; Aware: Do know and care, poorly managed a weak situation; Manage: Management often reactive; Defined: Organization is proactive; Performance: Open innovation approach).

3.3. Practical application of IM2

The proposed method was tested in 12 small mainly Industrial SMEs (10-20 people) and showed usefulness in assessing the current situation in an organization, while facilitating benchmarking and also providing guidelines for improvement (Wendler, 2012). Also, the Maturity Model IM2 helped to develop agile practical approaches towards innovation, with clear and defined directions to develop structured innovation processes based on an integrated innovation management approach (de Bruin et al., 2005).

The experience and feedback from participating companies proved the advantages for companies regarding the use of more holistic approaches in SMES compare to more specialized approaches (McDermott and Prajogo, 2012). Participating companies also devel-

oped capabilities and knowledge related to the model and levers defined by the proposed maturity model, increasing their innovation absorptive capacity (Brookes et al., 2014).

The maturity assessments were performed either way, by an external auditor or by self-assessment. The practical application process of IM2 is shown in Figure 2.

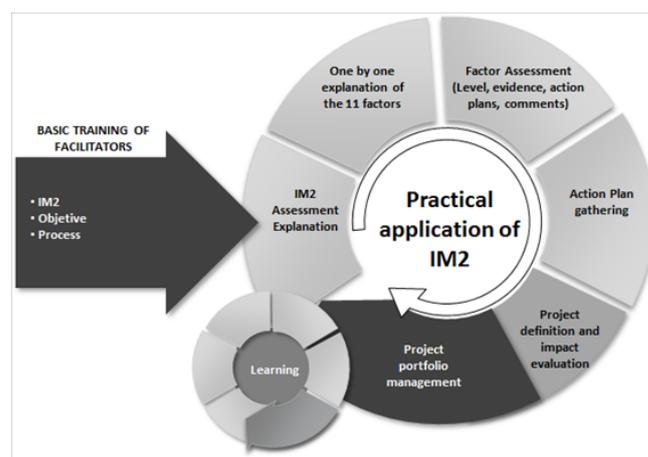


Figure 2. Practical application of IM2

Whilst self-assessment can be performed by an individual in isolation, they are perhaps more beneficial if approached as a team exercise. One reason for this is to eliminate single-respondent bias and promote organizational learning. Also, small SMEs integrate in few people all functional activities helping develop an agile cross-functional assessment, as well as consensus and team-building approach.

4. Conclusions

There is a need for small SMEs to develop practical approaches towards innovation, with clear and defined directions to develop structured innovation processes based on and integrated innovation management approach. This paper has reviewed a number of maturity models from an innovation and small SMEs perspective and also has explored how such maturity models are constructed and applied.

Application of maturity models to innovation in small SMEs is a first-step to focus innovation management in the strategically right areas and might help organizations to integrate this methodology into their culture fostering an organizational learning approach.

The tool presented in this paper illustrates an agile way to assess the maturity of a firm's innovation approach and a practical a first-step to focus innovation management in the strategically right area and to establish ac-

tion plans in order to advance in the achievement of established objectives, fostering an organizational learning approach.

The proposed IM2 maturity model was applied in a specific region in Basque Country with the participation of small SMES, Local Development Agencies and the University through an action research project. Specifically, the pilot project was carried out using the practical application of IM2 scheme.

We consider that this experience shows a practical method to foster innovation in small SMEs through the mastering of innovation management, the implementation of key factors and the promotion of a learning experience through a "step-by-step recipe".

The assumption that organizational change and evolution occur in predictable patterns in SMEs is partially confirmed, although opportunity (as an appropriate or favourable time or occasion) is a key factor in SMEs approach towards innovation.

Finally, we consider that further action research should be done in order to improve and adjust the factors, the levels, and levers. In addition, we consider that the relationship between the implementation of IM2 and innovation performance of participating companies could be a future research topic.

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