Diffusion of the UNE166002 innovation management standard: a forecast model approach towards internationalization

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Resumen:
El propósito de este trabajo es analizar la difusión de la norma de gestión de la innovación UNE 166002 en España y pronosticar el patrón de una hipotética futura norma de gestión de la innovación en el ámbito internacional. Utilizando los datos proporcionados por todas las organizaciones acreditadas a finales de 2011 en España, se analiza la evolución de la difusión de la norma UNE 166002 desde su creación. Además, este trabajo extrapola el análisis de la difusión de la norma de gestión de la innovación española a escala europea e internacionales. Además, se compara la posible evolución de esta hipotética futura norma con la evolución de los estándares más reconocidos. Los resultados confirman que la difusión de la UNE 166002 sigue una curva logística en forma de S. Por otra parte, los resultados muestran que la extrapolación, de la futura norma de gestión de la innovación a nivel global, se acerca a los 85.000 certificados europeos y más de 1.200.000 si se trataba de una norma ISO. Los resultado de este estudio deben ser de interés para los investigadores, las instituciones y organizaciones que participan en este tipo de certificaciones, así como, esas organizaciones que actualmente están liderando la creación de la futura norma internacional de gestión de la innovación.

Palabras clave: UNE 166002, Innovación, Norma de gestión, España, ISO 9000

Abstract:
The purpose of this paper is to analyse the diffusion of the UNE 166002 innovation management standard in Spain and to forecast the pattern of a

hypothetic future innovation management standard at international level. Using data provided by all of the accredited organizations at the end of 2011 in Spain, the evolution of the diffusion of the UNE 166002 standard since it was created is analysed. In addition, this paper extrapolates the analysis of the diffusion of the Spanish Innovation Management standard to European and international scales. In addition, a comparison of a hypothetic future innovation management standard diffusion with the evolution of the most recognized standards. The results confirm that the diffusion of UNE 166002 follows a logistic S-shaped curve. Moreover, the results show that the extrapolated diffusion of the hypothetic future innovation management standard at a European or an international level, would be approaching 85,000 European certificates and more than 1,200,000 if it was an ISO standard. The findings of this study should be of interest for researchers, institutions and organizations involved with this type of certifications, as well as, these organizations that are currently leading the creation of the future international innovation management standard.

Keywords: UNE 166002, Innovation, Management Standards, Spain, ISO 9000

1. Introduction

At the beginning of the 21st century, in a globalized world, there is no doubt that the interest in innovation phenomena, and innovation management best practices, has increased over the last decades, as it has been widely demonstrated that innovation is a key factor for competitiveness (Porter, 1990) and for successful organizations. Shumpeter (1934) was the first author to declare that innovation enhances economic development. Since then there have been numerous studies that support this theory, as we can see if we review the historical perspective of Rothwell (1994), which identified five generations of innovation processes from 1950 to the end of the 20th century, leading to the “fifth generation” Innovation Process (Rothwell, 1994) where innovation became an important (indeed, an essential) aspect of contemporary business practice.

Innovation is now recognised as critical to an exceedingly wide range of activities that impinge on business success, including: (i) accelerating the development of technology-based new products; (ii) increasing flexibility and adaptability; (iii) organisational change for business success; (iv) enhanced awareness of environmental issues; (v) a greater focus on customer satisfaction and efficiency; and (vi) the accumulation and management of corporate knowledge through systems integration and networking (SIN) (Rothwell, 1994; Gupta and Wileman, 1990; Rothwell, 1994; Peters, 1988; Spiker and Lesser, 1995; Nonaka & Tekeuchi, 1995).

At the beginning of the new millennium, Mir and Casadesus (2011) speculate on whether innovation management is at the threshold of a new generation of innovation processes—perhaps even the starting-point of the 'sixth generation' of innovation processes. As previously noted, Rothwell (1994) proposed a 'five-generation' (5G) framework for the development of innovation. The 'sixth generation' (6G) of innovation processes could thus be constituted by the 5G model (Rothwell, 1994), but with the additional feature of now being managed through a standardised management system based on the UNE 166002 standard, or similar subsequent Innovation Management Standards (InnMS).

UNE 166002 is the Spanish standard to systematize Research, Development and Innovation (R&D&I) activities in organizations. It was designed in 2002 in the experimental phase and subsequently the official publication was issued in 2006.

As far as we know, in the literature only a few case studies exist of implementations and certifications according to UNE 166002 standard requirements in some specific economic sectors (Pellicer et al. 2008; Mir and Casadesus, 2011 and Romero-Cuevas et al., 2010). Therefore, there is a gap in the analysis of the diffusion of UNE 166002 as a pioneering innovation management standard in the Spanish context.

However, beyond the analysis of the diffusion of the UNE 166002 innovation management standard, in this paper we also propose to extrapolate the Spanish data to European and International scale data using an index based on the GDP for each scope in order to understand what the current status of an international innovation management standard would be had it been created in conjunction with the Spanish standard. In addition, we analyse whether the diffusion of the hypothetic InnMS fits with a logistic curve proposed by Franceschini et al. (2004), and later adapted by many other authors as in the recent work of Llach et al. (2011). Because, although there is a first approach regarding this evolution in a case study (Mir and Casadesus, 2011), no paper has been detected that focuses on an approach to InnMS pattern diffusion analysis on a European or International scale nor any comparative analysis with ISO 9001 and ISO 14001 diffusion patterns.

Companies and managers need to know about trends on innovation. The phenomenon also triggers the interest of consulting companies specialized in the implementation of standards or in auditing management systems, as well as the interest of international, European and national standards institutes and accreditation and certification bodies. In focusing the study on the diffusion pattern of the InnMS there is an adoption of the methodologies previously developed for the diffusion of the ISO 9001 standard, which in fact has been.

The objective of the paper is, therefore, firstly, the analysis of the evolution of the diffusion of the UNE 166002 innovation management standard in Spain. Secondly, the development of a model to extrapolate Spanish InnMS (UNE 166002) to European and International scale using an Index of Number of CERtificates per GDP (INCERGDP) for the first time, and finally, the study of the diffusion pattern of the extrapolated data and its comparison with the real pattern diffusion analysis of the ISO 9001 and ISO 14001 as a pioneering contribution—is this pattern similar to others previously done at an international level? For instance just like those of ISO 9001 and ISO 14001? Finally we discuss whether InnMSs for Innovation Management are new trending in contemporary business performance, and continue the discussion started by Mir and Casadesús (2011) that questions whether an ISO InnMS should be created.

2. Literature review

This literature review is twofold. Firstly, literature reviewing studies on standard diffusion patterns, at a world-wide level, through the most common management standards. Secondly, literature covering studies related to innovation management systems, in general, and the UNE 166002 standard, in particular.

In relation to standard diffusion patterns, Liu and Li (2010) offer an updated bibliographical review on innovation diffusion, starting with the first steps of Rogers (1983) in this well-established theory of diffusion of innovation. According to Teece (1995), the dissemination of management tools and systems is analogous to the dissemination of innovations in general – in that they both follow an "S-shaped curve" that consists of three distinct phases. These phases were identified by Stoneman (1995) as: 'initial', 'expansion' and 'saturation'.

These general ideas on innovation diffusion have been applied to the specific question of the diffusion of the ISO quality management standards around the world. Some studies (Corbett and Kirsch, 2004) have examined the question from the geographical point of view; according to these studies, the different levels of commercial activity that exist across different countries explain the varying number of certifications of quality standards. Other studies (Franceschini et al., 2004; Corbett, 2006) have suggested that the global diffusion of management practices is associated with the role of supply chains in the increasingly globalised world economy.

A somewhat different approach to the question of diffusion of the ISO standards has been taken by other authors (Marimon et al., 2004, 2006, 2009, 2010, 2011; Casadesus et al., 2008), who have defined the dissemination curve as a so-called "logistic curve" The notion of the "logistic curve" was developed by Pierre Verhulst, a nineteenth-century Belgian mathematician who had the initial aim of working out the growth rate in the population of a given biological species. However, it should be noted that the studies that have analysed the diffusion of quality standards in accordance with this logistic curve (Marimon et al., 2004, 2006, 2009, 2010; Casadesus et al., 2008) have analysed the diffusion across various countries and among different sectors of activity.

Related to innovation management systems, a wealth of literature on this field exists, but there are few studies regarding the specific Spanish standard UNE 166002 and there are some discussions still not answered by any empirical study, such as whether UNE 166002 innovation management standard boosts innovation capacity in companies and the business results of companies or not.

From a historical perspective, as we mentioned previously, Rothwell (1994) has identified five generations of innovation processes and Mir and Casadesus (2011) speculate on whether innovation management is at the threshold of a new generation of innovation processes—perhaps even the starting-point of the 'sixth generation' of innovation processes.

The 'first generation' of innovation processes (1950s to mid-1960s) linked rapid employment creation and rising prosperity after the Second World War with new developments in products. Freeman et al. (1992) have expressed the opinion that this was a time when innovation was perceived as a result of a 'technology push' through a linear innovation process that proceeded to the marketplace.

The 'second generation' of innovation practices identified by Rothwell (1994) occurred during the late 1960s to early 1970s and coincided with the era of diversification, scale economies, new products based on existing technologies, and a good balance between supply and demand. The innovation process at this time can be characterised as a 'market pull' process, which, according to Hayes and Abernathy (1980), tended to focus only on incremental innovations, with more radical innovations being lost. It was during this time, from the mid-1960s onwards, that the first studies on innovation management were published. These studies represented the first step in the development of operational tools for improved management of R&D (Archibald, 1976; Francis, 1977; Lanford, 1972; Souder, 1973; Davies, 1970; Allen, 1977). Subsequently, the focus was on the development of methodologies for the strategic direction of innovation. These later evolved into such tools as: (i) the portfolio models of Little (1981) and Roberts & Berry (1985); (ii) benchmarking techniques for the performance of various technologies by S curves (Foster, 1986); (iii) the classification of new technologies according to their maturity and competitive impact (Roussel et al., 1991); and (iv) technological monitoring systems (Morin, 1985).

During the 'third generation' (early 1970s to mid-1980s), a large number of empirical studies (Myers and Marquis, 1969; Langrish et al., 1972; Rothwell et al., 1974; Schock, 1974; Szakasits, 1974; Utterback, 1975; Rothwell, 1976; Rubenstein et al., 1976; Cooper, 1980) concluded that neither 'technology push' nor 'market pull' were sufficient to describe the innovation process; rather, innovation was posited as a combination of the two, as suggested in Kline's (1985) chain interactive model. According to this model, the innovation process at this time focused on cost reductions in economic conditions of reduced demand and greater competition. The models developed during this period sought to address such issues as how the competitive position could be improved with technology (Kantrow, 1980); how technology could be integrated into corporate strategy (Katteringham & White, 1984), for example whether it was better to innovate as a leader or a follower, and the practicalities of innovation (acquiring licenses, technology cooperation, and internal R&D). These developments laid the theoretical foundations for a technology-based strategy of innovation (Porter, 1983).

The 'fourth generation' (early 1980s to early 1990s) models of the innovation process are essentially based on those of the 'third generation', with the addition of an increased focus on various other factors—including technology strategy (Peters and Waterman, 1982), information technology (Bessant, 1991), global strategy (Hood and Vahlne, 1988), strategic alliances (Hagedoorn, 1990) and time-based strategies (Dumaine, 1989). These strategies for innovation recognised the competitive Japanese performance compared with Western countries (Drucker, 1985), which had come about as a result of technological imitations, 'just-in-time' (JIT) production procedures, and an emphasis on quality control using integrated and interactive procedures of intensive information exchange with functional overlaps (Graves, 1987). During this period there was also a change in views about the nature of technological innovation, which came to be regarded as dynamic rather than static (Tushman and O'Reilly, 1997). This evolution was accompanied by a change in perceptions about the fundamental role of technology, which was no longer considered to be about the transmission of information, but rather about the generation and accumulation of knowledge (Cohen and Levinthal, 1990; Winter, 1987; Nieto, 2003).

The 'fifth generation' Innovation process proposed by Rothwell (1994) recognises innovation as critical to an exceedingly wide range of activities that impinge on business success, including: (i) accelerating the development of technology-based new products; (ii) increasing flexibility and adaptability; (iii) organisational change for business success; (iv) enhanced awareness of environmental issues; (v) a greater focus on customer satisfaction and efficiency; and (vi) the accumulation and management of corporate knowledge through systems integration and networking (SIN) (Rothwell, 1994; Gupta and Wileman, 1990; Rothwell, 1994; Peters, 1988; Spiker and Lesser, 1995; Nonaka & Tekeuchi, 1995).

In June 1991, there was an ISO & CEN Agreement in Vienna called Vienna Agreement (VA). The VA is an agreement on technical cooperation between ISO and the European Committee for Standardization (CEN) that replaced the Agreement on exchange of technical information between ISO and CEN (Lisbon Agreement) concluded in 1989. Finally, the VA was approved by ISO Council and the CEN Administrative Board in 2001.

The primary aim of the VA is to avoid duplication between standardization at international and European levels, for the benefit of contributors to, and users of, standards. The VA recognises the primacy of international standards, but also recognises that might be particular needs for standards (e.g. in EU) for which a need has not been recognised at the international level, and some basic principles are that transfer work from CEN to ISO is the preferred route. However, is not an automatic practice, but is feasible through parallel ISO-CEN approval procedure. IS0 can adopt a CEN standard as an available ISO standard and CEN can adopt an ISO standard as a European Standard (ISO-VA, 2011).

In September 1992, the European Committee for Standardisation (CEN) created the 'CEN-STAR committee', which aimed to draw up European standards for Research, Development and Innovation (R&D&I). Eight years later, in 2000, the Spanish standards authority (AENOR) created its own technical standards committee (AEN/CTN 166), which consisted of relevant professionals in the field of R&D&I. Against this background, the UNE 166000 family of standards was created in 2002 to cover R&D&I management in Spain (Mir-Mauri and Casadesus-Fa, 2008).

As we commented in the introduction, some first case studies made initial contributions to the UNE 166002 subject in the early years following its issue. Initial implementation evaluations revealed that ICTs (Information and Communication Technologies) play an important role in its implementation in an organization (Mir-Mauri and Casadesus-Fa, 2008). In the construction sector, Pellicer et al. (2008) developed a model of implementation of this standard, concluding that UNE 166002 is highly interesting for construction firms because it acts as a plus to help secure public purchase contracts.

Mir-Mauri and Casadesus-Fa (2011) made contributions in a comparative analysis between this standard and standards in other countries such as the British Standard BS 7000-1:2008 Innovation management. Romero-Cuevas et al. (2010) also found that implementing a management system based on UNE 166002 in a biomedical research centre is a good solution for improving innovation management and resource optimization.

To date, the European Committee CEN/TC 389 that was created in 2008 is still working on the standardisation of innovation management at European level (Mir and Casadesus, 2011).

As previously noted, Rothwell (1994) proposed a 'five-generation' (5G) framework for the development of innovation, furthermore the 'sixth generation' (6G) of innovation processes (Mir and Casadesus, 2011) could thus be constituted by the '5G' model (Rothwell, 1994), but with the additional feature of now being managed through a standardised management system based on the UNE 166002 standard, or similar subsequent InnMSs as an updated evolution of the '5G' of Rothwell (1994).

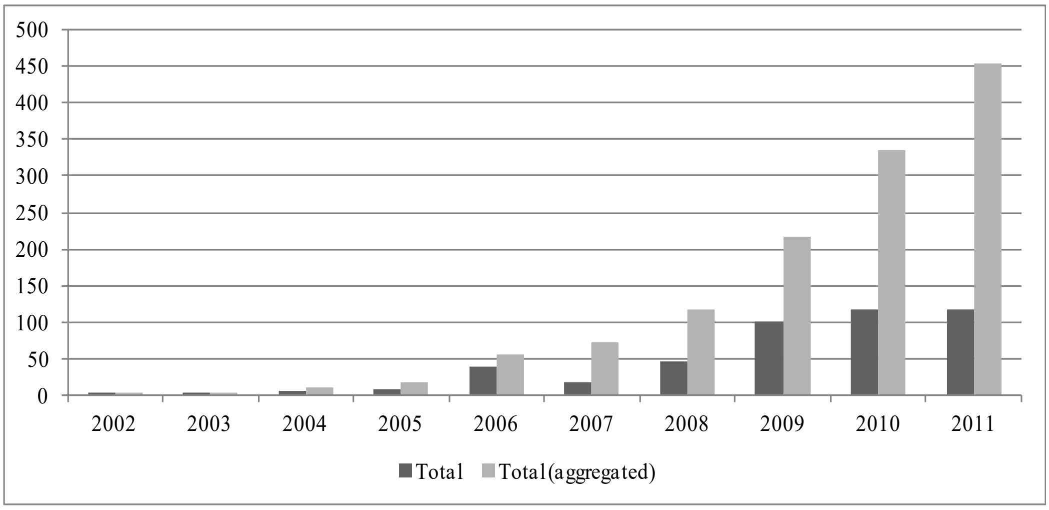
3. Literature review

3.1. Data set

The data used for this study have been collected by visiting the websites and emailing the six firms (AENOR, AIDICO, IVAC, EQA, Bureau Veritas Certification and SGS) accredited by the National Spanish Accreditation Agency (ENAC, 2012), as well as from the ISO survey (2011) and the WDB (2011).

Most of the Spanish certificates have been issued by AENOR, which represents almost 80% of the total of certificates, although lately this trend has diminished, mainly because of the entrance into the market of other accredited firms such as Bureau Veritas and SGS (since 2006), EQA and AIDICO (since 2009). IVAC has not issued any certificates. To follow, Figure 1 presents the number of certificates per year per accredited firm.

Figure 1 - Evolution of the total number of UNE 166002 certifications during the period 2002-2011



Source: Updated data from Mir and Casadesus (2011), compiled from AENOR, AIDICO, IVAC, SGS , Bureau Veritas and EQA

The number of firms certified with UNE 166002 has grown steadily each year. Figure 1 confirms this upward trend with the aggregated number of certificates by year as well.
Data for the extrapolation is the GDP of current $ from the WDB (2011) for three scopes: Spain, European Union and World.

3.2. Logistic curve

The model used to analyse the diffusion of UNE 166002 is that proposed by Franceschini et al. (2004), and later adapted by Marimon et al. (2004, 2006, 2009, 2010 and 2011) , Casadesus et al. (2008) and Llach et al. (2011). The model can be expressed as follows:

$$N = \frac{N_0 K}{(K - N_0)e^{-r_0 t} + N_0}$$

in which:
N represents the number of certificates (a function of time);
N0 represents the number of certificates at the starting point;
K is the maximum level that can be reached (the saturation level); and the initial growth rate is determined by r0.

3.3. Extrapolation model

The extrapolation model used for the comparison at international level is the following:

$$INCERGDP = \frac{N_{CERTIFICATIONS\_SCOPE1}}{GDP_{SCOPE1}}$$

in which:

INCERGDP represents the Index of Number of Certificates by GDP

N represents the Number of certificates in a selected scope

GDP represents the Gross Domestic Product in the same selected scope as the previous one.

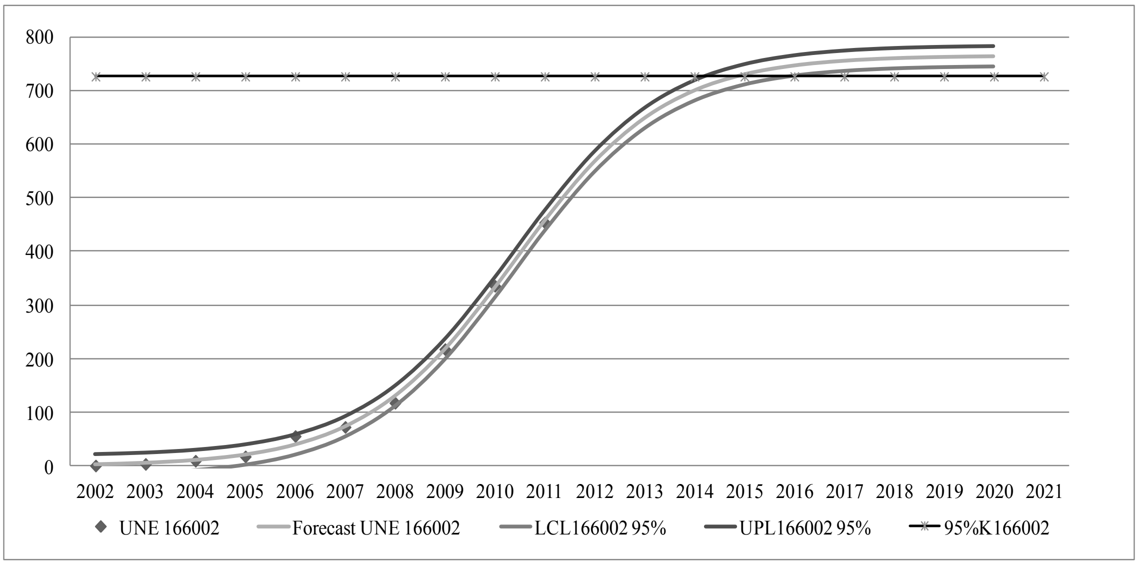
4. Results

The results and findings are twofold: firstly, the analysis of the diffusion pattern of UNE 166002, and secondly, the extrapolation to the international level in order to compare the forecasting of a hypothetic InnMS with the existing ISO 14001 and ISO 9001 diffusion patterns, widely studied in the literature.

4.1. Analysis of the diffusion of UNE 166002

Figure 2 presents the diffusion of UNE 166002 during the period 2002 - 2011. It is apparent that the logistic model provides a good fit for the data on the current number of certifications, with a fit of more than 99% for r squared in the curve. In terms of the current diffusion status (‘initial’, ‘expansion’, and ‘saturation’ levels) today we could consider that the number of certificates is in expansion, according to Stoneman’s (1995) taxonomy.

Figura 2 - Logistic curve and forecast of UNE 166002 certifications



	Sum Sq	DF
Regression	388913.698	3
Residual	452.302	7
Uncorrected Total	389366	10
(Corrected total)	223471.6	9
R squared	.998	

	Value	LI	UI
N_0	2.978	.960	4.996
K	764.496	541.786	987.207
r_0	.659	.544	.774
LI: Lower limit of the 95% confidence interval. UI: Upper limit of the 95% confidence interval.			

Source: own elaboration

4.2. Extrapolation to international scale

Using the INCERGDP index and the data of the number of UNE 166002 certificates in Spain there is a result of a hypothetic InnMS at European and International scale, see table 1.

Table 1 - Extrapolation data from UNE 166002 number of certifications in Spain to a hypothetical CEN or ISO Innovation Management Standard

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Spain[1]	1.46	4.53	9.58	15.93	45.35	50.63	74.03	148.90	238.74	322.58
EU[1]	13.64	51.65	126.14	218.97	665.10	858.46	1,351.24	2,428.58	3,872.98	5,233.14
World[1]	48,53	169,59	404,38	727,19	2.245,24	2.827,42	4.538,48	8.649,23	15.070,02	20.362,47
EU[2]	128	589	1.662	3,011	9,754	14,557	24,663	39,611	6,831	84,896
World[3]	1,616	6,354	17,076	33,202	111,154	157,908	278,229	502,419	951,278	1,285,358

[1] INCERGDP ($x10^{12}$)

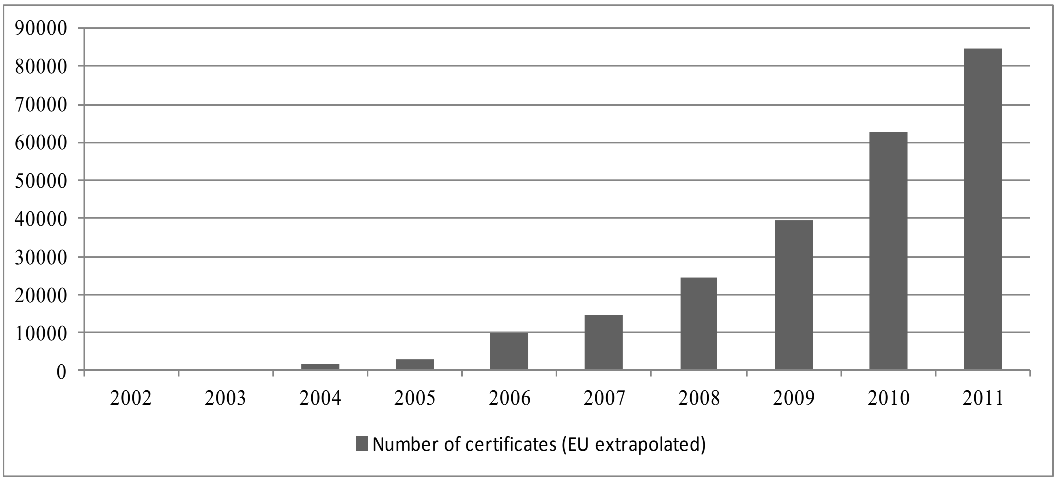
[2] extrapolated number of certificates EN-INNOV (aggregated)

[3] extrapolated number of certificates ISO-INNOV (aggregated)

Source: own elaboration

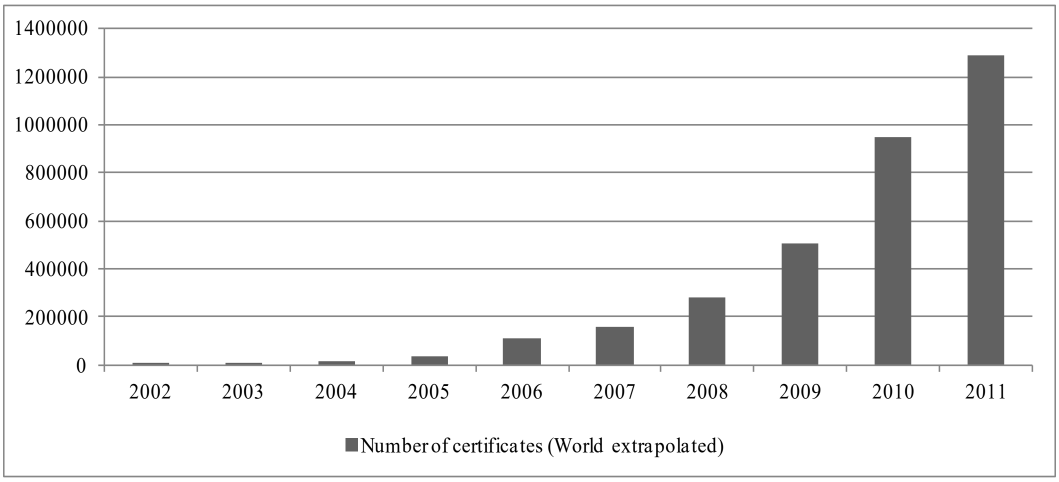
As we can see in Figures 3 and 4, there is a growing evolution of the number of certifications were the UNE 166002 a CEN or ISO standard for Innovation Management. In the case of European scope, today this could be approaching 85,000 certifications. In the case of an International standard, today there could be more than 1,200,000 certifications worldwide.

Figure 3 - Extrapolation evolution of UNE 166002 to European scale



Source: own elaboration

Figure 4 - Extrapolation evolution of UNE 166002 to international scale



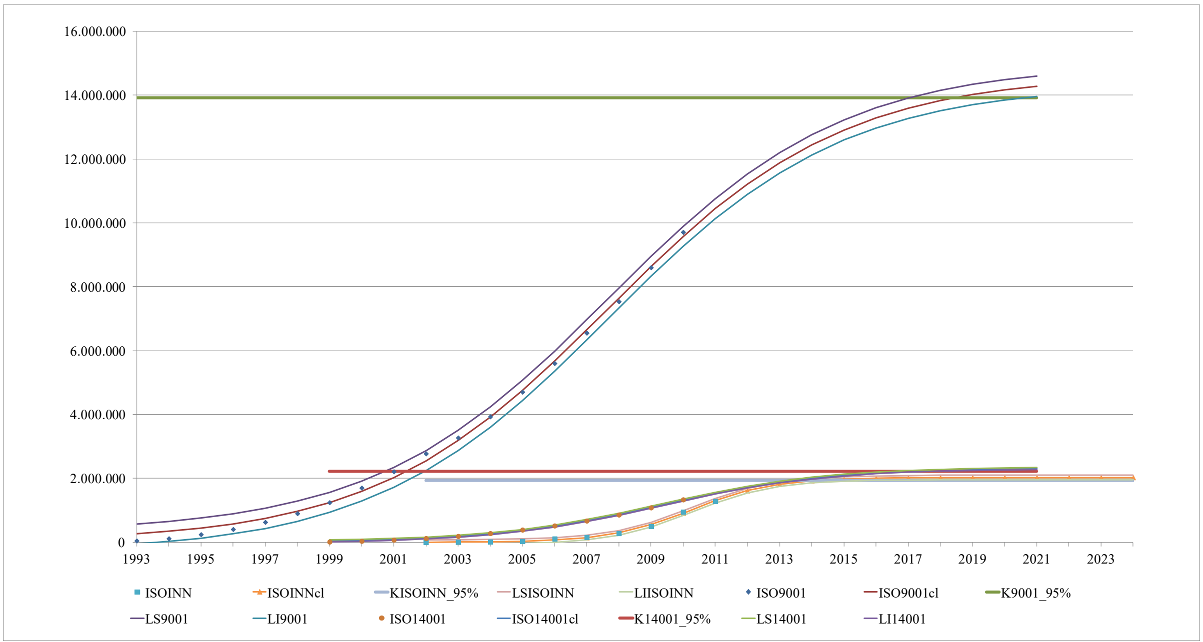
Source: own elaboration

4.3. Comparative diffusion analysis with ISO 9001 and ISO 14001

Finally we have considered it interesting to check the diffusion pattern with a logistic curve of the extrapolated data of UNE 166002 to the hypothetic InnMS at International scale with the most common international standard certifications (ISO 9001 and ISO 14001) to compare all three standards on the same scale.

Figure 5 is the representation of this comparative of the trending number of certificates ISO 9001, ISO 14001 and InnMS as an ISO speculation. We can see a parallelism with the ISO 14001 diffusion pattern, but both are somewhat lower than ISO 9001 because the latter focused on Quality Management and early issues had a higher impact as one of the requirements of the same standard was that any certified firm had to ask their suppliers to implement and certificate with the same ISO 9001 standard.

Figure 5 - Comparative of extrapolated InnMS diffusion at international level with ISO 9001 and ISO 14001 diffusion patterns



UNE166002	Sum Sq	DF
Regression	2,9x10^12	3
Residual	6,2 x10^9	7
Uncorrected Total	2,9 x10^12	10
(Corrected total)	1,8 x10^12	9
R squared	.997	

	Value	Ll	Ul
N_0	3,005.881	-537.989	6,549.750
K	2.02 x10^6	1.34 x10^6	2.71 x10^6
r_0	.788	.601	.974
Ll: Lower limit of the 95% confidence interval. Ul: Upper limit of the 95% confidence interval.			

ISO9001	Sum Sq	DF
Regression	3.6 x10^14	3
Residual	3.2 x10^11	15
Uncorrected Total	3.6 x10^14	18
(Corrected total)	1.6 x10^12	17
R squared	.998	

	Value	Ll	Ul
N_0	258,810.526	199,877.445	317,743.607
K	1.46 x10^7	1.25 x10^7	1.67 x10^7
r_0	.274	.248	.299
Ll: Lower limit of the 95% confidence interval. Ul: Upper limit of the 95% confidence interval.			

ISO14001	Sum Sq	DF
Regression	4.7 x10^12	3
Residual	3.0 x10^9	7
Uncorrected Total	4.7 x10^12	10
(Corrected total)	2.1 x10^12	9
R squared	.999	

	Value	Ll	Ul
N_0	41,794.276	31,337.495	52,251.056
K	2.33 x10^6	1.83 x10^6	2.83 x10^6
r_0	.389	.345	.432
Ll: Lower limit of the 95% confidence interval. Ul: Upper limit of the 95% confidence interval.			

Source: own elaboration

5. Discussion and conclusions

There has been a wide diffusion of management systems, especially quality and environmental management systems and standards, in recent decades. Academic study of the diffusion of management systems has usually been analysed from a cross-national perspective (see e.g., Franceschini et al., 2004, Corbett, 2006, Marimon et al., 2006, 2009, 2010, and Casadesus et al., 2008). Lastly, some studies have even analysed the diffusion according to activity sectors in the case of the two most diffused standards, ISO9001 (Llach et al., 2011) and ISO 14001 (Marimon et al., 2011).

In the present study, for the first time, as far as the authors know, the diffusion pattern of UNE 166002 has been analysed in the Spanish scenario. The realization of this study allows some conclusions to be extracted.

Firstly, the rapid increase in the total number of innovation management standard certificates issued in Spain is noteworthy. At the end of 2011, the total number of certified firms was already over 454. Secondly, following the methodology proposed by the literature, the trend of this increase follows a logistic curve in a similar way to ISO 9001 and ISO 14001 as previous studies. The Spanish standard has no peculiarities. And finally, according to the logistic curve, today, the market is still in expansion because the 454 certificates represent just 60% of the market. Based on the results, the saturation market forecast will not be reached until the year 2016. In terms of comparison with the most implemented ISO standards, ISO 9001 and ISO 14001, our analysis demonstrates that the hypothetic ISO InnMS would follow a similar pattern of the ISO 9001 and 14001, at worldwide level. Nevertheless, in terms of number of certificates, InnMS would be more similar of ISO 14001 than ISO 9001. The apparent reason would be the fact that ISO 9001, since the own standard requires to the certified firms that their suppliers should be certified, is the most diffused standard around the world.

However, the curves should be adjusted every year when new certifications are issued and, therefore, the saturation markets forecast will be modified constantly.

The findings of this study should be of interest for both academics and practitioners. For scholars, these empirical conclusions should be of interest, particularly for the line of research that analyses the diffusion pattern and adoption of ideas, models, systems, and tools for business management.

And finally, for the practitioners, that are leading with this type of certification; including accreditation organisations, certifying bodies, and business consultants specialising in the implementation of the UNE 166002 standards. As there is a CEN/TC 389 Technical Committee still developing a set of European InnMSs, we speculate as to whether the extrapolation model, proposed in the present paper, could become a reality in coming years. Even if a CEN Innovation Management standard is going to appear, it may become an ISO standard in a natural way if we take in account the CEN & ISO Vienna Agreement signed in 1991 (ISO-VA, 2011) in which the collaboration between CEN and ISO standardization procedures are much more focused on working together in order to avoid duplicities. Further research could be carried out in the same manner by sectors and by other scopes and other standards.

Regarding the limitations of this type of analysis of prediction based on mathematical models, the validity of the data is crucial. In this sense, the mathematical model must be updated annually in order to establish the saturation level of the diffusion which is growing while more data is collected.

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