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The evolution of intensity certification in ISO 9001 and ISO 14001: a comparative analysis by countries

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STRUCTURED ABSTRACT

Purpose -This paper has two main objectives: the first one is to provide a literature review of the most widespread management standard certificates, ISO 9001 and ISO 14001 and the second one is to pursue and intensify the previous researches about certification intensity level in both ISO standards.

Design/methodology/approach - We will trace the evolution of ISO 9001 and ISO 14001 in terms of diffusion, improvements, and analogies from their inceptions until nowadays. For each standard, we will look at its internalization and its decertification.

For this purpose, 16 countries have been selected along the period from 1999, the first year covered by ISO Survey in relation to both ISO 9001 and ISO 14001, until 2014.

An analysis on the evolution pattern of certification intensity levels for each country will be provided by plotting the intensity certification rates of both standards. A particular attention will be paid to China, Italy, Japan and Spain.

Findings – Through both quantitative and qualitative analysis, the patterns for the selected countries have been traced. Every country shows a specific trend because of its idiosyncratic history and of its increasing participation in the international economic context. Nevertheless, some categorizations are provided, focusing more on similarities than on dissimilarities countries' patterns can show. For this purpose, the classification into expansive, mature, retrocessive behavior is used.

Originality/value - Particular attention is paid to the studies conducted by Marimon, Casadesùs, and Heras resulting in two articles published in 2008 and 2010. Based on these, our analysis will

focus on the concept of certification intensity level aiming at discovering how much a country is certified against its wealth and how its certification level evolves over time.

Keywords: ISO 9001, ISO 14001, evolution, intensity level.

Paper type Research paper

INTRODUCTION

The current study aims at pursuing and intensifying the previous researches conducted by F. Marimon et al. about certification intensity level in both ISO 9001 and ISO 14001 standards. In particular, it has its origins in the two following articles: *ISO 14001 diffusion after the success of ISO 9001 model* and *Certification intensity level of the leading nations in ISO 9000 and ISO 14000 standards* (Marimon et al., 2008) (Marimon et al., 2010).

In the former, what is most relevant for our research is the identification and the classification of the three differentiated behaviors that Marimon et al. have detected by observing the country “movements” on the graph built.

The distinguished behaviors are named *expansionist* since an upwards relation is dominant, *mature* since a negative relation is present and finally *retrocessive* as a downward relation is relevant.

Thus a country shows an expansionist behavior when it presents a of growth phase for both standards rates, a mature one when it has an increasing ISO 14000 intensity rates but a decreasing ISO 9000 rates and a retrocessive one when it lives a decertification stage in both standards.

The latter provides the guideline of our research, concerning both the selection of the leading countries and the definition of the certification intensity index. Therefore, the leading countries comprises only the following four countries: China, Italy, Japan and Spain. They have been selected for two reasons. The first is that at that time they had the highest rankings in both of the amount of ISO 9000 and ISO 14000 series certifications, the second that they presented the highest growth rates in certifications.

ISO 9001 overview

ISO 9001 is the standard that gives the guidelines for a Quality Management System. It belongs to the ISO 9000 family, which provides other 16 standards to help an organization on aspects as performance improvements, auditing, training and so on in terms of quality. Nevertheless, ISO 9001 is the only standard in the ISO 9000 series that can be used for certification.

Currently the latest available version is ISO 9001:2015, released on Wednesday 23rd September

2015. This moment was considered by important specialists in the field as “beginning of a new era in the development of quality management systems”.

ISO 9001 has been updated to take into account the different challenges that businesses now face. For example, increased globalization has changed the way we do business and organizations often operate more complex supply chains, and there are increased expectations from customers. ISO 9001 needs to reflect these changes in order to remain relevant. Moreover, it is more compatible with other management systems, such as ISO 14001, ISO 22301, ISO 27001 and ISO 20000, making the integration even easier.

ISO 9001:2015 represents the first major revision since 9000. The scope of the standard has not changed. However, the structure and core terms were modified to allow the above-mentioned integration more easily with other international management systems standards. It also brings many challenges for implementation, transition, and maintenance of the QMS, as enhancement of the process approach and PDCA cycle, decentralization of the system and spread of responsibilities for the QMS throughout the organization, greater involvement of the top management in the QMS, introduction of risk-based thinking in the QMS and higher emphasis on performance monitoring.

ISO 14001 overview

In the field of environment, ISO has developed standards that help organizations to take a proactive approach to managing environmental issues: the ISO 14000 family. These series can be implemented in any type of organization in either public or private sectors.

Beyond ISO 14001, other 20 international standards belong to this family. Nevertheless, organizations can only register to ISO 14001, as well as to ISO 9001 in ISO 9000 series.

ISO 14001 is the principal management system standard, which specifies the requirements for the formulation and maintenance of an Environmental Management System EMS. This helps to control environmental aspects, reduce impacts and ensure legal compliance.

To keep in mind, ISO 14001 does not state requirements for environmental performance, but maps out a framework that a company or organization can follow to set up an effective EMS, as well as ISO 9001 does for a QMS.

In-line with ISO's commitment to review their standards regularly to ensure they remain recognized as best practice, ISO 14001 presents two revisions of the one published in 1996: the first in 2005 and the latest in 2015.

This revised ISO 14001 was published on 9th September 2015, 10 years later the previous ISO 14001:2005. This is an important step forward for a critical environmental standard. In fact, all environmental challenges, i.e. water, air, soil, waste, biodiversity, ecosystem services, climate challenges, etc., are incorporated in one standard.

The new version responds to the latest trends, such as an increasing recognition by companies of their impact on the environment. It implies a bigger need to better understand and manage this impact. The changes also ensure that the standard is compatible with other management system standards to facilitate the integration processes. Moreover, ISO 14001:2015 focuses mainly on sustainable development by incorporating a new way of thinking. In fact, the purpose is not only to prevent pollution and wastefulness, but also to protect the environment from harm and degradation. With this in mind, it is not surprising that key improvements in this version are associated to increased prominence of environmental management within the organization's strategic planning processes, greater input from leadership and a stronger commitment to proactive initiatives that boost environmental performance. Additionally, ISO 14001:2015 requires a focus on life-cycle, considering each stage of a product or service, from development to end-of-life and a more effective communication strategy.

LITERATURE REVIEW

The introduction of ISO 9001 and ISO 14001 took place in different moments, that is in 1987 for the former and in 1996 for the latter, and for different reasons, that is of quality management for the former and of environmental management for the latter.

Nevertheless, both certifications present very similar structure and philosophy. In fact, during the elaboration of the ISO 14000 standard, the ISO's technical committee TC207 have understood that the new standard had to be consistent with the previous successful ISO 9001 in order to promote its acceptance and its diffusion. Moreover, this would foster a smooth integration between quality and environment management systems with the resulting benefits in efficiency and in costs (Poksinska et al., 2003). Therefore, these two certifications are connected since their origin.

Several studies have been conducted to explore the relationship between ISO 9001 and ISO 14001 in terms of analogies, benefits, diffusion, drivers and degree of environmentalism. Corbett & Kirsch (2001) have been the firsts to carry out relevant findings by their qualitative and quantitative analysis of organizations in six countries. A key finding of this paper is that patterns of international certification to ISO 14000 are strongly correlated with those to ISO 9000, even though there are other significant explanatory factors like export-propensity and environmentalism.

By further exploring the drivers of ISO 14000 certifications and providing a different model from the Corbett and Kirsch one, Vastag, (2004) had achieved similar results.

Marimon et al., (2006) have analyzed the worldwide diffusion process of ISO 9000 and ISO 1400 standards determining that the pattern of diffusion is similar for both certifications and that the diffusion phenomenon is parallel trough different sectors of economic activity.

With this in view, it appears clear that in most cases the sequence of implementation trails the publication of standards, namely ISO 9001, the most common tool for the Quality Management Systems QMS, is usually followed by an ISO 14001 to comply with the Environmental Management System EMS. The studies conducted by Karapetrovic & Casadesùs, (2009) confirm this sequence of implementation in the development of an Integrated Management System IMS. Marimon et al. (2006) have analyzed the worldwide diffusion process of ISO 9000 and ISO 1400 standards determining that the pattern of diffusion is similar for both certifications and that the diffusion phenomenon is parallel through different sectors of economic activity.

It is no coincidence that more and more companies adopt and implement the integration of quality and environmental standards in order to wholly satisfy customer's needs of innovative and environmentally friendly products (Simon & Yaya, 2012). Heras-Saizarbitoria & Boiral, (2013) give a valuable summary on ISO 9001 and ISO 14001 by focusing on different from various perspectives.

RESEARCH METODOLOGY

The concept of certification intensity level is aiming at discovering how much a country is certified against its wealth and how its certification level evolves over time.

To build a similar index, therefore it needs to possess two kinds of data: the number of certifications and an economic performance indicator, both by each country for each year. For the formers the database used is *ISO Survey of Management System Standard Certifications, 2014* and for the latters *World Bank, International Comparison Program database*.

Once all data achieved, the next step is to compute the certification intensity indexes and then to build the evolution pattern of the certification intensity levels for each country.

Before proceeding ahead, a broad view of the data source is provided in the following sections.

ISO

International Standard Organization is an independent, non-governmental international organization with a membership of 162 national standards bodies. Through its members, it brings together experts to share knowledge and develop voluntary, consensus-based, market relevant International Standards that support innovation and provide solutions to global challenges.

The aim of International Standards is to make things work. They give world-class specifications for products, services and systems, to ensure quality, safety and efficiency. They are instrumental in facilitating international trade.

ISO has published more than 20500 International Standards and related documents, covering almost every industry, from technology, to food safety, to agriculture and healthcare. ISO International Standards affect everyone, everywhere.

World Bank

The World Bank is a vital source of financial and technical assistance to developing countries around the world. It is not a bank in the ordinary sense but a unique partnership to reduce poverty and support development through policy advice, research and analysis, and technical assistance. To ensure that countries can access the best global expertise and help generate cutting-edge knowledge, the Bank is constantly seeking to improve the way it shares its knowledge and engages with clients and the public at large. For example, World Bank provides the Open Data website in order to offer free access to comprehensive, downloadable indicators about development in countries around the globe.

Computing certification intensity indexes

By focusing on ISO 9001 and ISO 14001, in 2014 1138155 and 324148 are respectively the bundle of certifications released for each one. Currently the 16 countries as follows represent the most ISO certified countries and together they cover more than 79% of ISO 9001 certifications distributed globally and more than 81% of ISO 14001 ones: China, Italy, Germany, Japan, India, United Kingdom, Spain, United States of America, France, Australia, Romania, Brazil, Colombia, Czech Republic, Republic of Korea and Malaysia. That is why they represent a good sample to analyze. Once all data for each selected country is achieved, the next step is to compute the certification intensity indexes. To avoid any confusion and to be concise, we will label the certification intensity index of ISO 9001 as $p9$ and that one of ISO 14001 as $p14$. We need to compute both for each country for each year of the already defined period.

Then,

$$p9_t = \frac{N9001_t}{G_t}$$

$$p14_t = \frac{N14001_t}{G_t}$$

where $N9001_t$ is the number of ISO 9001 in the t year, $N14001_t$ is the number of ISO 9001 in the t year and G_t is the GNI based on PPP in the same t year.

This analysis covers the period between 1999 and 2014, for a total amount of 15 years.

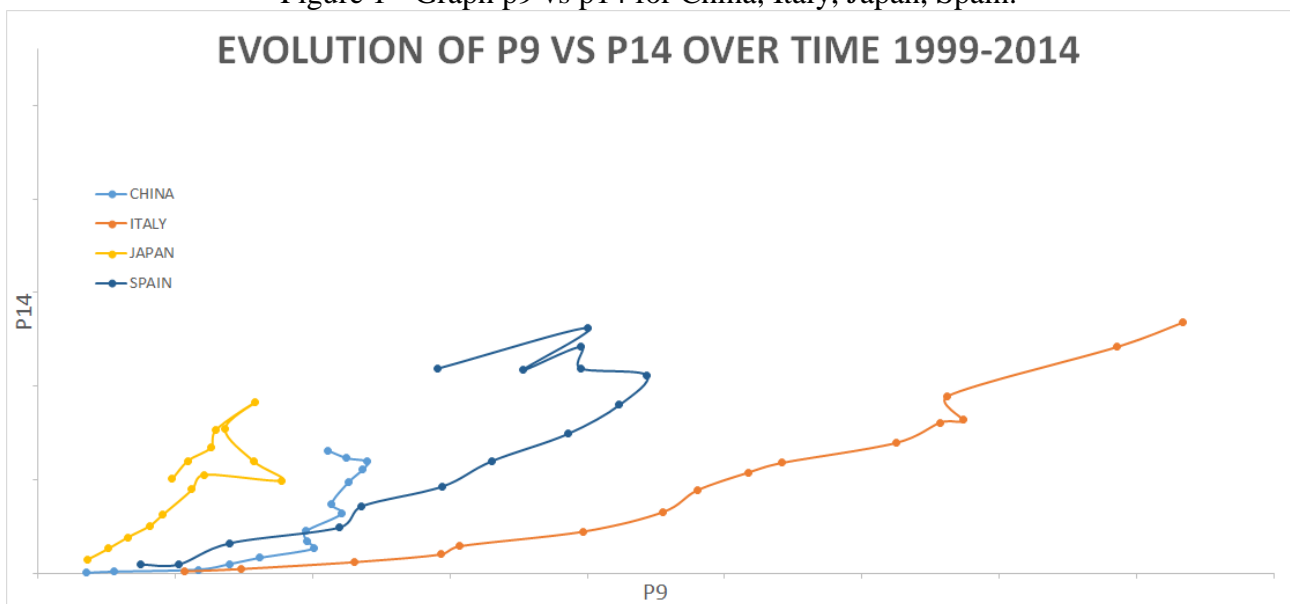
For each one of the two standards, we will compute 240 indexes (15years*16countries), for a total amount of 480. The intensity indexes are in the scientific notation. In particular, the data for $p9$ are expressed in E-09, those of $p14$ in E-12. Before going on, we have to make some

annotations about the findings: for both p9 and p14, Romania's indexes are up to 2012 included and some countries (i.e. China, Japan, Spain, United States of America, Brazil and Czech Republic) miss their indexes for 2014. These deficiencies are due to the lack of data about GNI based on PPP in 2014. From now on, we will ignore the exponential part and use only the digits such as it will be easier understand and read the graphs and the data themselves.

The certification intensity indexes p9 and p14 are useful to effectively analyze the relationship between ISO 9001 and ISO 14001 certifications.

For this purpose, we will plot the certification intensity rates for both standards on the same graph for our 16 countries. The graph thus obtained shows the evolution pattern of the certification intensity levels for each country. In fact by this, it is possible to observe the path each individual country follows in the years from 1999 to 2014 with regard to the number of certifications. In Figure 1, the patterns of China, Japan, Italy and Spain are provided as example.

Figure 1 - Graph p9 vs p14 for China, Italy, Japan, Spain.



An interesting phenomenon: the decertification

The phenomenon of decertification is going to increase for both ISO 9001 and ISO 14001 certifications. Essentially, there are two ways of thinking about motivations of abandoning the standards.

Firstly, it would seem that a market exhaustion has been achieved. In fact, if at the beginning certifying against a standard could bring competitive advantage and a better corporate image, nowadays companies do not have interest to invest any more money just to demonstrate a proper

implementation. Therefore, they prefer continuing to use the standard without be certified. It means each tool and procedures obtained by ISO 9001 are internalized and become simply common practices in an organization.

Secondly, part of decertification could be explained by taking into account that there are companies get the certifications but do not force themselves to implement properly the standards. Similar attitude brings no benefits to companies. Therefore, when they have to renew their certifications, they are not interesting to do it (Marimon et al., 2009) (Sansalvador & Brotons, 2015) (Heras-Saizarbitoria et al., 2016) (Bernardo & Simon, 2014).

ISO Survey of Management System Standard Certifications, 2014 reveals the data about withdraws of ISO 9001 and ISO 14001 standard. In Tables 1 and 2, we can look at ones relative to the 16 countries selected. These data cover a period of only 6 years, from 2006 until 2011. Any information about the last 5 years have not yet been released. Empty cells mean no data are recorded by ISO for that country in that year.

In absolute terms, China presents the highest number of withdraw for both standards, followed therefore by Spain and Malaysia. It appears evident by looking at the Graph 1 and 2.

A similar decline context can lead us to think the launch of the new standards, ISO 9001:2015 and ISO 14001:2015, is a way to push a recovery in certifications.

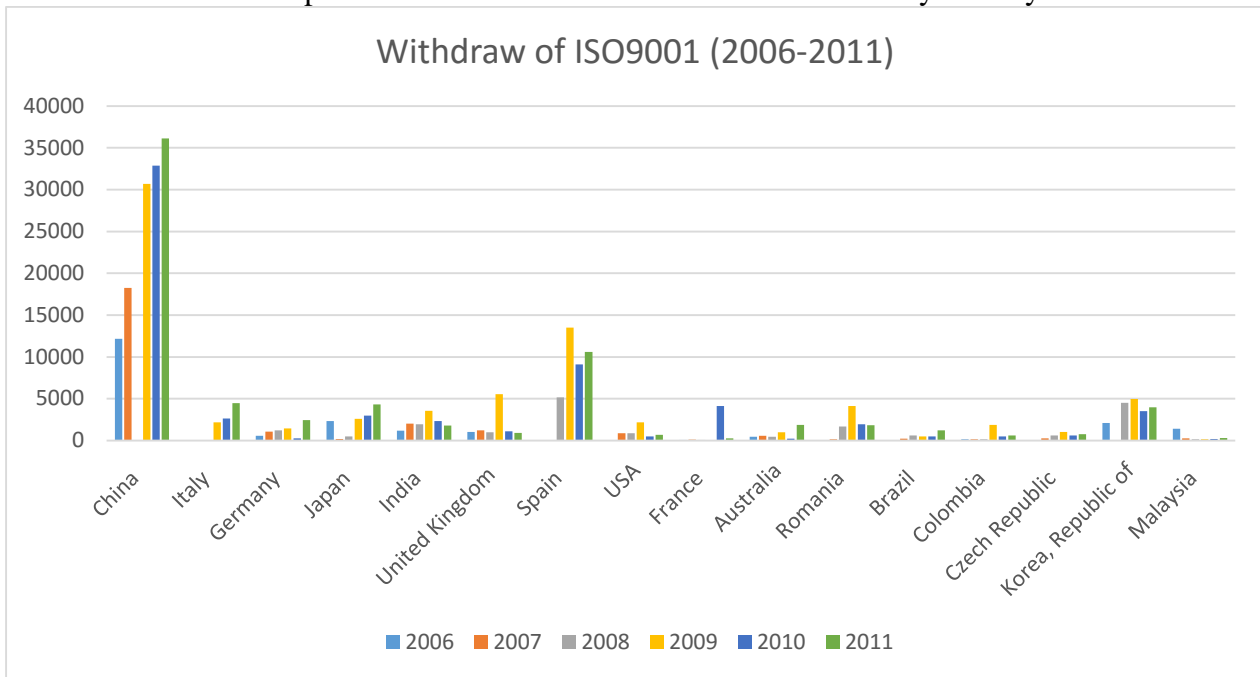
Table 1- ISO 9001 Withdraw

Country	2006	2007	2008	2009	2010	2011
China	12176	18260		30669	32848	36116
Italy				2174	2636	4461
Germany	567	1061	1226	1458	275	2435
Japan	2320	188	476	2580	2976	4323
India	1193	2034	1939	3558	2321	1808
United Kingdom	1030	1233	994	5559	1087	899
Spain			5170	13504	9118	10576
USA		863	877	2165	488	668
France	85	97	80	40	4140	269
Australia	443	573	454	981	209	1857
Romania		138	1674	4112	1942	1841
Brazil		228	607	496	485	1199
Colombia	148	151	145	1887	476	586
Czech Republic		263	618	1045	620	750
Korea, Republic of	2114		4519	4949	3504	3986
Malaysia	1402	274	137	142	203	303

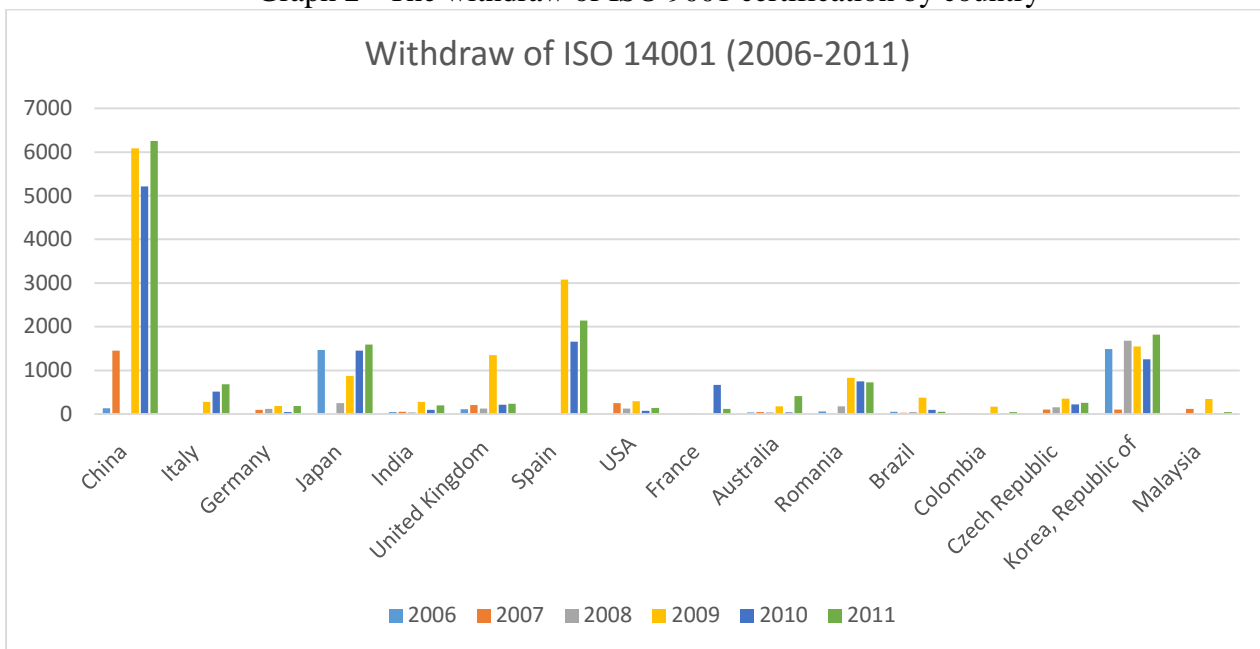
Table 2 - ISO 14001 Withdraw

Country	2006	2007	2008	2009	2010	2011
China	134	1452		6084	5217	6255
Italy				279	509	678
Germany	13	94	114	185	43	182
Japan	1466		245	874	1452	1578
India	45	54	38	278	91	194
United Kingdom	107	207	124	1347	211	236
Spain				3076	1654	2141
USA		248	124	289	76	140
France	6	4	9	5	663	113
Australia	34	42	36	175	34	411
Romania	61	7	173	825	748	728
Brazil	54	25	46	371	97	47
Colombia	16	9	2	170	14	42
Czech Republic		101	153	353	220	255
Korea, Republic of	1491	101	1679	1547	1253	1820
Malaysia	10	113	18	345	22	42

Graph 1 - The withdraw of ISO 9001 certification by country



Graph 2 - The withdraw of ISO 9001 certification by country



RESULTS

The results obtained by comparative analyses among countries are supplied here.

More specifically, we arrange two analysis. The first one focuses on the comparison among China, Italy, Japan and Spain by exploiting the investigations concerning the evolution pattern of each countries in order to verify if the trends and forecasts in the previous researches are correct and, if not, to investigate the possible causes of such discrepancies.

The second analysis offers a complete and general comparison among all other 12 countries.

Focus on China, Japan, Italy and Spain

These four countries have been chosen essentially because they were the most certified with the highest growth rates in certifications of both ISO 9001 and ISO 14001. Nowadays, the scenario is a bit different. In fact, the four countries are still in the Top 10 for number of certifications in ISO 9001 and ISO 14001 but only China and Italy are in the Top 10 for growth rates in both certifications.

Tables 3, 4, 5 and 6 show the ISO rankings provided by ISO Survey of Management System Standard Certifications, 2014.

It has to be noted that the patterns provided by Marimon et al. are referred to a period of six years, from 2002 to 2007. Instead, our patterns cover a longer period, from 1999 to 2013, in which the previous shortest is obviously included. We can see the summary graphs for both case studies in Graph 3 and 4.

According to the classification proposed by the same Marimon et al. (2008) the four countries belonged to the category of expansionist behavior. Nevertheless, at first sight, in the current researches Japan and Spain present different paths than expectations. Focusing on the final trend of their paths, in fact, we can see they do not follow an expansive behavior, as we would have expected. Instead, these two countries present a retrocessive pattern. This would confirm their absence in the Top 10 countries for ISO 9001 and ISO 14001 growth.

China, Italy, Japan and Spain occupy the highest rankings with respect to both ISO 9001 and ISO 14001 standards during the period analyzed by Marimon et al. in the *article Certification intensity level of the leading nations in ISO 9000 and ISO 14001 standards*. In particular, Italy shows the highest effort to spread ISO 9001 standard, above China and Spain, as seen in Graph 3. In fact, here we can find Italy on the right side of the graph, meaning the best intensity index in ISO 9001.

Regarding to the effort to spread ISO 14001 standard, Spain is the first by positioning above Japan and Italy. In the above-mentioned Graph 3, effectively we see the highest intensity value in ISO 14001 is provided by Spain.

Moreover, all four countries exhibit a growing trend in both intensity indexes, as their pattern towards the upper right corner demonstrate. For such reason, these countries belong to the category of expansionistic behavior, according to the classification proposed by Marimon et al., (2008).

It is also evident that Spain and Italy show similar and parallel patterns, despite the fact the former is focusing on dissemination of ISO 14001 standard, whereas the latter on that of ISO 9001. During the period analyzed by Marimon et al., the other two countries are still in earlier stages of the diffusion of both standards. Then, they present a bigger concentration on ISO 14001 certification than on ISO 9001 one. Overall, China and Japan exhibit a more moderate evolution compared to Italy and Spain.

Table 3 - Top 10 countries for ISO 9001 certificates

Top 10 countries for ISO 9001 certificates - 2014		
1	China	342800
2	Italy	168960
3	Germany	55363
4	Japan	45785
5	India	41016
6	United Kingdom	40200
7	Spain	36005
8	USA	33008
9	France	29122

Table 4 - Top 10 countries for ISO 9001 growth

Top 10 countries for ISO 9001 growth - 2014		
1	Italy	9215
2	Australia	6608
3	China	5767
4	Belarus	2833
5	Mexico	2538
6	Turkey	1794
7	Canada	1277
8	Colombia	1146
9	Portugal	965
10	Slovakia	713

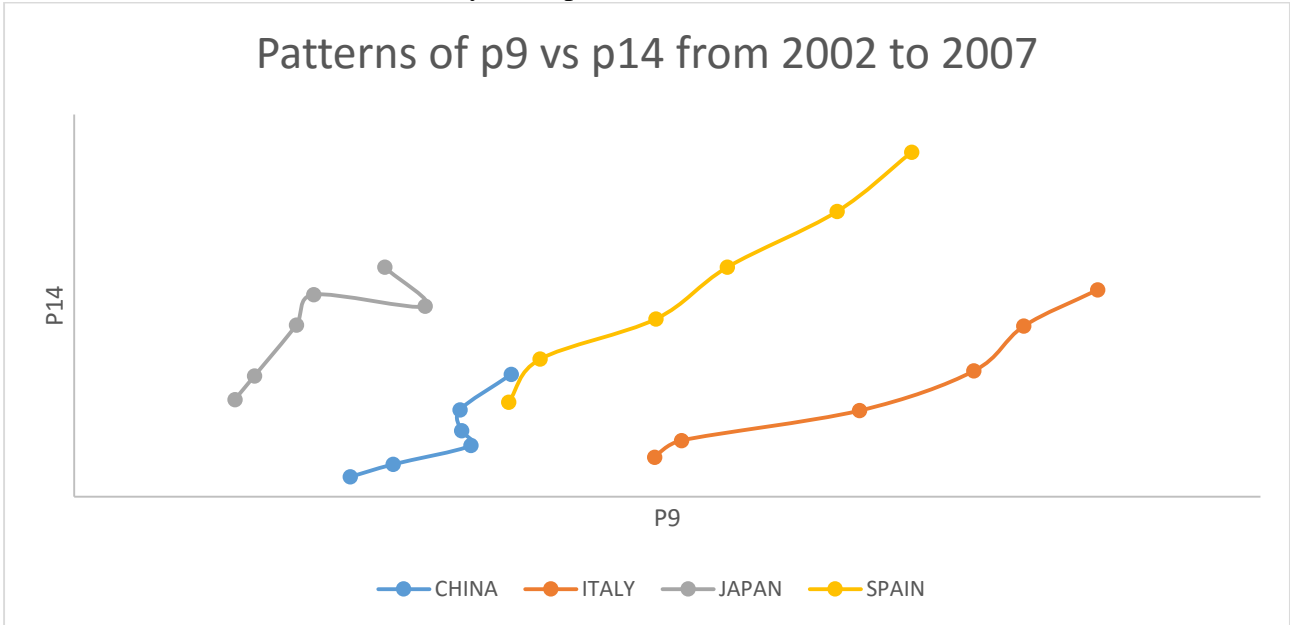
Table 5 - Top 10 countries for ISO 14001 certificates

Top 10 countries for ISO 14001 certificates - 2014		
1	China	117758
2	Italy	27178
3	Japan	23753
4	United Kingdom	16685
5	Spain	13869
6	Romania	9302
7	France	8306
8	Germany	7708
9	USA	6586
10	India	6446

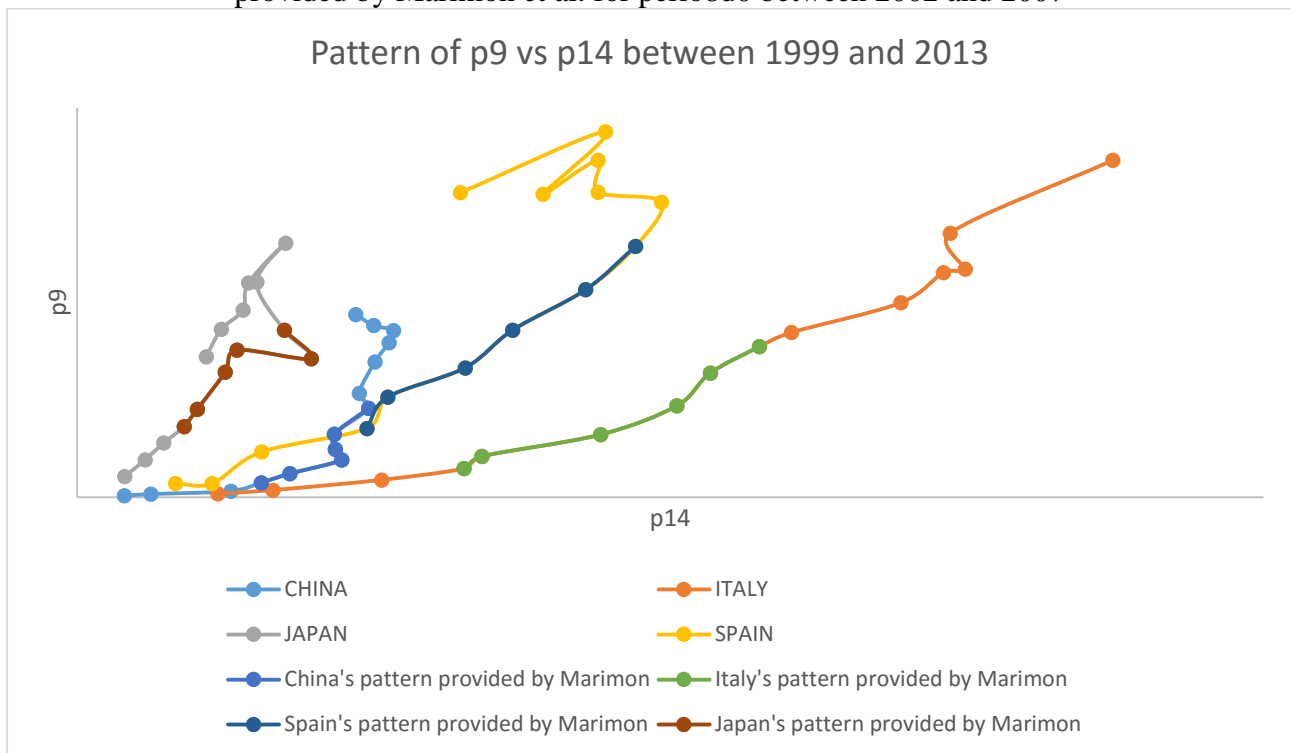
Table 6 - Top 10 countries for ISO 14001 growth

Top 10 countries for ISO 14001 growth - 2014		
1	China	13023
2	Italy	2560
3	Australia	2358
4	Czech Republic	1039
5	Colombia	667
6	India	574
7	Romania	558
8	USA	515
9	Turkey	499
10	Bulgaria	388

Graph 3 - Summary graphs provided by Marimon et al. for China, Japan, Italy and Spain from 2002 to 2007



Graph 5 - Summary graphs provided by the current study for China, Japan, Italy and Spain from 1999 to 2013 with evidence on the patterns provided by Marimon et al. for period between 2002 and 2007



To evaluate the current scenario, we need to look at how things have changed over the last years. Graph 5 shows the evolution patterns of each country in relation to ISO 9001 certification intensity level against ISO 14001 certification one. Moreover, the same Graph 5 highlights the patterns provided by Marimon et al. for the period between 2002 and 2007.

What emerges is that any country no longer shows a clear expansionistic behavior, except Italy. In fact, this last is the only country whose pattern remains regular and smooth over time. Its intensity levels in both ISO 9001 and ISO 14001 standard do not experience any stop. For this reason, Italy retains its position as the best country in ISO 9001 growth, whereas it is the second in ISO 14001 growth, behind China. Furthermore, it is the best country in terms of number of both certifications, always below China. Thus, the development of Italian pattern seems entirely suitable for the expansion expectations.

The similarity of trend shown by Italy and Spain disappears beyond 2008. Unlike Italy, Spain reaches a critical stage for its certification commitment. The movements towards the upper-left area prove a decrease in ISO 9001 certification intensity and a swing in ISO 14001 one. Because of such changes, Spain has lost its supremacy in quality and environmental certifications and currently it has no place among the leading countries ranking. Therefore, the predicted expansive behavior for Spain has been disregarded.

Nevertheless, an analogy between Spain and China emerges if their recent developments are considered. As well as Spanish, Chinese pattern moves towards the upper-left area. It implies ISO 9001 certification intensity is decreasing but ISO 14001 is not. In fact, unlike Spain, Japan continues its expansion in ISO 14001 without any uncertainty. Actually, China presents the best growth in this environmental certification, where it ranks as the third position in the growth of quality certifications. Despite the current diminishing development, China retains its supremacy in absolute terms, meaning China still owns the highest amount of certification, both quality and environmental. So far, we can say its behavior is no longer expansive rather it is mature. Finally, Japan shows the most unexpected pattern. By looking at Graph 5, we can identify a sharp reversal in Japanese trend after 2009. That is the case of a retrocessive behavior. Both ISO 1400 and ISO 9001 certification decrease. In particular, the drop of the environmental standard is much faster, as the speedy movements towards the bottom-left area demonstrate. With this in mind, it is no surprising Japan does not appear in the leading countries for growth in these two kind of certifications.

To sum up, we can state that Italy does not provide any changes in its certification expansion over time, China and Spain have moved from an expansive to a mature pattern. Instead, Japan have moved to an extraordinary retrocessive pattern directly.

Comparison among the other countries

The following section focuses on the remaining countries, which are Germany, India, United Kingdom, United States of America, France, Australia, Romania, Brazil, Colombia, Czech Republic, Republic of Korea and Malaysia. Despite each country presents its idiosyncratic evolution, we will try to identify similar trends and classify them. To this end, we distinguish the next four categories. Thus, a comparison among the countries within the same group is provided.

The typical expansive pattern

Germany, Colombia, Romania and France exhibit increasing developments. In fact, all these countries move towards the upper-right area.

To understand if they have also the same growth rate we need to plot all patterns together. By doing this, what emerges is that Romania is the most expansionist country and, because of this, its pattern hide the others completely. Among the remaining three countries, Colombia has the fastest growth in both ISO 9001 and ISO 14001 certification intensity, as shown in Graph 6. France and Germany respectively follow with more moderate certification levels.

An exclusive mature pattern

In Graph 7, two countries show unusual patterns. Since the beginning, their ISO 9001 certification intensity decrease, whereas their ISO 14001 certification level increase. That is the reason of the label exclusive mature. United Kingdom and Australia belong to this category.

By a comparison between them, we can verify the pattern of United Kingdom is smoother than that of Australia. In fact, this last country exhibits some sharp falls in ISO 14001 certifications intensity. Instead, United Kingdom has an almost continuous expansion in this same certification.

A swinging pattern

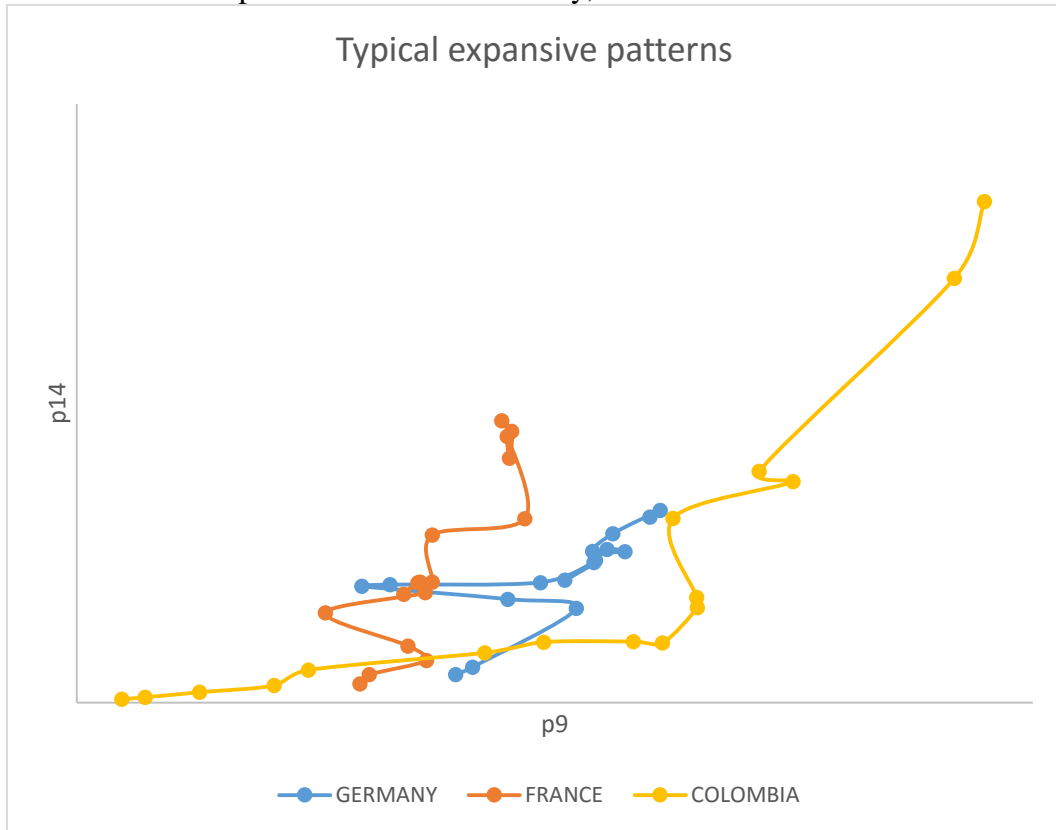
India, Malaysia, United States of America, Brazil, Czech Republic, and Republic of Korea exhibit irregular pattern. They move up and down, right and left with no particular trend. Nevertheless, it is possible investigate their size in term of growth. To end this, all six countries are plotted in a graph. It appears clear Republic of Korea and Malaysia have similar growth rate. Moreover, both show a retrocessive phase in the last few years.

In Graph 8, we can see their final reversal. Lastly, Republic of Korea has a much sharper drop in both certification intensity levels than Malaysia.

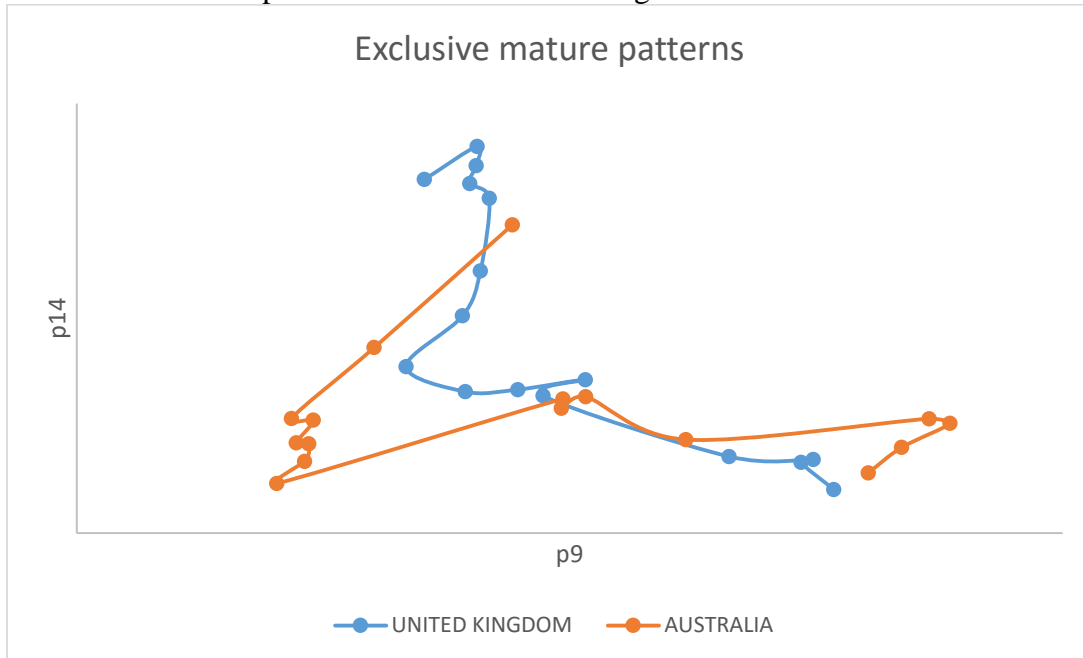
By grouping together Brazil, India and United States of America, we can verify that USA is the country with the worst growth in ISO 14001 and ISO 9001 certification intensities among them. Instead, Brazil is the best one. As Graph 9 shown, Brazilian pattern is contorted with high certification intensity period followed by low ones. It is noteworthy also the huge certification commitment in ISO 9001 certification provided by India, as the increasing curve demonstrates. However, during the last period it is progressively eroded.

Finally, we need to make some observations on the pattern of Czech Republic shown in Graph 10. It is generally expansive but presents too many bends. However, this country has the highest certification intensity in both ISO 9001 and ISO 14001 standards among all six countries.

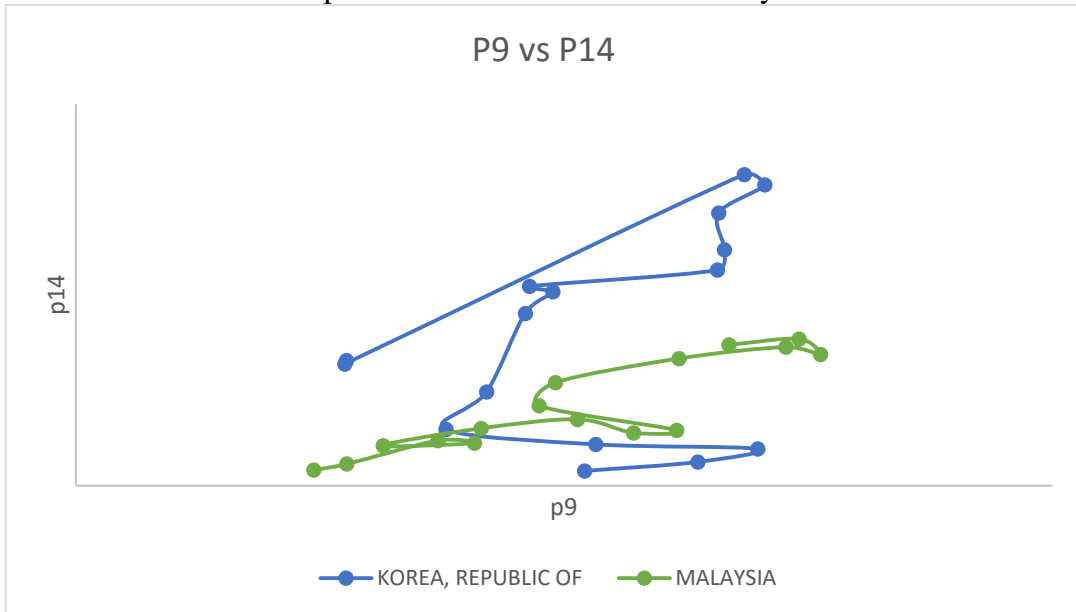
Graph 6 - Patterns of Germany, Colombia and France



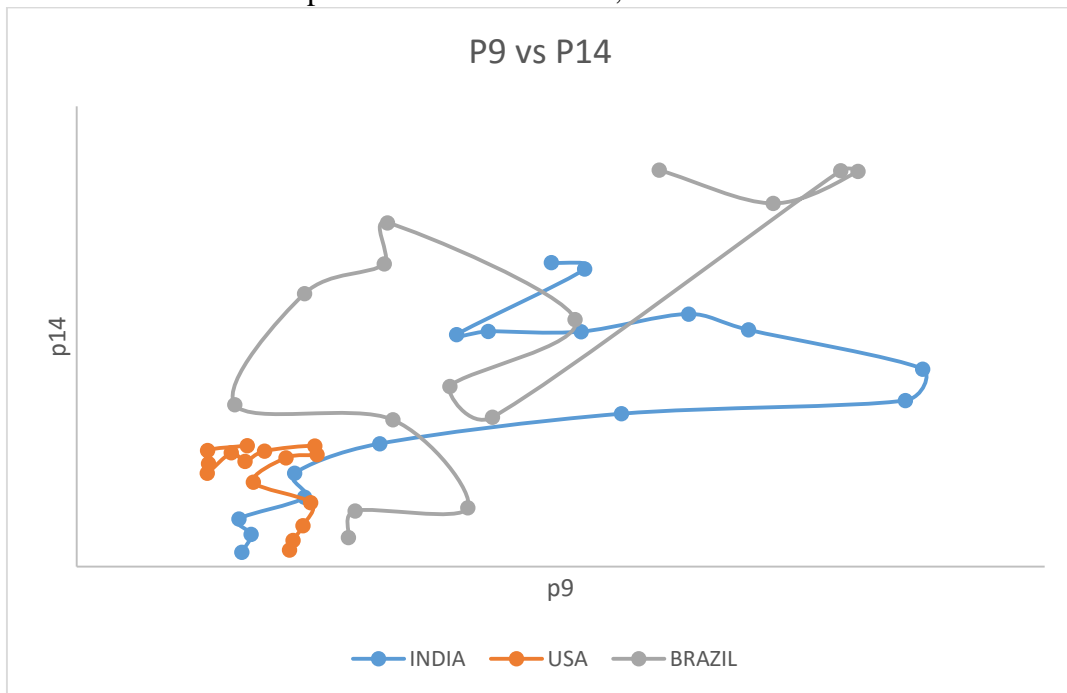
Graph 7 - Patterns of United Kingdom and Australia



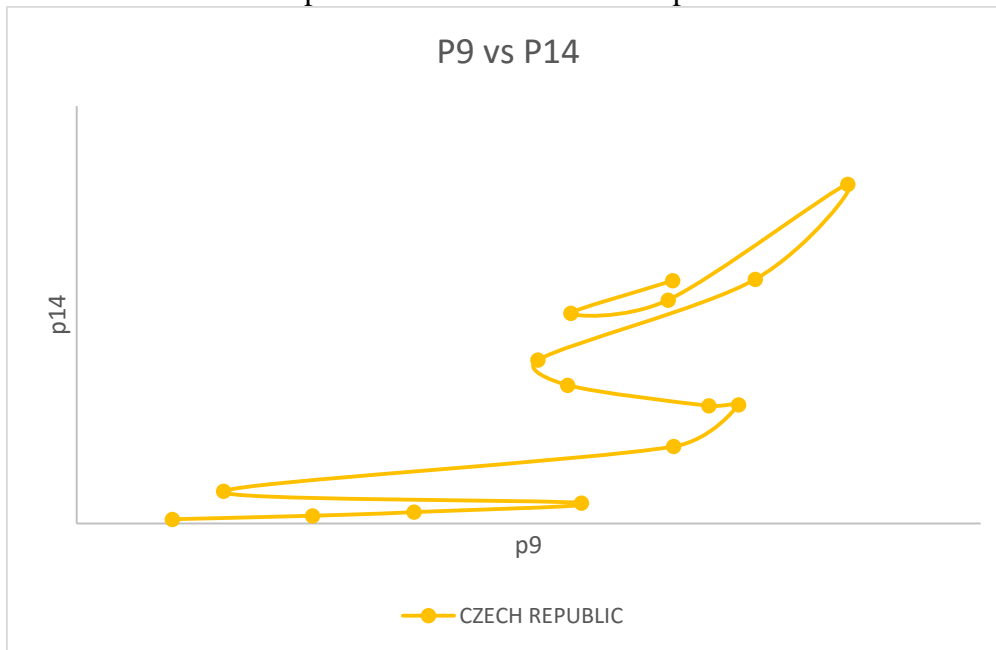
Graph 8 - Patterns of Korea and Malaysia



Graph 9 - Patterns of Brazil, India and USA



Graph 10 - Patterns of Czech Republic.



CONCLUSIONS

This research represents an investigation on how certification intensity by countries has evolved over time. Two kinds of certifications are considered, namely ISO 9001 and ISO 14001 standards. The former reflects the degree of commitment a country takes in terms of quality management, the second one in terms of environmental management.

Through both quantitative and qualitative analysis, the patterns for the selected countries have been traced. Every country shows a specific trend because of its idiosyncratic history and of its increasing participation in the international economic context. It is obvious that no country presents a real regular pattern. In fact, small fluctuations are present towards up or down, right or left. Therefore, it implies continuously drops and increases in ISO 9001 and ISO 14001 certification intensities.

Nevertheless, some categorizations are provided, focusing more on similarities than on dissimilarities countries' patterns can show. For this purpose, the classification into expansive, mature, retrocessive behavior is used.

Italy, Colombia, France, Germany and Romania continue to be expansionist countries. Australia and United Kingdom show an exclusive mature patterns. The remaining countries, namely Brazil, China, Czech Republic, India, Japan, Spain, Malaysia, Republic of Korea, United States of America show a swinging trend. It means countries experience each of mentioned behavior, including the retrocessive one.

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