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Quality tools and techniques, EFQM experience and strategy formation. Is there any relationship? The particular case of Spanish service firms

Lorenzo Revuelto-Taboada
Associate Professor
Department of Business Management (University of Valencia)
E-mail: Lorenzo.Revuelto@uv.es

Teresa Canet-Giner
Associate Professor
Department of Business Management (University of Valencia)
E-mail: Teresa.Canet@uv.es

Francisco Balbastre-Benavent
Associate Professor
Department of Business Management (University of Valencia)
E-mail: Francisco.Balbastre@uv.es

ABSTRACT: The study of the application of quality tools and techniques has been broadly covered by the specialist literature. To a lesser extent, the literature has analysed the strategic capability of the EFQM model, that is, its capacity to facilitate integrative (rational and emergent) strategy formation processes. But, the study of how the application of this model may affect how firms apply quality tools and techniques remain unexplored.

Taking this gap in the literature as a starting point, our research goal is threefold: first of all, we intend to study the relationship between the use of tools and techniques and the experience of a firm in the application of quality management and the EFQM Excellence Model; secondly, we have the intention of studying the extent to which quality tools and techniques may affect rationality and/or emergence in the strategy formation process; and thirdly, we try to analyse the effect of the experience in the use of the EFQM model on this relationship.

We employed a quantitative research methodology to try to reach these goals. As a consequence, some interesting results have come up. As an example, the experience in the application of the EFQM model has a moderating effect on how companies use quality tools and techniques. Concretely, a great experience in the employment of this model make firms to apply quality tools and techniques in a more participative way combined with high levels of formalisation and planning. Also, some other conclusions and implications have been drawn up.

KEYWORDS: EFQM model, experience in quality management, quality tools and techniques application, rationality, emergence.

Introduction

The evolution of competitive arenas in the last decades and, above all, in recent years has aroused the need for today's firms to become more adaptive, market-oriented, and prepared to facilitate the change, and this urgency is not exclusive to manufacturing firms; the service sector is also in the same situation. Total quality management (TQM) has played an important role in this search, especially in recent times, and service organisations

TÉCNICAS Y HERRAMIENTAS DE LA CALIDAD, EXPERIENCIA EN EL MODELO EFQM Y PROCESO DE FORMACIÓN DE LA ESTRATEGIA. ¿EXISTE ALGÚN TIPO DE RELACIÓN? EL CASO ESPECÍFICO DE LAS EMPRESAS ESPAÑOLAS DE SERVICIOS

RESUMEN: La aplicación de las herramientas y técnicas de calidad ha sido ampliamente estudiada en la literatura especializada. La capacidad estratégica del modelo EFQM, es decir, su capacidad para facilitar un proceso de formación de la estrategia integrador (racional y emergente), también ha sido analizada, aunque en menor medida. Por el contrario, el estudio de cómo la utilización de este modelo puede afectar a la forma en que las empresas aplican a las herramientas y técnicas de calidad constituye un área todavía no explorada.

Tomando este gap en la literatura como punto de partida, nuestra investigación se plantea un triple objetivo: en primer lugar, tratamos de estudiar la relación entre la utilización de las técnicas y herramientas de calidad y la experiencia de la empresa en la aplicación de la gestión de la calidad y del modelo de excelencia EFQM; en segundo lugar, tenemos la intención de estudiar la medida en la cual estas técnicas y herramientas pueden afectar a la racionalidad y/o emergencia del proceso de formación de la estrategia; por último, intentamos analizar el efecto de la experiencia en la utilización del modelo EFQM en esta última relación.

Para tratar de alcanzar estos objetivos, han sido empleadas metodologías de investigación cuantitativas, de las que se han derivado algunos resultados interesantes. Así, por ejemplo, los resultados han revelado cómo la experiencia en la aplicación del modelo EFQM cumple un papel moderador en relación con cómo utilizan las empresas las técnicas y herramientas de calidad. Concretamente, una mayor experiencia en la utilización de este modelo hace que las empresas apliquen estas técnicas y herramientas de forma más participativa, en combinación con altos niveles de formalización y planificación. Asimismo otras conclusiones e implicaciones de interés han sido recogidas en el trabajo.

PALABRAS CLAVE: EFQM, experiencia en gestión de calidad, aplicación de herramientas y técnicas de calidad, racionalidad, emergencia.

TECHNIQUE ET INSTRUMENTS DE LA QUALITÉ, EXPÉRIENCE DU MODÈLE EFQM ET PROCESSUS DE FORMATION DE LA STRATÉGIE. Y A-T-IL UNE RELATION? LE CAS SPÉCIFIQUE DES ENTREPRISES ESPAGNOLES DE SERVICES

RÉSUMÉ: L'application des instruments et des techniques de qualité a été beaucoup étudiée dans les publications spécialisées. La capacité stratégique du modèle EFQM, c'est à dire, sa capacité à faciliter un processus de formation de la stratégie intégratrice (rationnelle et émergente), a aussi été analysée, bien qu'à un niveau moins important. Par contre, l'étude pour savoir comment l'utilisation de ce modèle peut affecter la façon par laquelle les entreprises appliquent les instruments et techniques de qualité constitue un terrain d'étude encore inexploré. Prenant ce point de départ dans les publications, notre recherche propose 3 objectifs; tout d'abord, nous voulons étudier la relation entre l'utilisation des techniques et instruments de qualité et l'expérience de l'entreprise dans l'application de la gestion de la qualité et du modèle d'excellence EFQM. Ensuite, nous avons l'intention d'étudier dans quelle mesure ces techniques et instruments peuvent affecter la rationalité et/ou l'émergence du processus de formation de la stratégie. Finalement, nous essayons d'analyser l'effet de l'expérience dans l'utilisation du modèle EFQM dans cette dernière relation. Pour atteindre ces objectifs, des méthodologies d'investigation quantitatives ont été utilisées, et certains résultats intéressants se sont produits. Par exemple, les résultats ont révélé à quel point l'expérience joue un rôle modérateur dans l'application du modèle EFQM en rapport à la manière par laquelle les entreprises utilisent les techniques et instruments de qualité. Concrètement, une expérience importante de l'utilisation de ce modèle a pour effet que les entreprises appliquent ces techniques et instruments de façon plus participative, en combinaison avec de hauts niveaux de formalisation et de planification. D'autre conclusions et implications intéressantes ont été recueillies dans cette étude.

MOTS-CLEFS : EFQM, expérience en gestion de qualité, application d'instruments et technique de qualité, rationalité, émergence.

TÉCNICAS E FERRAMENTAS DA QUALIDADE, EXPERIÊNCIA NO MODELO EFQM E PROCESSO DE FORMAÇÃO DA ESTRATÉGIA. EXISTE ALGUM TIPO DE RELAÇÃO? O CASO ESPECÍFICO DAS EMPRESAS ESPANHOLAS DE SERVIÇOS

RESUMO: A aplicação das ferramentas e técnicas de qualidade tem sido amplamente estudada na literatura especializada. A capacidade estratégica do modelo EFQM, ou seja, sua capacidade para facilitar um processo de formação da estratégia integradora (racional e emergente), também tem sido analisada, ainda que em menor medida. Por outro lado, o estudo de como a utilização deste modelo pode afetar a forma em que as empresas aplicam as ferramentas e técnicas de qualidade constitui uma área qinda não explorada.

Tomando este *gap* na literatura como ponto de partida, nossa pesquisa propõe um triplo objetivo: em primeiro lugar, tratamos de estudar a relação entre a utilização das técnicas e ferramentas de qualidade e a experiência da empresa na aplicação da gestão da qualidade e do modelo de excelência EFQM; em segundo lugar, temos a intenção de estudar a medida na qual estas técnicas e ferramentas podem afetar a racionalidade e/ou emergência do processo de formação da estratégia; por último, tentamos analisar o efeito da experiência na utilização do modelo EFQM nesta última relação.

Para tentar alcançar estes objetivos, foram empregadas metodologias de pesquisa quantitativas, das quais derivaram alguns resultados interessantes. Assim, por exemplo, os resultados revelaram como a experiência na aplicação do modelo EFQM exerce um papel moderador em relação a como as empresas utilizam as técnicas e ferramentas de qualidade. Concretamente, uma maior experiência na utilização deste modelo faz com que as empresas apliquem estas técnicas e ferramentas de forma mais participativa, em combinação com altos níveis de formalização e planejamento. Da mesma forma, outras conclusões e implicações interessantes foram compiladas no trabalho.

PALAVRAS CHAVE: EFQM, experiência em gestão de qualidade, aplicação de ferramentas e técnicas de qualidade, racionalidade, emergência

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ADDRESS: University of Valencia, Faculty of Economics, Avda. Tarongers, s/n, 46022, Valencia, Spain.

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have been affected by this movement to the point that some literature claims that quality and satisfaction with the service have turned into the most significant factors for service firms to compete effectively in the marketplace (Chen, 2009; Edvardsson et al., 2000; Hu et al., 2009; Pao et al., 2010; Rhee & Rha, 2009; Sigala, 2009; Torres-Moraga, 2010).

TQM and continuous improvement are two topics that cannot be decoupled as the latter becomes one of the cornerstones for an effective TQM application. Also, the use of a selection of tools and techniques is necessary to support and develop a process of continuous improvement under a TQM framework. Thus, this relationship between the employment of tools and techniques under the framework of advanced quality management approaches (such as the TQM one) has been thoroughly and deeply studied by the specialized literature.

To this respect Dale (2007) hints that as the company becomes more mature on the TQM path tends to apply tools and techniques in a greater extent. More precisely, he makes reference to integration and complexity as two basic variables when analysing this relationship.

On the other hand, we can say that Business excellence models are considered useful frameworks to develop and continuously improve a management philosophy based on TQM principles (McAdam et al., 1998; Sinclair & Zairi, 2000), and that is why firms apply these models in order to adopt a TQM philosophy.

So, taking the above mentioned argument as a starting point we may derive that as the firm becomes more experienced and matured in the application of the EFQM model will tend to use continuous improvement quality tools and techniques in a greater extent, that is, in a more cumulative way and moving from the simpler to the more complex ones.

As stated before, this issue has already been studied broadly by the literature on quality management and, as a result, our contribution would be limited. However, if we introduce the strategic dimension into this picture our contribution becomes far greater. There is a debate about Excellence Models (particularly about the strategic capability of EFQM Excellence Models). Different authors (Balbastre, 2006; Balbastre & Canet, 2011; Kueng, 2000 or Williams et al., 2006) defend the strategic capability of the Model. The Model facilitates the adoption of an integrative strategy formation process in the organizations (Balbastre & Canet, 2011), more focused on participation and analysis.

At this point of our exposition some questions are arising: Is there any real relationship between the use of quality tools and techniques and the maturity and experience in the application of quality management? How are the experience and maturity in the application of the EFQM model and quality tools and techniques related? Is there any relationship between the use of advanced tools and techniques (such as the ISO 9001 standard) and the experience in the application of the EFQM Model and the features of the strategy formation process? Is the experience in the use of the model affecting how firms apply quality tools and techniques?

The research we present here aims at shedding light on these issues. Concretely, our research goal is threefold: First of all, we intend to study the relationship between the use of tools and techniques and the experience of a firm in the application of quality management and the EFQM Excellence Model; secondly, we have the intention of studying the extent to which quality tools and techniques may affect rationality and/or emergence in the strategy formation process; and thirdly, we try to analyse the effect of the experience in the use of the EFQM model on this relationship.

To try to reach these objectives we have structured this work as follows. First of all we show the theoretical framework where we analyse all the arguments to support our hypotheses. Later we make a brief reference to the research methods we have applied to the study. Then we show the main results. And finally, we draw some conclusions and implications as well as future research lines.

Theoretical framework

Quality tools and techniques and EFQM experience

As stated by the specialized literature, continuous improvement is one of the cornerstones of TQM application. In this context, "to support and develop a process of continuous improvement an organisation will need to use a selection of tools and techniques within a problem-solving approach" (Dale et al., 2007, p. 31).

A broad set of quality tools and techniques may be employed to this concern. In this range we can include from the most classical quality tools and techniques (checklists, flowcharts, the seven quality control tools, statistical process control, etc.) to other tools and techniques with a wider scope and deeper organisational implications such as benchmarking or total productive maintenance (Dale, 2007) as well as international standards such as the ISO 9001 or the ISO 14001 (Alic & Rusjan, 2011; Martinez-Costa & Martinez-Lorente, 2004; Suárez-Barraza & Miguel-Dávila,

2009; van der Wiele et al., 2001; Wilcock et al., 2006; Woerner, 1991).

These tools and techniques play a different role in the process of continuous improvement. Also, the maturity of a firm in TQM may affect how the company is going to apply them. Dale (2007), for instance, hints that as the company becomes more mature on the TQM path tends to apply tools and techniques in a greater extent. More precisely, he makes reference to integration (the use of integrated quality management tools and techniques) and complexity (the degree of use of sophisticated quality tools and techniques) as two basic variables when analysing this relationship. Particularly, the author (Dale, 2007, pp. 339-341) states that only as a result of the cumulative effect of a set of tools and techniques within a TQM approach the firm will start to see long-term benefits, and suggests that firms should begin with the application of simpler techniques (such as checklists, flowcharts or the seven original quality control tools) when the maturity and experience of the firm on TQM is short. This latter argument is also shared by Dale et al. (1998) and Fotopoulos and Psomas (2009).

Business excellence models are considered useful frameworks to develop and continuously improve a management philosophy based on TQM principles (McAdam et al., 1998; Sinclair & Zairi, 2000), and that is why firms apply these models in order to adopt a TQM philosophy. The EFQM Excellence Model is the framework commonly applied by European companies on their TQM path, like other models (Deming, Baldrige or Iberoamerican, for example) are applied in other geographical areas (Japan, US or Iberoamerica, respectively). Thus, the EFQM model embraces the TQM philosophy and encourages business improvement (Wilkinson and Dale, 2007). The latter allows us to state that the adoption of the EFQM model becomes a good indicator of TQM application.

Bearing in mind the above considerations we may formulate our four first hypotheses.

H1: *The greater the experience of a firm in quality management, the more complex the quality tools and techniques that the firm applies are.*

H2: *The greater the experience of a firm in quality management, the more integrated the quality tools and techniques that the firm employs are.*

H3: *The greater the experience of a firm in the employment of the EFQM model, the more complex the quality tools and techniques that the firm applies are.*

H4: *The greater the experience of a firm in the application of the EFQM model, the more integrated the quality tools and techniques that the firm employs are.*

Quality tools and techniques and strategy formation process. The experience in EFQM as a moderating factor

Traditionally, the study of the strategy formation process has become an important topic by the specialist literature. Some decades ago, authors such as Ansoff (1965), Lindblom (1959), Mintzberg (1990a, 1990b), or Quinn (1978) were already concerned about the analysis of how firms form their strategy, that is, how they formulate and implement their strategy to become more competitive. However, this interest has remained unaltered for today's researchers. Some examples are the works by Andersen (2004a, 2004b), Elbanna (2006), Jarzabkowski & Spee (2009), Johnson et al. (2003), or Slater et al. (2006).

The study of this phenomenon has generated two different and opposite research lines. The first one conceives strategy as a rational and prescriptive process where formal planning, formalisation and analysis are the basic features in the strategic process (Ansoff & McDonell, 1990; Ansoff & Sullivan, 1993; Brews & Hunt, 1999; Goll & Rasheed, 1997). The second one considers strategy as a process based on emergent issues such as empowerment, participation, involvement, and shared vision and values (Floyd & Wooldridge, 1996; Mintzberg, 1990b; Mintzberg et al., 1998). As a result, a considerable debate was generated in the specialist literature (Ansoff, 1991; Mintzberg, 1990b, 1991). To try to bridge these two trends, some proposals were developed more recently in the literature on strategic topics (Andersen, 2004a, 2004b; Grant, 2003; Hart & Banbury, 1994; Johnson et al., 2003). Consequently, this new research line sees strategy from an integrative perspective which puts together the need to adopt planned and rational processes and the need for flexibility and participation. In the end, this integration will facilitate a greater level of organisational flexibility (Andersen, 2004b; Grant, 2003; Regnér, 2003) and increase organisational performance (Andersen, 2004b; Brews & Hunt, 1999; Hart & Banbury, 1994; Hickson et al., 2003; Slater et al., 2006; Szulanski & Amin, 2001). In this context, Balbastre & Canet (2011, p. 4) define "*strategic capability* as the ability of an organisation to develop an integrative strategy formation process which generates, as a result, a greater organisational flexibility that leads to a greater organisational performance level", and propose that formal planning and analysis are the basic organisational variables that characterise the rational perspective whilst participation, empowerment and involvement become the primary variables underlying the emergent viewpoint in strategy formation (Balbastre & Canet, 2011, p. 8).

The study of the relationship between the application of quality tools and techniques and organisational performance has been widely covered by the specialized literature (for instance, Clargo, 2004; De Mast, 2006; Sousa et al., 2005). However, much less has been said about the link between the use of quality tools and techniques and strategy formation. Some works (Prašnikar et al., 2005; Yang & Yeh, 2009) have introduced the need to integrate some of these tools and techniques with strategic management in order to achieve positive organisational performance. But, the study of the particular dynamics and mechanisms through which these tools and techniques may affect rationality and/or emergence in strategy formation remain unexplored.

For instance, it is doubtless that the application of some complex quality tools and techniques such as the ISO 9001 standard will increase the degree of formalisation (Beck & Walgenbach, 2003; Merrill, 2003; Srivastav, 2010) and, as a result, organisational processes become more systematic and formal. Also, the application of the Balanced Score-Card (BSC) generates a greater level of formal planning in the firm and more control through the establishment of goals and indicators linked to basic organisational processes (Craig & Moores, 2005; Fletcher & Smith, 2004; Lawrie & Cobbold, 2004; Voelker et al., 2001). Thus, from this viewpoint it can be thought that the use of more sophisticated quality tools and techniques may have a positive effect on the rational perspective in strategy formation. But, the literature on these topics does not make any consideration (direct or indirect) about the relationship between the employment of simpler tools and techniques (Pareto's diagrams, control charts, statistical process control, design of experiments, for example) and strategy formation. Taking these arguments as a starting point we may formulate the following hypothesis.

H5: *The use of complex or sophisticated quality tools and techniques such as the ISO 9001 standard or the BSC will have a positive impact on the level of formalisation and, in so doing, generate more rational strategy formation processes.*

At this point it is interesting to introduce the EFQM model in our research landscape. The debate about the real strategic capability of the EFQM model is open in the specialized literature: some works argue that this model is only valid for strategy implementation purposes (Ahmed et al., 2003; Ghobadian & Woo, 1996; Leonard & McAdam, 2001, 2002, 2003, 2004; McAdam & Leonard, 2005; McAdam

& O'Neill, 1999) whilst others (Balbastre, 2006; Balbastre & Canet, 2011; Conti, 1997, 2001; EFQM, 2010; Kueng, 2000; Williams et al., 2006) show an opposing viewpoint and recognise that this model facilitates strategy formulation and implementation through rational and emergent processes (in other words, this model contributes to facilitate an integrative strategy formation process).

In this respect, Balbastre & Canet (2011) argue that the very structure of the EFQM model facilitates rationality and emergence in both formulation and implementation processes. The content of the *enablers* criteria of this model as well as the elements of its working logic, named RADAR logic[1] (*Results, Approach, Deployment, Assessment and Refinement*), (EFQM, 2010), contribute to develop organisational mechanisms, processes and systems through which formal planning and analysis (that is, rationality) together with empowerment, participation and involvement (basic variables underlying emergence) are present in strategy formulation and implementation (Balbastre & Canet, 2011, pp. 5-6).

In addition to the arguments exposed above, the analysis of the *time* variable becomes fundamental when we talk about the effect of the application of the EFQM model (Williams et al., 2006). The specialized literature (Garvin, 1991; Hendricks & Singhal, 1996, 1997, 2001; Porter et al., 1998) manifests that it is necessary a long time frame to see the effects of the application of this model on organisational results, as the areas for improvement that are identified as a result of self-assessment (the diagnosis strategic tool through which the EFQM model is adopted) do not generate organisational improvement immediately, i.e. in the short term (Balbastre & Canet, 2011).

The comments exposed above lead us to think that as the experience of a firm in the application of the model becomes greater, rationality and emergence seems to be increased in the strategy formation process. But also, this fact may generate an indirect effect on the use of quality tools and techniques. The greater experience in the application of the model may modify the way through which these tools and techniques are employed. Since this experience contributes to develop more rationality and formal planning as well as participation, empowerment and involvement, it could be hoped that as the experience in the employment of the model is higher quality tools and techniques are applied in a more formalised and participative way. This reasoning makes us establish the following research questions.

RQ1: *How the experience in the application of the EFQM model influence the strategy formation process?*

RQ2: *How the experience in the application of the EFQM model may modify the way through which quality tools and techniques are employed?*

Finally, the study of this phenomenon acquires special relevance in the case of service firms. In today's environments, service organisations are increasingly resorting to the application of quality tools, techniques and systems to become more competitive (Banerji et al., 2005; Gupta et al., 2005; Lewis & Gabrielsen, 1998; Canet & Balbastre, 2011). More than likely, the importance of the customer in the delivery of a service (in many services, production and consumption take place at the same time) contributes to explain why service firms are greatly focused on customer satisfaction and service quality (Lewis, 2007) and, as a result, try to apply quality management practices to achieve these aims.

Taking the latter argument as a starting point, the specialized literature has paid a great attention to analyse the use of quality tools and techniques by service organisations (Beaumont et al., 1997; Gustafsson et al., 2003; Lee et al., 2009; McAdam & Canning, 2001; Sousa et al., 2005) and study the application of the EFQM model by this kind of firms (Bayo-Moriones et al., 2011; Behara & Gundersen, 2001; Calvo-Mora et al., 2005). However, the relationship of any of these constructs with strategy formation in the case of services has not been carried out yet. With the work we present here we try to make a contribution also in this field.

Research methodology

Sample

To try to reach the objectives stated above we have designed and applied a quantitative research methodology. We created a database of Spanish firms applying the EFQM Excellence Model and whose main activity was located at Spain. This fact guarantees that the firms are on the TQM path and also that they are familiar with the use of quality tools and techniques. The initial database registered 531 organisations involved in the adoption of the EFQM

[1] These elements constitute the true spirit and philosophy behind the Model, since they represent the management culture underlying it. RADAR logic implies the need for a firm to establish goals in line with the organisation's policy and strategy, to plan actions taking these objectives as a starting point, to systematically deploy or implement what has been planned, to assess the results achieved, to try to learn from others, and to analyse organisational measures and what others are doing to identify vital information for improvement (EFQM, 2010). In other words, full-scale application of the RADAR logic contributes to ensuring that organisational processes become more rational, systematic and purpose-oriented.

Excellence Model. The questionnaire was firstly e-mailed to the organisations, which they responded to by means of a telephone interview. As a result, we obtained 104 valid questionnaires, 80 of which were corresponding to service firms. This is the final sample we have employed for the analysis in this work. Most of the service firms analysed belong to the education or consulting sectors. 52% of the firms have less than 50 employees and the greater part of the studied firms have experience in the application of quality management (71% have been adopting a quality management approach for more than five years). The information was gathered from July to October 2009.

Measures and analysis

Scales used to measure variables are all five point Likert scales. To measure the *complexity and level of integration of the quality tools and techniques* we have employed 13 variables contained in Table 1 (P24 to P36), that show a broad range of quality tools that firms can use in a TQM context.

TABLE 1. Tools and techniques used in quality management.

TOOLS AND TECHNIQUES
P24 Final inspection of end products
P25 Statistical process control (SPC)
P26 Techniques for process control and improvement (Pareto chart, histograms, control chart, cause and effect diagram, affinity diagrams, tree diagrams, interrelationship diagrams, etc.)
P27 Design of experiments (DoE)
P28 Taguchi methods
P29 Balanced scorecard
P30 Lean Manufacturing
P31 Just in time (JIT)
P32 Six Sigma
P33 Quality management system based on ISO 9001 standard
P34 Environmental management system
P35 Labour risk prevention system (LRP)
P36 Integrated management systems (quality + environment + LRP)

Source: Authors.

Complexity of the employed tools is a concept that has been measured through an index, considering a combination of the degrees of complexity of the different tools and its level of usage. Using experts' criteria we considered six degrees of complexity (in footnote 2 you can see the six groups of variables; every group is weighted differently depending on its degree of complexity). As a result, we have generated an index[2] that allowed us to measure the level of complexity in a five point scale. Three levels of complexity were finally established (see Table 2). Results are summarized in Table 2.

TABLE 2. Results of the variable complexity of the quality tools.

		Frequency	%	Valid %	Cumulative %
Valid	**From 1 to 2**	23	28.8	28.8	28.8
	From 2 to 3	40	50	50	78.8
	From 3 to 5	17	21.2	21.2	100
	Total	80	100	100	

Source: Authors.

Integration of quality tools and techniques has been built taking a combination of the degree of use of Six Sigma tool and Integrated Management Systems (quality, environment and LRP) as a starting point. Again, we resorted to the criteria of experts to identify the indicators and the integration levels. Two levels of integration were finally established:

- Low level: The firm does not use these tools regularly.
- High level: The firm has a moderate/high level of usage of Six Sigma or/and Integrated Management Systems.

Results can be observed in Table 3.

TABLE 3. Results of the variable integration of the quality tools.

		Frequency	%	Valid %	Cumulative %
Valid	**Low integration level**	49	61.3	61.3	61.3
	High integration level	31	38.9	38.9	100
	Total	80	100	100	

Source: Authors.

We have measured the experience in quality management and the experience in the use of the EFQM model through two variables, P37 (Use of quality management) and P38 (Use of the EFQM Excellence Model) respectively in the original questionnaire. They were measured with a Likert scale, where: 1= less than a year; 2= between 1 & 2 years; 3= between 3 & 4 years; 4= between 5 & 7 years; 5= 8 years or more.

We have also measured the constructs "*integrative strategy formation process*" (variables P1 to P23) and "*use of quality tools*" (P24 to P36). We have analyzed internal consistency

[2] COMPLEX=(P24+2*(P25+P26)+3*(P27+P28)+4*(P30+P31+P32)+5*(P29+P33+P34+P35)+6*P36)/50.

of both constructs through the Cronbach's alpha analysis to test their reliability. To this respect, Nunnally (1978) states that an exploratory research requires that the alpha value is equal or greater than 0.7. As we can appreciate, both constructs comply with the statistical requirements (see Table 4).

TABLE 4. Cronbach's alpha for quality tools and strategy formation process.

Construct	Cronbach's alpha
Use of quality tools	0.765
Integrative strategy formation process	0.940

Source: Authors.

Additionally, we have developed an exploratory factor analysis and principal component analysis to establish a more coherent formation of the constructs. Results of rotated component matrix for the first construct "*integrative strategy formation process*" showed five factors explaining the 73.4% of variance, and the rest of statistics calculated (KMO, Bartlett's sphericity test) revealed the acceptability of the model. All the variables show values greater than 0.7 in their factors, and factors explain a great part of the variables analyzed.

Consequently, the structure of the construct "*integrative strategy formation process*" includes five factors with the following interpretation:

- FACTOR 1: Formalization and control (variables P7, P8, P11, P13 & P14)
- FACTOR 2: Degree of use of strategic analysis (variables P1, P2, P3 & P6)
- FACTOR 3: Employees' participation (variables P17, P18, P19 & P20)
- FACTOR 4: Reward systems (variables P22 & P23)
- FACTOR 5: Internal diagnosis (variable P5)

Results of the factor analysis are summarized in Table 5. Seven variables were removed from the analysis.

With respect to the second construct *"use of quality tools"* we have obtained four factors that explain the 63.7% of the variance. Statistic results are suitable and the final structure of the construct is formed by four groups of tools–four factors–that are understood as follows:

- FACTOR 1: Production-oriented quality tools (var. P27, P28, P30, P31 & P32)
- FACTOR 2: Management Systems (var. P33, P34, P35 & P36)
- FACTOR 3: Classical quality control tools (var. P24 & P25)
- FACTOR 4: Process control and improvement (var. P26 & P29)

TABLE 5. Factor analysis of the construct "integrative strategy formation process".

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
P.7 Systematic process for strategic planning	**0.732**	0.306	0.265	0.268	-0.054
P.8 Written strategic processes	**0.740**	0.397	0.098	0.188	0.016
P.11 Written deployment process	**0.786**	0.096	0.262	-0.079	0.138
P.13 Defined and formalized control process	**0.793**	0.065	0.091	0.071	0.254
P.14 Written control process	**0.840**	0.096	0.171	0.225	0.041
P1. General environment analysis	0.335	**0.753**	0.163	0.108	0.018
P.2 Competitive environment analysis	0.283	**0.785**	0.262	0.141	0.163
P.3 Resources and capabilities analysis	0.195	**0.732**	0.365	0.127	0.303
P6 Use of self-assessment technique based on the EFQM Excellence Model	0.060	**0.709**	0.222	0.149	-0.022
P.17 Initiative in the workplace	0.290	0.224	**0.837**	0.072	0.050
P.18 Strategic initiative	0.220	0.208	**0.846**	0.014	0.031
P.19 Participation with respect to the work	0.214	0.394	**0.751**	0.185	0.198
P.20 Strategic participation	0.056	0.172	**0.728**	0.302	0.160
P.22 Reward systems for work improvement	0.116	0.190	0.193	**0.865**	0.170
P.23 Reward systems for strategic improvements	0.191	0.123	0.130	**0.889**	0.106
P5 Internal diagnose	0.156	0.088	0.150	0.140	**0.867**
% explained variance	22.5%	16.3%	16.3%	11.1%	7.2%
Cronbach a: 0.940					
% total explained variance: 73.4%					
KMO test: 0.856					
Barlett's sphericity test: Chi^2=1303.85 df: 231 sig. 0.000					

Source: Authors.

TABLE 6. Factor analysis of the construct "use of quality tools".

	Factor 1	Factor 2	Factor 3	Factor 4
P27 Design of Experiments (DEO)	**0.587**	-0.004	0.140	0.250
P28 Taguchi Methods	**0.795**	0.032	0.013	0.220
P30 Lean Manufacturing	**0.812**	0.222	0.131	0.044
P31 Just in Time	**0.836**	0.248	0.104	-0.036
P32 Six Sigma	**0.665**	0.014	0.182	-0.092
P33 Quality Management system based on ISO 9001 standard	0.011	**0.514**	0.553	0.159
P34 Environmental management system	0.190	**0.825**	-0.075	-0.007
P35 Labour risk prevention system (LRP)	0.068	**0.699**	0.027	0.128
P36 Integrated management systems (quality + environment + LRP)	0.092	**0.792**	0.113	0.145
P24 Final inspection of end products	0.225	0.048	**0.759**	-0.171
P25 Statistical process control (SPC)	0.200	-0.063	**0.792**	0.237
P26 Techniques for process control and improvement	0.179	0.057	0.332	**0.725**
P29 Balanced scorecard	0.044	0.349	-0.200	**0.685**
% Explained variance	22.7%	17.7%	13.5%	9.7%
Cronbach's alpha of the whole scale: 0.765				
% Total explained variance: : 63.7%				
KMO Test: 0.709				
Barlett sphericity test: Chi^2=330.59 df: 78 sig. 0.000				

Source: Authors.

TABLE 7. Correlation analysis between complexity and experience in quality management and the use of the EFQM Excellence Model.

Spearman's correlation	EXPERIENCE IN ...	
	QUALITY MANAGEMENT	USE OF EFQM MODEL
TOOLS COMPLEXITY	0.414**	0.099

**Correlations is significant at a 0.01 level: Any p-value under 0.01 indicates a significant relationship. On the contrary, a p-value equal to or over 0.01 indicates lack of relationship
Source: Authors.

Results are summarized in Table 6.

Also, as we want to analyze causal relationships among the considered variables we have employed correlations and linear regression analysis for the statistical contrast of the formulated hypotheses.

Results

As we exposed in the theoretical framework, the hypotheses we have developed for our study are the following:

H1: *The greater the experience of a firm in quality management, the more complex the quality tools and techniques that the firm applies are.*

H2: *The greater the experience of a firm in quality management, the more integrated the quality tools and techniques that the firm employs are.*

H3: *The greater the experience of a firm in the employment of the EFQM model, the more complex the quality tools and techniques that the firm applies are.*

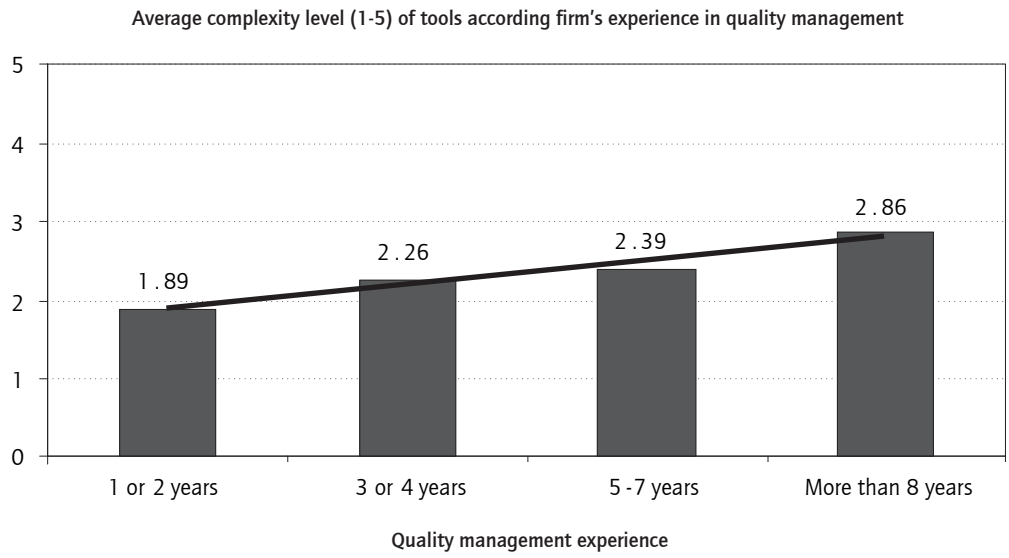
H4: *The greater the experience of a firm in the application of the EFQM model, the more integrated the quality tools and techniques that the firm employs are.*

Hypotheses H1 & H3 will be analyzed to test if there is any correlation between complexity and experience in quality management and the use of the EFQM Excellence Model. To do so, we have applied Spearman's correlations[3] (see Table 7).

From the analysis of the Spearman's Rho coefficient we can derive that experience in quality management permits the use of more complex tools; but we cannot conclude anything about the effect of the use of the EFQM Excellence Model on the complexity of the tools applied. Figure 1 shows the positive trend of complexity according to the increase of time and experience in the application of quality management.

[3] A version of Pearson' correlation when variables are not normally distributed.

FIGURE 1. Complexity level of tools depending on quality management experience.



Source: Authors.

As explained before in the *Research methodology* section, integration of quality tools and techniques is a concept obtained from a combination of two variables (the use of Six Sigma tool and Integrated Management Systems), obtaining as a result two integration levels (low and high).

To this respect, hypotheses H2 & H4 have been solved testing if there are significant differences on the integration level according to the experience of the firm in the application of quality management. To do so, we have employed the Pearson's Chi^2 test –a non-parametric

TABLE 8. Correlation analysis between tools' degree of integration and experience in quality management and the use of the EFQM Excellence Model.

Pearson's Chi^2 (p-value)	EXPERIENCE IN ...	
	QUALITY MANAGEMENT	USE OF EFQM MODEL
TOOLS' DEGREE OF INTEGRATION	0.396	0.132

Significant 5%: Any p-value lower than 0.05 indicates a statistically significant relationship. On the contrary, a p-value higher than or equal to 0.05 indicates an absence of relationship
Source: Authors.

TABLE 9. Experience in quality management and tools and techniques' integration level.

		EXPERIENCE IN QUALITY MANAGEMENT					
		Total		< = 4 years		> 4 years	
		Firms	%	Firms	%	Firms	%
INTEGRATION	Total	80	100.0	23	100.0	57	100.0
	Low	49	61.3	16	69.6	33	57.9
	High	31	38.8	7	30.4	24	42.1

TABLE 10. Experience in the application of the EFQM Excellence Model and tools and techniques' integration level.

		EXPERIENCE IN THE APPLICATION OF THE EFQM EXCELLENCE MODEL					
		Total		< = 4 years		> 4 years	
		Firms	%	Firms	%	Firms	%
INTEGRATION	Total	78	100.0	41	100.0	37	100.0
	Low	48	61.5	24	58.5	24	64.9
	High	30	38.5	17	41.5	13	35.1

Source: Authors.

TABLE 11. Summary of the results according to our initial hypotheses.

Hypotheses' validity	EXPERIENCE IN QUALITY MANAGEMENT	EXPERIENCE IN THE APPLICATION OF THE EFQM MODEL
DEGREE OF TOOLS AND TECHNIQUES' COMPLEXITY	H1: True	H3: False
DEGREE OF TOOLS AND TECHNIQUES' INTEGRATION	H2: False	H4: False

Source: Authors.

association test. This test is used to compare the proportion of firms in each integration level with respect to the different degrees of experience.

As shown in Table 8, the p-values of the association tests (p-value>0.05) reveal that there isn't a relationship between experience in quality management and experience in the application of the EFQM Excellence Model and the integration level of the tools and techniques applied.

Tables 9 and 10 contribute to explain this result. As can be observed in both tables, the percentage of firms classified in each integration level shows no significant differences with the global results for each degree of experience.

Bearing in mind all the results of the tests shown before, we may state that the degree of complexity of quality tools and techniques is only affected by the experience of the firm in quality management. However, neither the experience in quality management nor in the application of the EFQM model have a statistical relation with the degree of integration of quality tools and techniques. Table 11 illustrates the results of our study considering our initial hypotheses.

Now, we have to test the degree of accomplishment of hypothesis 5 (see below).

> **H5:** *The use of complex or sophisticated quality tools and techniques such as the ISO 9001 standard or the BSC will have a positive impact on the level of formalisation and, in so doing, generate more rational strategy formation processes.*

To do so, we have developed a correlation analysis between each one of the complex tools identified and the level of formalization and control–factor 1 of the construct *integrative strategy formation process*–to analyze the isolated influence of each technique. Afterwards, we have developed a multivariate model of linear regression to test if one of the techniques analyzed has more influence than other; that is, if a previous effect or relationship has changed with a joint analysis. Table 12 shows the Spearman's correlations relating the use of the tools and techniques with the level of formalization and control.

We can observe that, with the exception of the ISO 9001 standard, a greater use of complex quality tools produces a moderate raise of the formalization and control level. Above all, the use of the LRP system produces a clear and positive effect on formalization. The results with respect to the ISO 9001 standard are surprising, as the specialized literature assumes that the use of the ISO 9001 standards contributes to a clear formalization of organizational processes. But, in our case the results obtained indicate an opposite meaning. This fact may be mainly explained by the composition of our sample. The majority of the firms analyzed belong to the education sector, and these firms tend to apply the ISO 9001 standard in a very adaptive way, that is, introducing a low level of formalization in the documental system. Even more, some of them apply the EFQM Excellence Model and/or environmental standards but don't use the ISO 9001 standard, as they think the latter may restrict the application of the EFQM Excellence Model.

TABLE 12. Relationships between quality tools and techniques with formalization and control.

QUALITY TOOLS AND TECHNIQUES	FORMALIZATION AND CONTROL	
	Correlation coefficient Rho of Spearman	Significance
Balanced scorecard	0.261*	0.019
Quality management system based on ISO 9001 standard	0.131	0.246
Environmental management system	0.229*	0.041
Labour risk prevention system (LRP)	0.318**	0.004

* Correlation is significant at a 0.05 level

** Correlation is significant at a 0.01 level

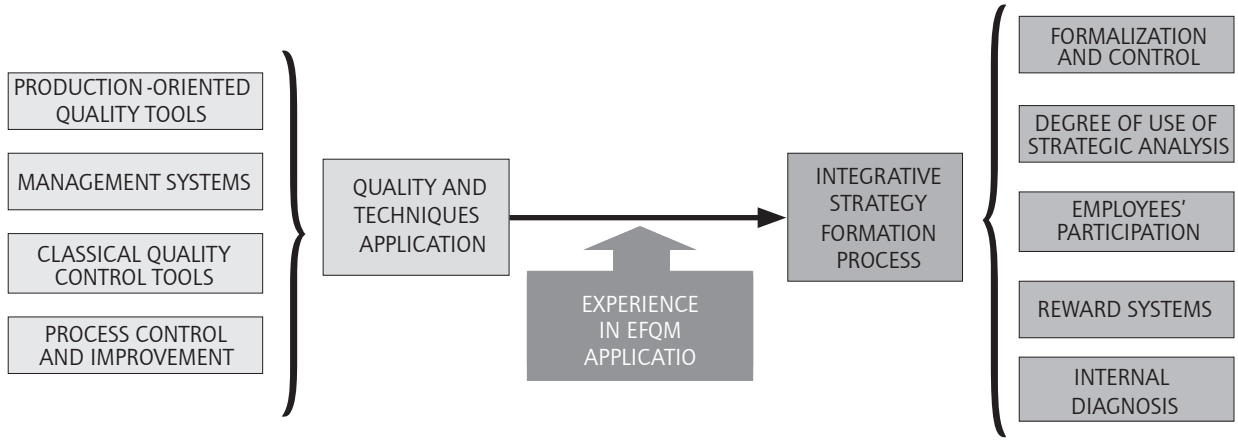
Source: Authors.

TABLE 13. Results of the regression analysis for Hypothesis 5.

	Dependent variable: FORMALIZATION AND CONTROL	
	β coefficient	Sig.
Constant	-0.793	0.013
Labor risk prevention system (LRP)	0.207	0.008
R^2	0.086	
Durbin-Watson	1.764	
F of Snedecor	7.325	
Significance F	0.008	

Source: Authors.

FIGURE 3. Global model.



A multivariate model will permit to detect which of those tools are crucial in the increase of the level of formalization and control, as it considers interactions among variables and, in so doing, eliminates the redundant effects from the model and removes non-relevant variables. We have employed the stepwise method. The formulated regression model is illustrated in figure 2.

FIGURE 2. Regression model for formalization and control.

H5: FORMALIZATION AND CONTROL=
$\alpha + \beta_1$ * Balanced scorecard
$+ \beta_2$ * Quality management system based on ISO 9001 standard
$+ \beta_3$ * Environmental management system
$+ \beta_4$ * Labor risk prevention system (LRP)

Table 13 shows the results of the regression analysis. As can be observed, the model has only included the LRP tool. The model is adequate as the F of Snedecor's value is significant at a 95% level (and also at a 99% level) and the Durbin-Watson statistic is also suitable (1.764).

However, the model does not completely explain the behavior of the formalization and control level (the R^2 value is not very high: 0.086). As expected, this fact implies that there are other factors affecting the level of formalization and control in the strategy formation process different from those that are considered in the model. The equation resulting from the model we have proposed is the following[4].

FORMALIZATION AND CONTROL=
-0.793 + 0.207 * Labor Risk Prevention System (LRP)

As it can be seen, the tool that had a greater correlation with formalization and control has been incorporated into the model. This fact implies that the application of the rest of quality tools and techniques has a lesser and secondary effect on formalization and control.

Finally, we analyze if the experience in the application of the EFQM model affects the different variables we have employed in the theoretical framework to characterize the strategy formation process. In other words, if the strategy formation process becomes more participative or more formalized as a result of the application of the model.

[4] The equation of the model has been statistically tested.

Therefore, we must answer our research questions (see below).

RQ1: *How the experience in the application of the EFQM model influences the strategy formation process?*

RQ2: *How the experience in the application of the EFQM model may modify the way through which quality tools and techniques are employed?*

We have established 5 linear regression models in order to study the influence that the experience in the application of the EFQM model may have on the behaviour of service firms with respect to their use of quality tools and techniques and how they form their strategies. In these regression models the four factors or groups underlying the construct *use of quality tools* (see Table 6) become the independent variables, and the five factors or groups underlying the construct *integrative strategy formation process* (see Table 5) become the dependent variables. Also, the experience in the application of the EFQM Excellence Model will be introduced in this regression model as an independent variable to try to control its influence. Figure 3 illustrates the global model to be checked.

The linear regressions will be as follows:

FORMALIZATION AND CONTROL = $\alpha 1 + \beta 11$ * Production-Oriented Quality Tools + $\beta 12$ * Management Systems + $\beta 13$ * Classical Quality Control Tools + $\beta 14$ * Process Control and Improvement + $\beta 15$ * Experience in EFQM Application

DEGREE OF USE OF STRATEGIC ANALYSIS = $\alpha 2 + \beta 21$ * Production-Oriented Quality Tools + $\beta 22$ * Management Systems + $\beta 23$ * Classical Quality Control Tools + $\beta 24$ * Process Control and Improvement + $\beta 25$ * Experience in EFQM Application

EMPLOYEES' PARTICIPATION = $\alpha 3 + \beta 31$ * Production-Oriented Quality Tools + $\beta 32$ * Management Systems + $\beta 33$ * Classical Quality Control Tools + $\beta 34$ * Process Control and Improvement + $\beta 35$ * Experience in EFQM Application

REWARD SYSTEMS = $\alpha 4 + \beta 41$ * Production-Oriented Quality Tools + $\beta 42$ * Management Systems + $\beta 43$ * Classical Quality Control Tools + $\beta 44$ * Process Control and Improvement + $\beta 45$ * Experience in EFQM Application

INTERNAL DIAGNOSIS = $\alpha 51 + \beta 51$ * Production-Oriented Quality Tools + $\beta 52$ * Management Systems + $\beta 53$ * Classical Quality Control Tools + $\beta 54$ * Process Control and Improvement + $\beta 55$ * Experience in EFQM Application

Table 14 summarizes the 5 regressions.

As Table 14 illustrates, all the models except from model 3 (Employees' participation) are suitable as the F of Snedecor values are significant at a 95% level and Durbin-Watson statistics are within the adequacy interval (1.5-2.5). However, these models do not have a great explicative capacity as the proportion of variance they explain does not reach, at best, 15%. Hence, as expected, there are other factors, apart from the ones that the model considers, that affect the strategy formation process.

After we have checked the adequacy of the models, the resulting equations are the following:

TABLE 14. Summary of the linear regressions.

	Model 1 FORMALIZATION AND CONTROL		Model 2 DEGREE OF USE OF STRATEGIC ANALYSIS		Model 3 EMPLOYEES' PARTICIPATION		Model 4 REWARD SYSTEMS		Model 5 INTERNAL DIAGNOSIS	
	β	Sig.	β	Sig.	β	Sig.	β	Sig.	β	Sig.
Constant	0.006	0.958	0.017	0.873			-0.704	0.065	-0.016	0.885
Production-Oriented Quality Tools	---	---	---	---			---	---	**0.226**	0.045
Management Systems	**0.264**	0.020	**0.282**	0.011			---	---	---	---
Process Control and Improvement	---	---	**0.253**	0.020			---	---	---	---
Experience in EFQM Application	---	---	---	---			**0.222**	0.041	---	---
R^2	0.069		0.143		---		0.054		0.052	
Durbin-Watson	2.005		2. 124		---		1.382		2.241	
F of Snedecor	5.647		6.257		---		4.341		4.139	
F significance	**0.020**		**0.003**		----		**0.041**		**0.045**	

Source: Authors.

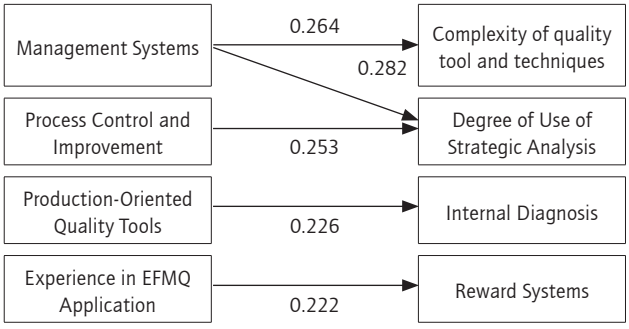
FORMALIZATION AND CONTROL	=	0.264* Management Systems
DEGREE OF USE OF STRATEGIC ANALYSIS	=	0.282* Management Systems +0.253* Process Control and Improvement
REWARD SYSTEMS	=	0.222* Experience in EFQM application
INTERNAL DIAGNOSIS	=	0.226* Production-Oriented Quality Tools

To end up with, figures 4, 5 and 6 illustrate the checked models as well as the significant relationships.

FIGURE 4. Final diagram of the relationship between quality management experience and complexity of quality tools and techniques (see Table 7).

FIGURE 5. Final diagram of the regression model for formalization and control (see Table 13).

FIGURE 6. Final diagram of the global model (see Table 14).



Conclusions and implications

As suggested by the specialist literature, our research has revealed that the maturity or experience in the application of quality management affects the use of quality tools and techniques, and particularly affects the complexity of these tools and techniques. The greater the experience in quality management, the more complex the quality tools and techniques that the firm tends to apply.

However, this is not the case for those firms with a great experience in the application of the EFQM model. Our results do not allow us to make the same statement for these firms. One possible explanation to this fact is that the very nature of the model (it is a strategic framework) make companies to pay more attention to those tools and techniques with a greater strategic perspective. Also, the application of the EFQM Excellence Model is a result of the maturity and evolution in the application of a TQM framework for industrial firms (they firstly apply simpler tools; later, they apply more complex and sophisticated tools such as the ISO 9001 standard; and end up with the application of the EFQM model).

On the contrary, many service firms can be experienced in the use of the model, but don't need to have applied the ISO 9001 standard or use quality control tools previously. Different reasons contribute to explain this, among them, the nature of the activity, the requirements of the sector, or the culture of the firms competing in a particular service industry. In this case, it is very difficult to analyse the relationship between quality tools and techniques and experience, as in these cases complex tools such as the ISO 9001 standard are not commonly employed or are applied with more flexibility.

Also our results have revealed that neither the experience in quality management nor in the use of EFQM model show an influence on the level of integration of the tools and techniques analyzed. Probably, this result has to do with the fact that integrated management tools are more commonly used in production firms (i.e. lean manufacturing), and our analysis has been focused on the characteristics of the service firms. Consequently, our results can only support hypothesis H1.

With respect to the relationship between the use of complex (or more advanced) quality tools and techniques and rationality, our results show the existence of a positive correlation between the use of these sophisticated tools and techniques and formalisation. Particularly, our results show a positive and significant correlation with BSC, LRP and environmental standards and, in doing so, support H5. Results of the regression analysis show that labour risks prevention systems, among the different analyzed tools, have the greater influence on the level of formalization and control of the strategic process. The use of the ISO 9001 standard does not have a significant influence on the formalization construct. As we have exposed in the results section, many service firms belonging to education do not use this standard; it's a cultural question, as it has been observed in a qualitative work developed in the education sector (Balbastre et al., 2010).

Also, our study has revealed that the use of different groups of quality tools and techniques and the experience in the application of the model affect the strategy formation process. The use of management systems as well as tools for process control and improvement have a positive influence on the rational dimensions of the strategy formation process (formalization and control, and analysis). And the maturity in the application of the EFQM model leads to the use of reward systems that encourage autonomy

and participation; these results show that a greater experience in the use of the EFQM model has an effect on the emergent dimension of the strategic process, as this experience promotes employees' participation. These results give support to literature suggesting that the use of the EFQM Excellence Model contributes to develop an integrative strategy formation process.

With the work presented here academicians may find a first approach to study how the use of quality tools and techniques is affected by the experience of the firm in the employment of a quality management framework. Also, it is noteworthy to see how the use of different tools and techniques affects the rationality and emergence of the strategic process, and how the experience in the use of the EFQM model facilitates the emergence of the strategy. Hence, we offer a new line of inquiry in this field that could be followed by academicians to deepen in the study of this phenomenon. Also, with this work businessmen can find evidence that the application of the EFQM model may contribute to generate more rational and emergent (integrative) organisational processes and a different application of quality tools and techniques.

Concerning the limitations of this research, we may state that a greater effort should be made in the literature review to analyse the effect of EFQM application on the use of quality tools and techniques. Also, the small size of our sample and the fact that we have only considered service firms may have conditioned our results. And some control variables such as the size of the firm or the characteristics of the activity developed should be considered in the analysis to try to avoid biases and to observe contextual effects that can enrich final results.

And last but not least, this research opens important future research lines. First of all, we could carry out the same study with a greater sample to see if the results remain similar. This would imply to broaden the sample size; but this effort would allow us to develop new and more complex statistical analysis that could enrich the results of the research. Also, we have studied how the experience in the use of the EFQM model modifies the use of quality tools and techniques. But a new research should be oriented to see if this change in the application of these tools and techniques also contributes to generate greater organisational results.

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