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## Article

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Article

# Executives' Knowledge Management and Emotional Intelligence Role: Dynamizing Factor towards Open Innovation

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**Abstract:** The main aim of this empirical research was to classify the profiles of executives of Spanish companies. We classified the executives' profiles based on two key factors of innovation: knowledge management and emotional intelligence. The sample comprised study 241 executives of Spanish companies, a principal component analysis, a two-stage cluster analysis, and an ANOVA analysis conducted by taking innovation as a dependent variable. The theory of resources and capacities was the theoretical framework. We conclude that the differentiation of executives' profiles is essential to avoid the loss of innovative potential and a consequent loss of competitive advantage in the Spanish business sector. This research contributes to identify a taxonomy of executives' profiles—agile, laggard, soloist and cooperator. These groups present some different levels of knowledge management and emotional intelligence and differences in their ability to innovate.

**Keywords:** innovation; knowledge management; emotional intelligence; ANOVA analysis; cluster analysis



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## 1. Introduction

According to the annual report of the National Statistics Institute, in 2019, 28.9% of Spanish companies with ten or more employees were innovative in the 2014–2016 period. This percentage includes technological (product and process) and non-technological (organizational and marketing) innovations. The markets' globalization in a high rivalry environment with rapid technological changes, where the lifecycles of products and technology are increasingly shorter, especially small and medium-sized ones, is focused on innovating because innovation is a key factor for competitiveness and growth in modern economies [1].

Harmancioglu et al. [2] also stressed that top management involvement is the key to innovate for high performance and desirable outcomes. Managerial innovation has gained increased popularity in research and practice because of its positive effects on organizational renewal and performance. As a result of the interest in creating more innovative and competitive firms and the fact that knowledge plays a key role in value creation within them, several researchers have analysed the strategic role of knowledge and knowledge management in the innovation processes [3–7]. Emotional Intelligence is the key to effective performance and to staying ahead in times of organizational change [8].

Nowadays top managers, owners, and executives are the responsible authorities for making strategic decisions in their firms [9,10]. Talke et al. [11] described that top management diversity influences firm's performance through configuring innovation tactics. Every organization is a social system in which its members are involved in an interaction between themselves and possible external agents. These interactions naturally involve and evoke emotions that underlie human behavior [12]. The emotions experienced

by a member of the organization affect both their psychological and physical health, as well as the attitude of that member towards duties, the organization and professional achievements [13].

From the scientific literature previously exposed are deduced the following problems: (a) unsuitable knowledge management and (b) the avoidance of managers' emotions to make decisions; both lead forward an unsuitable management of human resource and, consequently, accelerated depreciation of competitive advantages over time. The fundamental aspects are as follows: being able to transmit to people the idea that their actions have meaning and purpose, and when important changes are registered almost every day, making employees feel valued and respected in an era of thinning structures and low job security; and maintaining a good state of mind and high motivation in the face of uncertainty and the stress derived from it [14].

Regardless of the growing number of studies on management innovation where we can find different taxonomies linked to innovation [15–17]. There is a lack of empirical studies that integrate and synthesize taxonomies of owners or executives [18] related to innovation, emotional intelligence and knowledge management.

From an integrative and inclusive perspective and often based on humanistic considerations [19,20], which understand that in the ideal organization each person has a role that they play and something that they contribute. Our aim is to obtain an executives' profiles taxonomy in Spanish companies by focusing on two key factors of innovation: knowledge management and emotional intelligence.

## 2. Theoretical Background

### 2.1. Emotional Intelligence and Innovation

The generally accepted view of Salovey and Mayer [21] defines Emotional Intelligence (EI) as the ability to monitor one's own and others' feelings and emotions, to discriminate among them, and to use this information to guide one's thinking and action. EI is the capability to unify emotions and rationale, to use emotions to facilitate a more effective rationale, and to think in a more intelligent manner with regard to an emotional life.

Goleman [22] points out three elements that influence the professional success of an individual: technical skills, purely intellectual skills, and skills in the field of EI. Therefore, he showed that emotional skills are twice as prevalent as technical skills and purely intellectual skills together [23]. Mayer and Salovey [24] in their four-branch model defend that EI is composed of a quartet of skills: (1) perception, evaluation, and expression of emotions; (2) emotional facilitation of thinking; (3) understanding and analyzing emotions, and employing emotional knowledge; and (4) reflective regulation of emotions to promote emotional and intellectual growth.

Several studies have claimed that superior EI includes some concrete abilities, as follows: (1) to identify, evaluate, and provide personal emotions precisely [21]; (2) to integrate and manage personal emotions in order to facilitate better thinking-quality skills [25]; (3) to be aware of other people's emotions for better management of personal relationships [26]; and (4) to exploit various emotional forces to facilitate problem-solving efficiency [27]. Employees with higher levels of EI may have a better understanding of people's emotions, better control of their emotions, and rarely express negative emotions at work [8]. Many academics believe that the emotional intelligence of the leader leads to establishing a positive environment and can effectively predict employee performance [28].

Zulfadil et al. [29] suggested that EI directly influences knowledge Sharing, conflict in teams, the structure mechanism, and team performance. Several previous studies [30–36] have found a partial relationship between EI and team performance. Regarding the relationship between EI and innovation, Blázquez and Bermúdez [37] empirically demonstrate that senior executives' EI exerts a positive, direct influence on innovation in Spanish companies.

## 2.2. Knowledge Management and Innovation

According to Dimttia and Oder [38] Knowledge Management (KM) is about extracting and organizing knowledge to develop a profitable and more efficient organization. KM is a process of capturing organizational collective skills, wherever the knowledge lies, either in databases, in papers, or in the heads of people, and then that knowledge can be distributed wherever it can produce the greatest achievement.

In this research paper, Knowledge Management plays a pivotal role in the support and fostering of innovation through the following mechanisms: (a) knowledge Acquisition (KA) from the overseas market, and the workforce, internally, offer opportunities so that companies can combine current knowledge and create new learning processes [39]; (b) knowledge sharing (KS) refers to collective beliefs or behaviors and routines related to the propagation of learning between different individuals or units within an organization, according to Moorman and Miner [40]; and (c) Knowledge Application (KAP) is such that the value of individual and organizational knowledge lies primarily in their application, because of the rigidity and tacit nature of knowledge [41]. A deeper KAP enables firms continuously to translate their organizational expertise into embodied products [42].

Innovation (INNOV) is a widely discussed topic, especially in business, information technology, engineering, and public development contexts [43]. We define innovation broadly as ideas, systems, technologies, products, processes, services, or policies that are new to the adopting organization [44,45]. Innovation is the creation or acquisition of an idea and the insertion of it into the organization; once inserted, it can thus materialize into a new product, object, process, or method. Wang et al. [46] state that innovation is conceptually a process that begins with a ground-breaking idea and concludes with the insertion into the market.

Regarding of the innovation typology, we focus on product innovation, which includes introducing a new product or new service into the market, or one that is significantly improved, in terms of its characteristics or intended use, and on process innovation, which refers to the introduction of a new, or significantly improved, production and/or distribution process with the aim of reducing the unit costs of production or distribution or even enhancing product quality [47].

The value of employees is not only reflected in their work, but also in their innovative ideas [48], which can be transformed into products and services. Likewise, it fosters the creation of new projects through the instigation, storage and transfer, and application and use of knowledge, and as a result of the foregoing, leads to a positive influence on entrepreneurial innovation [49,50].

Others' research in the field of processes suggests that knowledge and learning environments have positive effects on processes and innovation [51]. In short, KM can leverage innovation through the processes of generation, transfer and use of new ideas and their business exploitation [3,52–54]. A high level of participation would create the conditions to encourage employees to bring new ideas and exchange knowledge in the ongoing innovation process and, in turn, enhance innovative outcomes [55,56]. Chen and Huang [57] findings provide evidence that KM capacity plays a mediating role between strategic human resource practices and innovation performance. Hayati Abdul—Jalal et al. [58] argument, the knowledge-based view of organizational behavior emphasizes the importance of knowledge for organizations to retain their competitive advantage and the lack of employee's sharing capability on the success of KS may lead to an inability of the organization to remain competitive.

Alegre et al. [59] analyze how knowledge management affects innovation performance in companies in the biotechnology industry, where large pharmaceutical companies coexist alongside specialist SMEs. Their findings indicate that the dynamic capacities of KM act as a variable that mediates between the practices of KM and innovation performance. However, analysis of how knowledge management affects processes and innovation performance is more recent and more scattered, with no mature and uniform empirical structure [60–66]. Several previous studies have found a partial relationship between KM and team perfor-

mance [67–73]. In order to explain differing innovative behaviors in Spanish high and medium technology firms according to the investment made in knowledge management practices within their innovation processes and their investment in their workers' capacities, Luengo-Valderrey and Moso Díez [74] provides empirical evidence that knowledge workers have a greatest impact on innovation performance and there is also a strong correlation between workers and investment in internal knowledge management.

### 2.3. Theoretical Framework and Conceptual Model

The theoretical framework on which our proposed research model is based on the Theory of Resources and Capacities. There are two streams of thought: resource-based theory [75–78] which focuses on managing heterogeneous intangibles in favor of organizations [79] and the theory of resources based on dynamic capacities [80–82] which is related to capacities formulated as complex intangible assets, which must be unique, rare, and difficult to imitate and replace and help to enhance income generation. This implies adaptation and change to integrate, build, and reconfigure internal and external competences, to face changing environments.

Next, the Figure 1. Effects of knowledge Management and Emotional Intelligence on Innovation, represents the research model proposed and shows the two key factors, KM and EI, because they determine the innovative potential of different senior executives' profiles of Spanish companies.

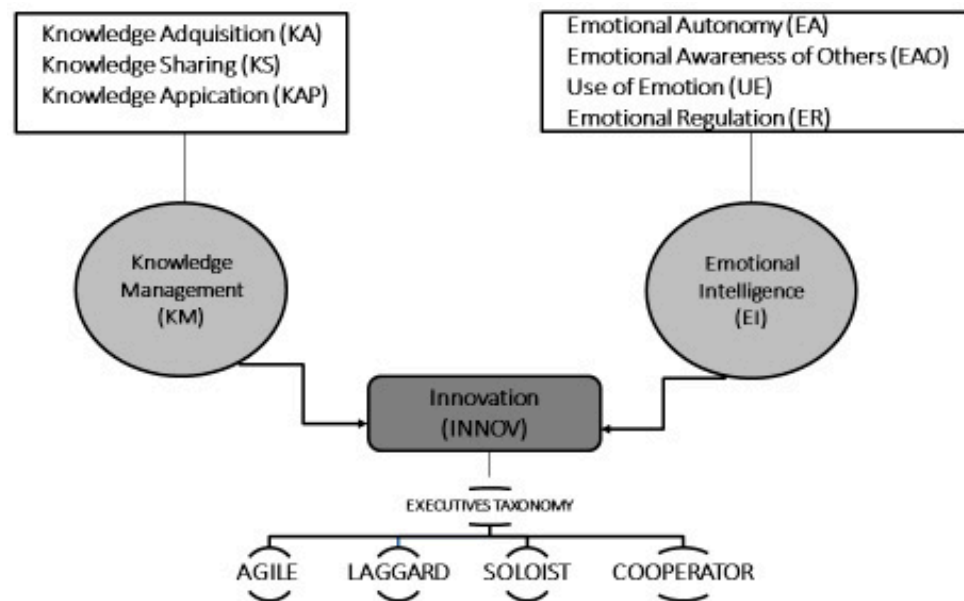


Figure 1. Research model.

- The Knowledge Management capabilities by Lin and Lee [83] and Gold et al. [84] are understood in terms of: Knowledge Acquisition (KA); Knowledge Sharing (KS) and Knowledge Application (KAP).
- The Emotional Intelligence measurement scale we use in this research is EI by Wong and Law [85] and based on 15 items that consist of four dimensions: Emotional Autonomy (EA); Emotional Awareness of Others (EAO); Use of Emotions (UE), and Emotional Regulation (ER).
- The Innovation results measurement scale we use in this study was developed by Prajogo and Sohal [86] with four criteria being considered: level of originality (LO), use of the latest technological advances (ULT), number of innovations (NOI), and speed of innovation (SI).

### 3. Methodology

To comply with the proposed aim to classify executives' profiles, we distributed a self-administered online survey through the LinkedIn social networking platform in the last quarter of 2019. The sample was extracted from LinkedIn because of the ease of accessibility and the inability to access other directories. This survey was directed towards senior executives over 25 years old employed by Spanish companies engaged in a wide range of activities. The total number of respondents was 272. Next, 31 outliers were identified and eliminated to prevent distortion of the subsequent analysis; thus, 241 observations were included.

The questionnaire comprised 30 items. Each respondent was required to express their level of agreement or disagreement for each item through a seven-point Likert scale based on the proposal of [87–89] with the following answer categories: 1 = totally disagree, 4 = neutral, and 7 = totally agree.

The survey was used to measure four constructors: (1) Knowledge Management by Lin and Lee [83] and Gold et al. [84] was based on eight items in three dimensions: KA; KS and KAP; (2) Emotional Intelligence by Wong and Law [85] was based on 15 items in four dimensions: EA, EAO, UE, and ER; and (3) Innovation by Prajogo and Sohal [86] was based on seven items in two dimensions: Product Innovation (IPROD) and Process Innovation (IPROC). These classifications have been used in empirical studies before the innovation [90–93].

To reduce the variables and build the latent variables—KM, EI, and INNOV—the observations of which are not direct, we used the principal components method, whose main objectives, according to Abdi and Williams [94] and Jolliffe [95], are to extract the most important information from a multivariate dataset, compress the data and keep only the information considered important (to reduce the dimensionality of the data), and simplify the structure of observations and variables. Subsequently, cluster analysis was conducted to classify the executives based on the variables EI and KM. Next, we conducted variance analysis (ANOVA) of a factor to determine the differences between the four senior executives' profiles found.

### 4. Results

The empirical results obtained are shown in the following tables:

Table 1. Sociodemographic profile and characteristics of the sample, shows the sociodemographic profiles and the characteristics of the companies in the sample. For instance, based on gender and age characteristics: 68% are men and 32% are women, and their ages range between 41 to 45 years and 46 to 55 years are the highest percentages in the sample, specifically 24.3% and 31.8%, respectively. The characteristics of each company are class, number of employees, age of the staff and template antiquity. The sample consists of a high percentage of private companies (66.4%) and fewer (27.8%) public companies. Regarding the number of employees, 31.1% work for companies with less than 25 employees, and 34.9% work for companies with more than 500 employees.

**Table 1.** Sociodemographic profile and characteristics of the company.

| Gender | %    | Age   | %    | Class   | %    | Employees | %    | Template Antique | %    |
|--------|------|-------|------|---------|------|-----------|------|------------------|------|
| Male   | 68.0 | <25   | 0.4  | Public  | 27.8 | <25       | 31.1 | <1               | 3.7  |
| Female | 32.0 | 26–30 | 7.5  | Private | 66.4 | 25–50     | 12.0 | 1–5              | 19.1 |
|        |      | 31–35 | 8.3  | Others  | 5.8  | 51–75     | 2.9  | 6–10             | 10.8 |
|        |      | 36–40 | 19.1 |         |      | 76–100    | 5.8  | >10              | 66.4 |
|        |      | 41–45 | 24.1 |         |      | 101–250   | 6.6  |                  |      |
|        |      | 46–55 | 31.8 |         |      | 251–500   | 6.6  |                  |      |
|        |      | 56–55 | 7.9  |         |      | >500      | 34.9 |                  |      |
|        |      | >66   | 0.4  |         |      |           |      |                  |      |

Source: authors.



The use of the measurement scales described allowed a factorial analysis to be conducted with the principal component method and rotation Varimax. This technique allows for the identification of structures constituted by the factors [96]. The well-known Cronbach’s alpha was used (1951). Moreover, to evaluate the validity of the constructs, both the Kaiser-Meyer-Olkin (KMO) test for sampling adequacy and Bartlett sphericity test were used to determine whether it was pertinent to perform factorial analysis on the variables [97]. The KMO test helps determine whether the data are apt to adapt to a factorial model, whereas the value of the Bartlett sphericity Test can refute the hypothesis of variables not initially correlated [98].

Table 2. Cronbach’s alpha, the reliability of the measurement scales is measured. We obtained a result between 0.875 and greater than 0.950, and three results greater than 0.8, which is the minimum acceptable according to Carmines and Zeller [99]. Regarding the results of the factor analysis, the KMO test reached a value of 0.840 for KM, 0.886 for EI, and 0.905 for innovation. When reaching a value close to one, the data is susceptible to a reduction of variables through factor analysis to form the factors. KM is in the limits of Gerbing and Anderson [100], who maintain that the Cronbach’s alpha indicator is admissible if it is between 0.70 and 0.90; while the other two constructs, EI and innovation, are at the limits to be considered ideal, namely, greater than 0.9 [101,102].

**Table 2.** Cronbach’s Alpha.

| Construct | Variable/Tag                        | Cronbach’s Alpha |
|-----------|-------------------------------------|------------------|
| KM        | Knowledge Acquisition (KA)          | 0.875            |
|           | Knowledge Sharing (SK)              |                  |
|           | Knowledge Application (KAP)         |                  |
| EI        | Emotional Autonomy (EA)             | 0.908            |
|           | Emotional Awareness of Others (EAO) |                  |
|           | Use of Emotion (UE)                 |                  |
| INNOV     | Emotional Regulation (ER)           | 0.950            |
|           | Product Innovation (PRODI)          |                  |
|           | Process innovation—(PROCI)          |                  |

Source: authors.

The Bartlett sphericity test tested the null hypothesis that the correlation matrix is an identity matrix that if accepted, would suppose the existence of null correlations between the variables. When the “*p*” value is less than 0.05, the null hypothesis is rejected, determining the adequacy of the data to the factor model [97].

The rotated components matrix shows the following: If the items are grouped into the factors identified in the model, by showing factor loads near +1 or −1 according to the orthogonal rotation method used, with a greater link between the item and the factor if the weights approach +1 or −1, and a lower link, the closer they come to zero [96].

Table 3. Rotated Components Matrix, represents the factor analysis (matrix of rotated components) where we can deduce the following:

KM1 is a component that synthesizes all the variables related to KA, KS, KAP and provides greater weight to KS3 (in your company the knowledge is shared with others departments), KA1 (your company effectively manages knowledge for practical use), and KA2 (your company uses knowledge effectively for practical use).

KM2 is a component that summarizes all the variables shown in the table related to the KA, KS and KAP, giving greater weight to KA1 (the company obtains the knowledge from the clients), and KA2 (the company obtains the knowledge through their collaborators).

EI1 is a component that summarizes all the variables shown in the table related to emotional autonomy, EAO, use of emotion, and ER, giving a higher weight to UE2 (I am a self-motivated person), EA3 (most of the time I have a good feeling about my feelings), EA2 (I understand I have a good understanding of my own emotions), and EA3 (I really understand what I feel).

EI2 is a component that summarizes all the variables shown in the table related to EA, EAO, UE, and ER, giving greater weight to ER4 (I have good control of my own emotions), ER2 (I am quite capable of controlling my own emotions), ER1 (I am able to control my temperament and handle difficulties rationally), and ER3 (when I am angry I can always calm down quickly).

EI3 is a component that synthesizes all the variables related to EA, EAO, UE, and ER, giving a greater weight to EAO2 (I am a good observer of the emotions of others), EAO3 (I have a good understanding of the emotions of the people around me), and EAO1 (I always perceive emotions from my friends through their behaviors).

**Table 3.** Rotated Components Matrix.

|      | Components |       |       |       |       |
|------|------------|-------|-------|-------|-------|
|      | KM1        | KM2   | EI1   | EI2   | EI3   |
| KA1  | 0.120      | 0.865 | -     | -     | -     |
| KA2  | 0.297      | 0.805 | -     | -     | -     |
| KA3  | 0.515      | 0.355 | -     | -     | -     |
| KS1  | 0.760      | 0.333 | -     | -     | -     |
| KS2  | 0.781      | 0.204 | -     | -     | -     |
| KS3  | 0.815      | 0.188 | -     | -     | -     |
| KAP1 | 0.859      | 0.171 | -     | -     | -     |
| KAP2 | 0.867      | 0.148 | -     | -     | -     |
| EA1  | -          | -     | 0.717 | 0.129 | 0.329 |
| EA2  | -          | -     | 0.583 | 0.167 | 0.376 |
| EAO1 | -          | -     | 0.126 | 0.149 | 0.812 |
| EAO2 | -          | -     | 0.216 | 0.082 | 0.888 |
| EAO3 | -          | -     | 0.303 | 0.098 | 0.841 |
| EAO4 | -          | -     | 0.337 | 0.203 | 0.625 |
| UE1  | -          | -     | 0.646 | 0.136 | 0.183 |
| UE2  | -          | -     | 0.768 | 0.220 | 0.205 |
| ER1  | -          | -     | 0.219 | 0.867 | 0.115 |
| ER2  | -          | -     | 0.233 | 0.868 | 0.145 |
| ER3  | -          | -     | 0.172 | 0.828 | 0.151 |
| ER4  | -          | -     | 0.276 | 0.888 | 0.120 |

Source: authors.

Cluster analysis, also known as conglomerates analysis, is encompassed within methods known as interdependent. This technique was created for classifying observations into groups. The aim is to gather the observations in groups as homogeneous as possible so that the components of the conglomerates are very similar. Simultaneously, maximum heterogeneity between clusters is sought [103].

Table 4. Description of obtained clusters, shows the different clusters obtained: agile, laggard, soloist, and cooperator. The clusters' names have given by authors regarding the components analysis obtained in Table 3. Each cluster has been classified according to these executive' characteristics expressed in percentage (%): male, female and public, private and others companies. In this study have been used gender and age as control variables, but we have not found significant differences in these variables between the groups.

**Table 4.** Description of obtained clusters.

| Conglomerate       | Characteristic | Total (%) | Conglomerate          | Characteristic | Total (%) |
|--------------------|----------------|-----------|-----------------------|----------------|-----------|
| <b>(1) Agile</b>   | Male           | 64.70     | <b>(3) Soloist</b>    | Male           | 76.47     |
|                    | Famale         | 35.30     |                       | Famale         | 23.53     |
|                    | Public         | 24.70     |                       | Public         | 21.57     |
|                    | Private        | 70.59     |                       | Private        | 78.43     |
|                    | Others         | 4.71      |                       | Others         | 0.00      |
| <b>(2) Laggard</b> | Male           | 69.57     | <b>(4) Cooperator</b> | Male           | 60.98     |
|                    | Famale         | 30.43     |                       | Famale         | 39.02     |
|                    | Public         | 41.30     |                       | Public         | 29.27     |
|                    | Private        | 45.65     |                       | Private        | 63.41     |
|                    | Others         | 13.05     |                       | Others         | 7.32      |

Source: authors.



According to the Leneve test, the level of significance was greater than 0.05, that is, there were no differences in variances. T Leneve test is a statistical test to evaluate the equality of variances for a variable, in this case, innovation, for various groups. We also calculated the F statistic with its significance level. The results of the ANOVA of a factor are shown. The significance is less than 0.05; thus, we rejected the hypothesis of equality of means, which implies that there are at least differences between two of the groups.

In this research, the Table 5. Centre of final clusters and average values of the clusters, represents the attitudes of four groups of executives towards innovation:

- (a) **Agile.** This profile of executives has significantly more innovation than Cluster 2, the "laggard", and has a low level of KM2, this group gives little weight to the company acquiring the knowledge of its clients and its collaborators. By contrast, this group has a high level of KM1 and EI2; thus, in their companies, knowledge is shared with other departments, and knowledge is managed and used for practical use. Furthermore, executives have good control of their emotions; are able to control their emotions; control their temperament and handle difficulties rationally; and when angry, can calm down quickly. This group represents 38.11% of the respondents and comprises 64.70% men and 35.30% women. Compared with the other groups, this group has a greater presence in the private sphere, with 70.59% in 24.70% in public companies, and 4.71% corresponds to other mixed companies.
- (b) **Laggard.** This profile of executives presents less attitudes to innovate than agile executives, soloist, and cooperator executives. This group has a lower score in KM2, they practically do not obtain the knowledge of clients and collaborators, and they do not share knowledge with other departments because they also have a low KM1. This group has no notable strong points in terms of emotional skills and the worst EI score; thus, they are not self-motivated, have a poor understanding of their emotions, and have a good understanding of their emotions and what they really feel. Laggard executives, comprising 69.57% men and 30.43% women, represent 20.63% of the total respondents. They have practically the same presence in the public sphere as in the private sphere, at 41.30% and 45.65%, respectively, and 13.05% have a presence in other mixed companies.
- (c) **Soloist.** This profile of executives has a good attitude towards innovation that is better than that of the laggard executives. This group present differences respect Agile profile relative to KM. Soloist executives have greater weight in KM2 than KM1, and they give more importance to the company obtaining knowledge from clients and through collaborators. Executives in this group have a lower EI2 score, that is, they have poor control over their own emotions, they are not very capable of controlling their temperament or their emotions, and they find it difficult to calm down when they are angry. By contrast, they have greater weigh in EI3, they are good observers of the emotions of others, and they have a good level of understanding of the emotions of the people around them and a good level of perception of the emotions of their friends through their behaviors. They also have a high level of EI1, are self-motivated people, and most of the time, these executives have a good feeling about their feelings, a good understanding of the emotions of the people around them, and a good level of perception of the emotions of their friends through their behaviors. Of the soloist executives 76.47% are men and 23.53% are women, and this profile represents 22.87% of the total executives surveyed. Notably, this profile has a greater presence in the private sphere, with 78.43% than in the public sphere. Other types of companies are not present in any percentage.
- (d) **Cooperator.** This profile presents a lower attitude towards innovation than the agile and soloist executives and therefore a significantly greater attitude towards innovation than the group of laggard executives. These executives present a lower score in EI2, highlighting as strengths their levels of EI3 and KM2. They have a low level of ER; instead, they are good observers of the emotions of others, have a good understanding of the emotions of the people around them, and always perceive the emotions of

their friends through their behaviors. It also has significantly greater weight in terms of the level of knowledge acquisition through clients and their collaborators. This profile represents 18.39% of the total respondents (60.98% men and 39.02% women). Its presence in the private sphere with respect to the public is 63.41% and 29.27%, respectively, and 7.32% other companies.

As aforementioned, the results obtained show that at least four different executive profiles can be distinguished within the public and private companies in Spain: agile; laggard; soloist; cooperator. Of these four profiles, only the laggard group shows significant differences in innovation; the rest of the profiles do not show significant differences.

After performing the ANOVA analysis, we used innovation as a dependent variable and then concluded that managers exhibit different behaviors regarding innovation because they present different levels of KM and EI. Those senior executives with skills in both KM and EI have the greatest influence on the development of process innovations and product innovations.

**Table 5.** Centre of final clusters and average values of the clusters.

| Clúster  | (1) Agile | (2) Laggard | (3) Soloist | (4) Cooperator | Middle Value of Variables | Bonferoni o Tamhane                      |
|--|-----------|-------------|-------------|----------------|---------------------------|--|
| KM1  | 0.66295   | -1.30916    | 0.02868     | -0.00876       | -0.01241                  | 1-2 *; 1-3 *; 1-4 *; 2-3 *; 2-4 *        |
| KM2  | -0.17367  | -0.71226    | 0.29077     | 0.67608        | -0.02232                  | 1-2 *; 1-3 *; 1-4 *; 2-3 *; 2-4 *        |
| EI1  | 0.21251   | -1.05946    | 0.49350     | 0.08439        | -0.00916                  | 1-2 *; 2-3 *; 2-4 *                      |
| EI2  | 0.57740   | -0.10100    | -0.09162    | -0.91726       | 0.00965                   | 1-2 *; 1-3 *; 1-4 *; 2-3 *; 3-4 *; 4-2 * |
| EI3  | 0.30249   | -0.17847    | -1.06825    | 0.72567        | -0.03241                  | 1-2 *; 2-3 *; 2-4 *; 3-1 *; 3-4 *; 4-1 * |
| INNOV  | 0.249509  | -0.671475   | 0.070343    | -0.007066      | -0.321807                 | 1-2 *; 2-3 *; 2-4 *                      |
| <b>Total numbers of cases in each clusters</b> |           |             |             |                |                           |  |
|  | 85        | 46          | 51          | 41             | 223                       |  |

Source: authors. \* Prob < 0.5.

## 5. Discussion: Innovation Potential of Executive and Open Innovation

### 5.1. Discussion: The Role of Executives in Knowledge Management and Emotional Intelligence

In the present moment, the society in general is being affected by a global Coronavirus pandemic. Helping society demands rapid decision-making by the executives of public and private companies worldwide. Spanish companies must be aware that they must manage human resources and promote the innovative potential of each executive. This research proposes integrating reason and emotion for making decisions in Spanish companies which translates into a challenge for executives and a change in the innovation strategy of Spanish companies to enhance the innovative potential of executives. Each executive has different personal resources such as unique capacities in KM and in EI. In summary, the KM (reason) and EI (emotions) capacities must be developed and trained because the higher the level of KM and EI, the greater the innovation capacity of that executive in that company. It is in line with the research of Zufadil et al. [29]; Blázquez and Bermúdez [37]; Tsai W [56]; Chen and Huang [57], Hayati Abdul—Jalal et al. [58]; McEvily S [60] and Luengo—Valderrey and Moso Díez [74].

Spanish companies should develop the emotional regulation capacity of their executives to boost their innovative potential. It is a key factor to reducing conflict levels and proceeding to decision-making in companies to innovate. These findings are in line with Anwar et al. [9]; Papadakis and Barwise, [10]; Talke et al. [11]. Nowadays executives are the responsible authorities in strategic decisions making of their firms and top management diversity influences firm’s performance through configuring innovation tactics, such as the executives taxonomy.

These arguments are in consonance with Carmeli and Josman [12], interactions naturally involve and evoke emotions than underlie human behavior and with Moon and Hur [13], the emotions experienced by a member of the organization affect both their

psychological and physical health, as well as the attitude of that member towards the organization and professional achievements. At the same time, results are in line with the contributions of Suliman and Al-Shaikh [104], who observed that employees with higher levels of EI are inclined to report lower levels of conflict and higher levels of willingness to create and innovate. Enhance the finding of Zufadil et al. [29], the direct influence of knowledge sharing on team performance and the indirect influence of emotional intelligence on team performance through the mediation of KS.

## 5.2. Discussion: The Role of Executives for Open Innovation

Traditional innovation paradigms, where R&D activity was generally performed internally as a whole, might not be enough to face such a broadly dynamic and competitive business environment. Management scholars have advised that for firms, it could be better to open up their innovation processes by undertaking forms of external collaborations, which might be critical to favor organizational flexibility and accelerate innovation processes [105,106]. Opportunities for innovative products and/or processes grow rapidly [107], with a flourishing variety of public and private organizations born for investing resources in new innovation projects [108,109].

Open innovation (OI) is a holistic approach to innovation management by “systematically encouraging and exploring a wide range of internal and external sources for innovation opportunities, consciously integrating that exploration with firm capabilities and resources, and broadly exploiting those opportunities through multiple channels” [109]. Regarding the determinants of OI, it has broadly examined organisational level elements (e.g., internal R&D expenditure) or environmental factors (e.g., market turbulence) [110], but little attention has been paid to the role of human elements [111,112], which are known to have a deep effect on strategy and innovation management [113]. Furthermore, the top management of firms must recognize the importance of culture in OI implementation. Self-motivation and openmindedness are two important factors that facilitate OI implementation [114] and overcoming Not Invented Here (NIH) [115] and Not Sold Here (NSH) syndrome [116] will require the establishment of a new company-wide culture encouraging knowledge import and export. The results might be extended to larger corporations and provide an implication for human resource management. The SMEs policy should become more human-oriented.

The micro-foundation of OI, in which key individuals’ choices and behavior shape firm-level strategy, cannot be underestimated [117], particularly in Small and Medium Enterprises (SMEs), where key players, such as CEOs, have a strong influence on firm-level decisions [118]. As key agents of change, they will substantially influence the resistance, readiness and momentum of organizational change [119]. CEOs’ positive attitude, entrepreneurial orientation (EO), patience and education can play important roles in facilitating OI in SMEs [120].

However, sharing innovation projects with external partners often requires an open mindset of the organization, with the ability of the CEO or executives to seize and exploit the innovation challenges [121,122].

Enhancing the culture of multi-actor collaboration in the public sector will allow public agencies to more actively collaborate with external parties [123]. In this study we propose Spanish companies should develop the emotional Intelligence and Knowledge management of their executives to boost their innovative potential. It is a key factor to reducing conflict levels and proceeding to decision-making in companies to innovate. Culture for open innovation in the public sector should embrace efficient, equitable, and accountable values, because open innovation in public administration could be used to explore collective action problems and to reveal how to solve them [124,125].

Even though open innovation is a strong force for driving the emergence of creative business models and new companies, if emergence and complexity are not balanced, open innovation channels cannot be maintained. The diverse complexities that appear with the increase of open innovation should be controlled, it is necessary a balance [126]. Govern-

ments should consider not only start-up motivation policies but also open innovation serial entrepreneur motivation policies through collaboration with public and private firms if they want to create new jobs and industries.

Establishing a culture for open innovation is critical not only for the industry, but also for cities and societies [127,128]. In the age of climate change, natural disasters, and pandemics, it is critical to rethink how we are going to build our cities on the basis of smart and sustainable development principles [129,130]. In this regard, a cultivating environment for open innovation is needed in our cities to restructure them as smart and sustainable cities [130,131]. The way to achieve knowledge-based, smart and sustainable digital government including smart cities with the development of Information and Communication Technology (ICT) and E-government [132].

## 6. Conclusions

### 6.1. Implication

Regardless there is a lack of empirical studies that integrate and synthesize taxonomies of executives related to innovation, such as Salmon and Allman [18]. This research contributes to identify a taxonomy of executives' profiles to avoid the loss of innovative potential in companies from different areas of activity: health, industrial, social, finance, educational, and others, related to innovation, knowledge management and emotional intelligence. The results obtained in our investigation lead us to this conclusion: There are at least four profiles of leaders in Spanish companies: (1) agile; (2) laggard; (3) soloist; (4) cooperator. Each group present different levels of KM capacity and different levels of EI. Only laggard executives show specific differences regarding ability in innovation and ability in EI, specifically regarding the ability to observe and understand the emotions of others and to interpret emotions through behaviors. Agile, soloist, and cooperator executives do not show significant differences in innovation capacity and the ability to observe, understand, and interpret emotions, that is, EI3. The greatest differences between the profiles of executives are in EI2, that is, in terms of the ability to regulate emotions, specifically, in terms of the importance that each executive profile provides having good control over their emotions; being quite capable of controlling their own emotions, being able to control their temperament and handle difficulties rationally, and being able to calm down quickly when angry.

The results obtained in this empirical research are in line with Resources Theory based on Dynamic Capabilities [80–82,133] and the contributions of González- Lureiro et al. [134], who argued that the key to achieving sustainable competitive advantages lies in knowing how to combine knowledge and that human resources can be a potential source of sustainable competitive advantage Wright et al. [135] because they possess unique characteristics, which are demonstrated in their attributes, to become a source of competitive advantage because they are valuable, rare, non-imitable, and heterogeneous factors of production. Spanish companies must translate the KM and EI of executives into new processes that lead to new products and services. This action will increase personal and organizational well-being, which improves their competitive advantage. Companies must develop in their workers EI' skills to develop a shared sense for the improvement of teamwork, and the improvement of decision-making in complex and uncertain situations.

This research contributes to innovation management literature identifying a taxonomy of executives' profiles—agile, laggard, soloist and cooperator—which present some different levels of KM and EI and differences in their ability to innovate. At the same time, this research introduces the develop of two key factors in companies: EI an KM. It proposes integrating reason and emotion in making decisions in companies which translates into a challenge for executives and a change in the innovation strategy of Spanish companies to enhance the innovative potential of executives.

Finally, these results contribute to the theoretical and empirical development of the innovative potential of different executive profiles in Spain, which will directly or indirectly lead to an improvement in the socioeconomic well-being of employees and companies.

Moreover, the results contribute to the achievement of the EU 2030 Strategy because an improvement in the management of executives of public and private companies in Spain in favor of EU.

### 6.2. Limitations and Further Research

Our study may suffer from the limitations that suggest some space for future research. First, the sample comprises only executives; thus, further research should consider other profiles of workers (e.g., technicians and operators). Second, the heterogeneity of the sample could be considered a limitation. However, we consider the heterogeneity of the sample as one of the main strengths of this research. Notably, we recognize as a limitation the lack of homogeneity in the number of responses according to the range of activities companies. Third, in this research it has not been identified the most suitable technology that allows integrating human resources at the epicenter of the open innovation process to contribute to the current business lines.

For future lines of research, it is proposed to explore what is the most suitable technology to speed up the creation of collaborative networking supported by Information and Communication Technology (ICT), which facilitate systemic integration at all levels: social, technological, economic, political, environmental, cultural, juridical-legal; both from educational institutions and research centers, as well as from Universities and public and private business sector. Technology focused on the key role of the human factor as a catalyst for open innovation and technology that fits to the current business lines. Furthermore, future research is needed to take into consideration other Executives or CEOs' factors that may significantly affect OI adoption.

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