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Key Factors in the Implementation of E-Proctoring in the Spanish University System

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Abstract: Between two possible practices when supervising a remote synchronous evaluation, during the COVID-19 pandemic, the majority of Spanish universities opted for the use of videoconferences with audio and active video, instead of implementing e-proctoring. Thus, in order to analyze the reasons for this non-implementation and take measures so that its use can be extended in the Spanish university system, this study focused on identifying the critical factors in the decision of Spanish universities to accept and implement e-proctoring as a method of remote supervision. For this, a causal study was carried out using the methodology of fuzzy cognitive maps, and the data obtained were processed through the FCMappers tool. This allowed a glimpse of the key role played by students in this non-implementation (who alleged the non-possibility of having the resources necessary for the use of e-proctoring and the violation of privacy that the use of this tool entailed) and highlighted the role of the "pressure or incentives from government" factor if these allegations are to be eliminated and if e-proctoring is to be implemented in Spanish universities.

Keywords: e-proctoring; implementation factors; universities; online teaching; ICT; education

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1. Introduction

One of the systems where weaknesses and shortcomings can be observed due to the disruption of COVID-19 in Spain is the educational system, where the mandatory nature of complete remote teaching in higher education (universities), caused by the restrictions of movement of the inhabitants, showed a high capacity for adaptation when extrapolating face-to-face teaching to the virtual mode, but a great problem when carrying out the evaluation process remotely, trying to ensure academic integrity. Above all, the latter, when trying to find a synchronous evaluation of theoretical–practical content, is what is intended to be achieved with face-to-face exams in traditional teaching [1–3].

Among the problems caused by this remote evaluation model were [4] identity theft and copying of students (consulting third parties or accessing materials not allowed in the development of an exam). As a solution to these problems, there were two possible practices: the use of e-proctoring and the use of videoconferences with audio and active video, where the majority of Spanish universities opted for the use of videoconferences instead of implementing e-proctoring [5,6].

The electronic supervision system known as e-proctoring or electronic proctoring was used for remote teaching before the COVID-19 pandemic; it allowed monitoring the remote evaluation process through telematic resources in order to ensure academic integrity and achieve reliable results based on the knowledge actually achieved by students [7].

This method of supervision made possible visual and auditory surveillance of the remote evaluation process (using the audio system and camera of the examinee's computer or mobile phone), as well as monitoring of the computer (if the test is computerized) to display the screen where the student is taking the test and to not allow the student to leave the exam screen or to consult another application or program on that computer [8].

These two e-proctoring applications were able to achieve a reliable validation of the student's identity, control the student's behavior when taking the exam, and record the student's activity on the computer during the exam, leaving everything recorded for possible revisions and identification of examination rule violations [9].

However, for this process to be successful, it was necessary to guarantee appropriate equipment, adequate connectivity, and prior training for teachers and students, as well as to ensure that all requirements and processes related to data protection were met [10].

Despite the applications of this tool and the relevance of its use to increase the academic integrity and quality of the evaluation process without requiring physical presence (not only now, to help guarantee the performance and sustainability of this process in this pandemic, but for possible future pandemics or for a possible globalization of universities and their services in an increasingly remote future), this tool did not achieve widespread use in Spanish universities during this period [5,6].

For this reason, and in order to analyze reasons for this non-implementation and take measures so that its use can be extended in the Spanish university system, this study focused on locating the determining factors in the decision of Spanish universities to accept and implement e-proctoring as a method of remote supervision.

Thus, for this research, a literature review was carried out that allowed the presentation of a list of factors that influence the adoption and use of new technological tools (that is, when Spanish universities accept this tool as a method of remote supervision), and subsequently a causal study of all these factors that influence this decision was developed using fuzzy cognitive maps, a methodology based on expert judgment in which experts in technology and education quantify and analyze all of the causal relationships between these factors to determine the most influential factors when universities accept this tool.

Most of the investigations studying the factors involved in the adoption and use of technological tools in a company/institution have independently assessed the degree of influence that each of these factors exerts on that decision, but have not taken into account that the factors that affect a decision can influence each other (which can cause changes in the relevance of each of the factors in decision making). For this reason, it was decided to carry out a causal study of the system of factors that are involved in this decision making, and it was decided not to carry out a causal study of the influence of each of the factors on the decision to be made.

The data collection for the study was carried out through an interview, where each of the interviewees had to carry out a causal study of the system that would later serve to make a global causal map with the average assessment of experts, which was processed with the FCMappers tool and allowed to obtain the most relevant factors in this decision, in addition to the factors that exert the most influence on the rest of the factors and the factors that receive the most influence from the rest.

2. Literature Review

In our society, the evolution and advancement of technologies in the activities that we must carry out every day is more than evident [11–15]. This is something that can be observed in all sectors [16–19].

During the pandemic period, in Spain, a great development of technologies in the educational sector [20–22] was demonstrated and made it possible to effectively and efficiently extrapolate face-to-face teaching at Spanish universities to a virtual mode [23–25].

Many of the technological tools that were used in this extrapolation had already been used as a complement to the face-to-face teaching process, so their use did not cause alterations among teachers, students, and universities [26–28]. Among these tools were digital platforms [29–31], MOOCs [32], tools based on word processing [33,34], multimedia tools, gamification tools [35–38], social networks [39–41], augmented reality [42–46], robotics [47–49], and/or virtual forums [50,51], among others.

Other technological tools that were used in this extrapolation and that had not been used as a complement to the face-to-face teaching process were incorporated without major

problems, such as the use of videoconferences to retransmit teaching [52] or the use of videoconferences to carry out tutorials [53], since neither of these two forced students to have their camera active.

However, a problem arose when carrying out the evaluation processes remotely in an attempt to ensure academic integrity, since these processes brought identity theft attempts by students and multiple complaints of plagiarism into exams [54,55]. This caused some universities to initially opt for e-proctoring when supervising exams remotely, but finally, the vast majority of universities opted for video conferencing with active audio and video [5,6].

These are the two possible practices when supervising a remote synchronous evaluation, and the advantages, disadvantages, and tips for using both can be seen below [1,10] (Table 1):

Table 1. Advantages, disadvantages, and tips for use in supervision practices in remote synchronous evaluation.

	Advantages	Disadvantages	Tips
VIDEOCONFERENCES (with active audio and video)	- Supervision of students and their environment. - Easy configuration.	- Requires adequate connectivity. - It is not recommended in large groups.	- You need to record the videoconference as evidence.
E-PROCTORING	- Supervision of students and their environment. - Supervision of students' computers. - Reliable identification of students. - Recommended in small groups and in large groups.	- Requires adequate connectivity. - Requires taking into account everything related to data protection. - Although its use is easy, it requires prior training for teachers and students to ensure correct installation.	- It is necessary to carry out a test the first time it is used.

The use of e-proctoring is growing in the field of online personnel recruitment [56] and in the educational field [57], where its most common use is usually found in training through MOOCs (Massive Open Online Courses): platforms such as edX (one of the main platforms in MOOCs) uses this practice since 2017 [58].

Its use is making it possible to offer complete remote training in universities (such as Indiana University) [59–61], in schools for the evaluation and certification of skills to practice professions (such as the International Accrediting Body) [62], in MOOCs or Microdegrees [58], in territories with geographical dispersion and emerging countries [63,64], and in asynchronous environments within the teaching-learning processes [65,66], all of this providing credibility in the identification when evaluating and certifying knowledge [58].

ProctorU, one of the distributors of this system and one of the most common e-proctoring systems today, announced in 2017 that it had already performed more than 4 million exams using this procedure [67]. It is not the only distribution company of this system that exists; we can also find Remote Proctor NOW (RPNOW), e-Proctoring or Proctor Exams, among others, each of which provides its own computer control systems where the test is carried out.

Despite the widespread use of e-proctoring, its applications and the relevance of its use to increase the academic integrity and quality of the evaluation process without requiring physical presence, which could have caused a great advance in the possible globalization of Spanish universities and their services remotely, this tool did not achieve widespread use in Spanish universities during this pandemic period. It was the option of using videoconferencing with audio and active video, which was finally chosen by the vast majority of universities.

Thus, in order to analyze the reasons for this non-implementation and take measures so that the use of e-proctoring can be extended in the Spanish university system, this study focused on locating the determining factors in the decision of Spanish universities to accept and implement e-proctoring as a method of remote supervision.

To do this, a literary review was first carried out based on the research present in the main scientific databases (Web of Science, Scopus and Google Scholar), which allowed us to present a list of 15 factors that influence the adoption and use of new technological tools. Each one of these factors and their implication in the adoption and use of new technological tools was ratified by the investigations from which they were extracted, which are reflected below:

- Complexity: This factor refers to the level of difficulty in terms of the use, exploitation, and manageability. This factor is part of the technological context and was adopted from the studies by Sonnenwald, Maglaughlin, and Whitton [68] and Berman et al. [69].
- Compatibility: This factor refers to whether the adoption is consistent with the values, needs, and previous experiences of potential adopters. This factor is part of the technological context and was adopted from the study by Rogers [70].
- Relative advantage: This factor refers to whether the benefits in adoption are perceived to have advantages over the systems it replaces. This factor is part of the technological context and was adopted from the studies by Rogers [70] and Ekong et al. [71].
- Perceived cost: This factor refers to the expenses incurred in the adoption. This factor is part of the technological context and was adopted from the study by Premkumar, Ramamurthy, and Crum [72].
- Characteristics of the leader or manager: This factor refers to the influence of the manager's age, training, and degree of innovation on adoption. This factor is part of the organizational context and was adopted from the study by Cerdán [73].
- Perceived reliability of the technology: This factor refers to the confidence of potential adopters in the adoption. This factor is part of the organizational context and was adopted from the study by Tu [74].
- Top management support: This factor refers to the degree of support from the prospective adopters' management in the adoption. This factor is part of the organizational context and was adopted from the studies by Al-Shura et al. [75], Lin and Chen [76], and Feuerlicht and Govardhan [77].
- Size of the company: This factor refers to the influence of company size on adoption. This factor is part of the organizational context and was adopted from the studies by Al-Shura et al. [75] and Lippert and Govindarajulu [78].
- Technological organizational readiness: This factor refers to the availability of the organizational technological resources necessary for adoption, namely, technological infrastructure and specialized human resources. This factor is part of the organizational context and was adopted from the studies by Iacovou, Benbasat, and Dexter [79], Mehrtens, Cragg, and Mills [80] and To and Ngai [81].
- Pressure from competitors: This factor refers to the pressure related to the adoption of this new technological tool in competitors. This factor is part of the environmental context and was adopted from the study by Laforet [82].
- Pressure from business partner: This factor refers to investor pressure based on previous adoptions. This factor is part of the environmental context and was adopted from the study by Gutierrez, Boukrami, and Lumsden [83].
- Pressure from customers: This factor refers to the pressure from customers to adopt this new technological tool. This factor is part of the environmental context and was adopted from the study by Kula and Tatoglu [84].
- Pressure or incentives from government: This factor refers to the influence of the appropriate use of standards as an incentive to encourage adoption. This factor is part of the environmental context and was adopted from the study by Tu [74].

- Support from the information systems providers: This factor refers to the support of providers in the adoption. This factor is part of the environmental context and was adopted from studies by Rogers [70] or Premkumar and Roberts [85].
- Security: This factor refers to the feeling of absence of danger or risk in use. This factor is part of the security context and was adopted from the study by Weber [86].

Later, a causal study was developed with all of these factors, which influence the adoption and use of new technological tools, to locate the determining factors in the decision of Spanish universities to accept and implement e-proctoring as a method of remote monitoring.

3. Methodology

This causal study was carried out through the fuzzy cognitive maps methodology, as this methodology not only reflects the causality of each of the factors regarding the decision to be made, but also reflects the existing causality between all of the factors involved in the decision to be made (a fact that can cause changes in the relevance of each of the factors involved and that represents a more faithful image of what really happens in a decision-making process) [87–89].

This methodology is one of the most relevant in the study of knowledge and is one of the most used for this type of study, as can be seen in the review that Papageorgiou and Salmerón made on the research carried out with fuzzy cognitive maps in recent years [90]. Additionally, it is a methodology that is used to identify, define, and validate the factors of a system and identify the causal relationships between these factors, in order to propose strategies and help make decisions [91].

In the scientific field, it is usually used for its descriptive (it allows describing the factors involved in a system), explanatory (it allows explaining the behavior of the factors involved in a system), reflective (it allows decisions to be made based on the behavior of the factors in a system), and/or predictive application (it allows predicting the actions of the factors involved in a system) [92].

Due to these applications within the scientific field, in this study, it was decided to opt for this methodology, as it allows to identify the factors involved in decision making, in addition to explaining the reasons for a decision thanks to the existing causality between the factors involved in decision making.

This methodology is based on expert judgment, and interviews are typically used for data collection. For this reason, interviews were conducted with experts in the technology and education fields, who identified the factors involved in this decision and quantified and analyzed all of the causal relationships between these factors.

In each of the interviews, a causal study of the studied system was carried out; the interviewees received a table with the factors identified during the literature review, and they had to identify which of these factors were involved in this decision making and contribute new factors if they saw fit [93]. Subsequently, they had to analyze the causal relationships existing between all of the factors involved in this decision making (identified and contributed) and had to assess the degree of each of these relationships, quantifying it in an interval $[-1, 1]$ (as -1 if a factor had a strong negative influence on another factor, 0 if one factor had no influence on another factor, or 1 if a factor had a strong positive influence on another factor) [94,95].

The data acquired in each of the causal studies were used to create a global causal map with the average assessment of each of the causal relationships identified by the interviewees, and this causal map was transformed into the adjacency matrix, which can be observed in Table 2.

Table 2. Adjacency matrix of the studied system.

	Complexity	Compatibility	Relative Advantage	Perceived Cost	Characteristics of the Leader or Manager	Perceived Reliability of the Technology	Top Management Support	Size of the Company	Technological Organizational Readiness	Pressure from Competitors	Pressure from Business Partner(s)	Pressure from Customers	Pressure or Incentives from the Government	Support from Information System Providers	Security
Complexity	0.00	–0.40	–0.80	–0.30	0.00	–0.70	–0.70	0.00	0.00	–0.60	–0.70	–0.90	1.00	1.00	–0.85
Compatibility	0.00	0.00	0.50	0.20	0.00	0.70	0.95	0.00	0.00	0.80	0.80	0.40	0.90	0.00	0.00
Relative advantage	0.00	0.90	0.00	0.40	0.00	0.70	1.00	0.00	0.00	0.90	0.95	0.20	0.70	0.00	0.00
Perceived cost	0.00	0.00	–0.30	0.00	0.00	0.00	–1.00	0.00	0.00	–0.70	–0.80	0.00	0.00	0.30	0.00
Characteristics of the leader or manager	0.60	0.80	0.80	0.20	0.00	1.00	1.00	0.00	0.90	0.00	0.00	0.00	0.00	0.00	0.90
Perceived reliability of the technology	0.40	0.80	0.90	0.40	0.00	0.00	0.85	0.00	0.00	0.60	0.90	0.00	0.65	0.00	1.00
Top management support	0.00	0.75	0.00	0.60	0.00	0.60	0.00	0.00	0.90	0.00	0.80	0.00	0.90	0.00	0.00
Size of the company	–0.60	0.65	0.70	0.80	0.00	0.00	0.00	0.00	0.80	0.40	0.40	0.00	0.75	0.90	–0.80
Technological organizational readiness	0.60	1.00	0.00	0.40	0.00	0.80	0.80	0.00	0.00	0.00	0.40	0.00	0.30	0.60	0.90
Pressure from competitors	0.00	0.00	0.60	0.00	0.40	0.90	0.80	0.00	0.70	0.00	0.75	0.10	0.90	0.00	0.00
Pressure from business partner(s)	0.00	0.00	0.90	0.40	0.60	0.60	1.00	0.00	0.80	0.00	0.00	0.00	0.90	0.00	0.40
Pressure from customers	0.90	0.90	0.90	0.60	0.00	0.90	0.90	0.00	0.70	0.60	0.90	0.00	1.00	0.60	1.00
Pressure or incentives from the government	0.80	0.80	0.80	0.60	0.00	0.80	1.00	0.00	0.75	0.60	0.80	0.80	0.00	0.60	1.00
Support from information system providers	0.90	0.90	0.80	0.30	0.00	0.70	0.80	0.00	0.60	0.00	0.80	0.00	0.00	0.00	0.80
Security	0.90	0.90	0.90	0.40	0.00	1.00	0.80	0.00	0.00	0.00	0.50	0.80	0.80	0.70	0.00

This shade of adjacency is a square matrix formed by all of the factors involved in this system and represents the causal relationships (existing between all of these factors) identified by the interviewees. Each of the rows of this matrix collected the average assessment of the causal relationships of the factor found in the corresponding row with respect to the rest of the factors of the system (which are reflected in the columns); that is, row 1 collected the average assessment of the causal influence that the "Complexity" factor exerts on each of the factors found in the columns—and the same applies to the rest of the rows.

This matrix was finally processed with the FCMappers tool, a fuzzy cognitive map analysis tool based on Microsoft Excel [96], which allowed us to obtain the determining

factors in this decision, in addition to the factors that exert the most influence on the rest of the factors and those that receive the most influence from the others [97].

FCMappers first appeared as a beta version in 2009 and is the first Microsoft Excel-based tool used to analyze fuzzy cognitive maps. To use this tool, the data of the acquired adjacency matrix must be entered, and later, the factors are processed and classified by the degree of influence they exert on the other factors, by the degree of influence they receive from the other factors, and by the degree of participation or influence in decision making.

Regarding the experts who participated in these interviews and provided the analyzed data, they were selected for their involvement in the area studied and came from two different profiles:

- University professors who taught remotely in Spanish universities during the COVID-19 pandemic, with training in educational technologies, research in the application of technologies in the educational sector, and more than 10 years of teaching and research experience. All of the professors of this profile belonged to different universities (since only one professor per university was interviewed), all teaching in the area of education, since they are great experts in the application of technologies in the educational sector.
- Those responsible—or who were responsible—for the area of virtual teaching in Spanish universities, since they are great experts in the implementation of technologies in the educational sector and all of them had implemented technologies in their universities during the time in their position. All those assigned to this profile belonged to different universities (since only one manager or previously responsible person was interviewed per university).

An invitation email was sent to the experts of the two profiles and the optimal number of interviewees was reached when the new interviewees stopped contributing new factors (involved in this decision) with respect to those already identified by the previous interviewees, as indicated by Özesmi and Özesmi [98] for studies using this methodology. In this way, there have been studies that used fuzzy cognitive maps with 45 [99], 40 [100], 30 [101], 29 [99], 8 [8], 7 [93], and 4 interviewees [102].

In this study, the optimal number of interviewees was reached with 40 experts (20 experts from each of the two differentiated profiles); none added new factors to those identified in the literature review, but this number continued to provide greater significance to the results achieved. Furthermore, no great differences were observed in the assessments of the interviewees in terms of the causal relationships to be analyzed, which also increases the significance of these results.

4. Results

The adjacency matrix obtained by the average assessment of the interviewees to the existing causal relationships between the factors involved in this decision making consisted of 15 factors and 133 causal connections (Table 2).

Processing this adjacency matrix through the FCMappers tool allowed obtaining the classification of the most relevant factors in this decision, in addition to the classifications of the factors that exert the most influence on the rest of the factors and the factors that receive the most influence from the other factors. These classifications were achieved with the assessments that this tool provided to each of the factors based on the assessments that the experts offered in terms of the causal influences existing between them and based on the desired classification.

The classifications of the factors that exert the most influence on the rest of the factors (from highest to lowest) include: pressure from customers, pressure or incentives from the government, complexity, security, size of the company, support from information system providers, perceived reliability of the technology, characteristics of the leader or manager, technological organizational readiness, relative advantage, pressure from business partner(s), compatibility, pressure from competitors, top management support, and perceived cost (Figure 1).

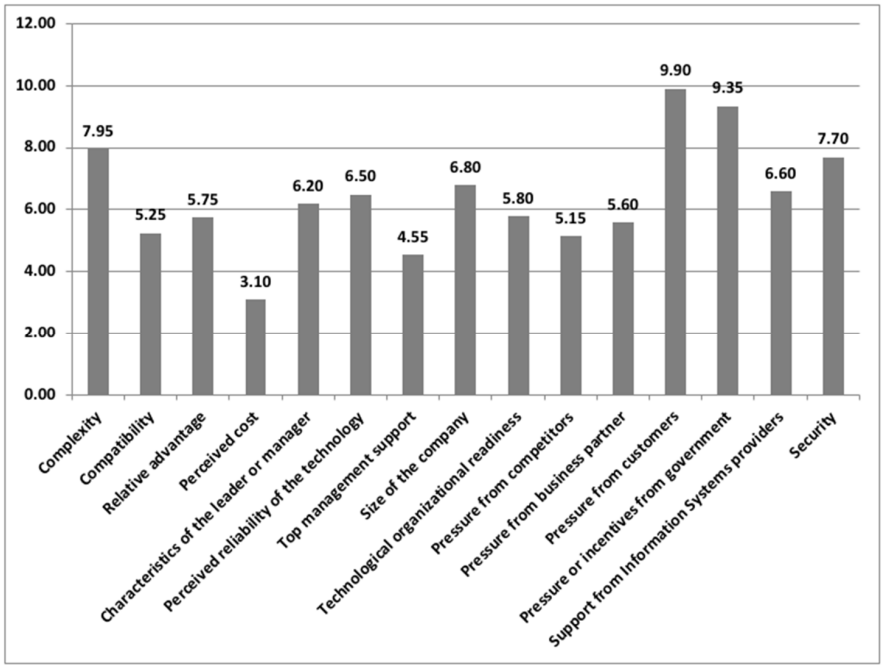

Figure 1. Factors that exert the most influence on the rest of the factors.

The factor that exerts the most influence on the rest of the factors was shown to be pressure from customers, for which the FCMappers tool provided a score of 9.90. Seven of the 15 factors were above the mean (6.50) of the difference between the factor with the highest score (9.90) and the factor with the lowest score (3.10).

The classifications of the factors that receive the most influence from the rest of the factors (from highest to lowest) include: top management support, pressure from business partner(s), perceived reliability of the technology, relative advantage, compatibility, pressure or incentives from the government, security, technological organizational readiness, complexity, perceived cost, pressure from competitors, support from information system providers, pressure from customers, characteristics of the leader or manager, and size of the company (Figure 2).

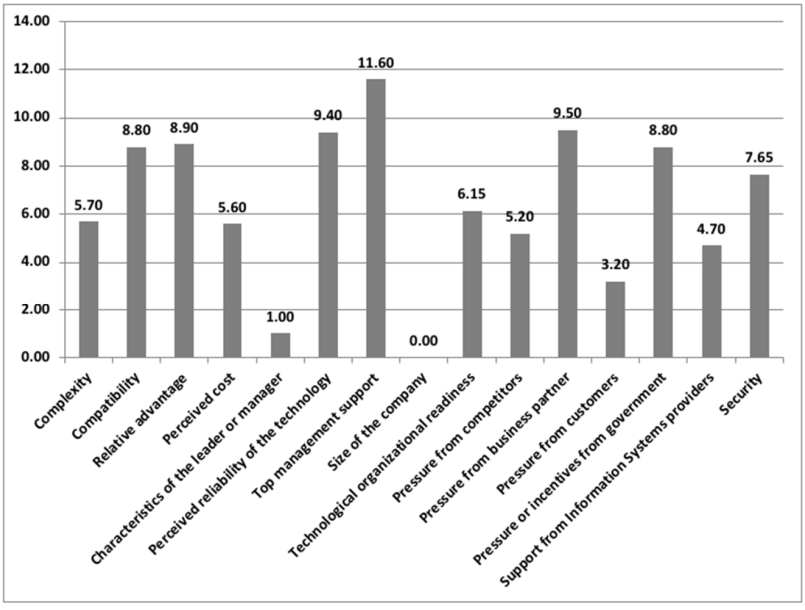

Figure 2. Factors that receive the most influence from the rest of the factors.

The factor shown to receive the most influence from the other factors was top management support, for which the FCMappers provided a score of 11.60. Eight of the 15 factors were above the mean (5.80) of the difference between the factor with the highest score (11.60) and the factor with the lowest score (0.00).

The classifications of the most relevant factors in this decision (from highest to lowest) include: pressure or incentives from the government, top management support, perceived reliability of the technology, security, pressure from business partner(s), relative advantage, compatibility, complexity, pressure from customers, technological organizational readiness, support from information system providers, pressure from competitors, perceived cost, characteristics of the leader or manager, and size of the company (Figure 3).

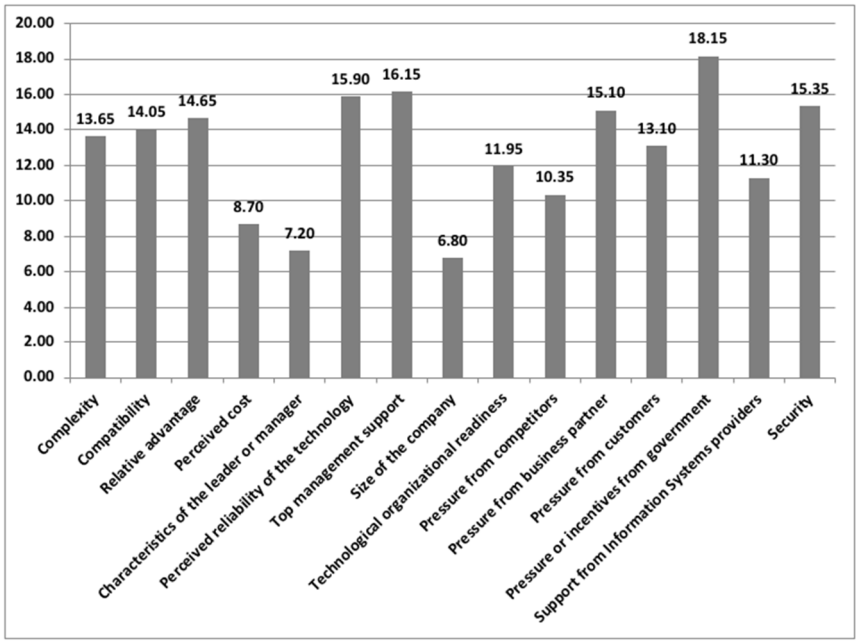

Figure 3. Most relevant factors in this decision.

The most relevant factor in this decision was shown to be pressure or incentives from government, for which the FCMappers tool provided a rating of 18.15. Nine of the 15 factors were above the mean (12.475) of the difference between the factor with the highest score (18.15) and the factor with the lowest score (6.80).

5. Discussion

When it comes to pointing out the key factors in the decision of Spanish universities to accept and implement e-proctoring as a method of remote supervision, the results achieved in this study ended up pointing out other factors than those already mentioned in previous studies on the implementation of this tool in educational institutions.

This is because the virtualization of the educational process caused by the COVID-19 pandemic has meant that this tool was put to the test in Spanish universities, which has made it possible to visualize the real problems or the real key factors of these institutions in accepting and implementing this tool today.

Previous studies pointed out drawbacks in this system, such as the fact that the exams were not well prepared to be carried out under this modality or that supervisors or examiners did not know how to act when student reaction problems or telematic communication problems arose, which led to the development of mathematical models and algorithms to help in the design of exams and to help the people responsible for proctoring those exams [103–109], in order to improve the use of e-proctoring.

Even so, in these studies, the "security" factor has always been the center of investigations in this decision as it is the key factor or the main problem when implementing this

tool, since its effectiveness in reducing cheating in remote evaluations of exams created mistrust and insecurity [8,110–112] and many institutions did not dare to use it despite studies confirming its effectiveness and advising its use in educational institutions for remote evaluations [113–116].

In this study, two factors gained prominence that had previously not acquired such relevance, one of which was the "pressure from customers" factor, while the other was the "pressure or incentives from the government" factor.

The "pressure from customers" factor was the factor shown to exert the most influence on the rest of the factors, which focuses on the pressure from students when Spanish universities accept and implement this tool. This was verified during this period, where the students refused its definitive implementation when Spanish universities began to opt for this tool as a method of remote supervision, alleging social, legal and ethical implications, such as the inability to have the necessary resources for its use and the violation of privacy [117–121]. This led them to finally opt for videoconferences with active audio and video [5,6] as a supervision method, which did not remedy the problems alleged by the students, but reduced the need for resources and the violation of privacy.

All of this has caused the "pressure or incentives from the government" factor to become the most relevant factor when it comes to Spanish universities accepting and implementing this tool, so if this method is expected to be implemented in Spanish universities as a method of remote supervision, it is necessary to offer initiatives from the universities or from the government that encourage the acquisition of necessary resources, and initiatives from the universities or from the government that normalize the recording of students in the development of the evaluation and monitoring of their computers.

With regard to the initiatives from the universities or the government that normalize the recording of students in the development of evaluations and the monitoring of their computers, facts that may lead to ethical problems and possible conflicts with the European standards of the General Data Protection Regulation (GDPR), as can be seen in previous studies [112–126]; the distributors of these e-proctoring systems have already proposed guidelines in this regard that allow them to comply with said regulations [127], and the responsibility would fall on the universities to provide their approval of these guidelines or indicate if they see other more fitting ones.

These distributors take into account the regulatory framework in order to develop their solutions and confirm e-proctoring as a totally legal system as long as the rules set by data protection regulations and user privacy laws are respected, which they are ensured if the guidelines they provide for their operation are met [128]:

- Students must give consent from the beginning and must be informed about the evaluation methodology.
- Those involved in this process must be informed of how the software is going to collect personal data (before and during the evaluation process), how it is going to treat this information and facilitate withdrawal possibilities.
- Digitized processes must be established that prevent the information collected from being used for non-academic purposes.
- And all those involved must have the possibility of accessing their personal data and the information collected at any time, in addition to having the possibility of demanding its deletion and rectification.

These distributors offer solutions that manage all of this, freeing educational institutions from any ethical and legal responsibility.

In terms of initiatives from the universities or the government that encourage the acquisition of necessary resources (computers, webcams, headphones, microphones, and Internet connection), no measures have been taken to encourage said acquisition because their use has not yet been decided, but it is something that should be taken into account if they decide to implement this process one day. This implementation has social implications, and it cannot be allowed to generate inequalities in terms of opportunities depending on whether a student has the necessary resources or not [129,130].

6. Conclusions

Between two possible practices when supervising a remote synchronous evaluation, during the COVID-19 pandemic, the majority of Spanish universities opted for the use of videoconferences with audio and active video, instead of implementing e-proctoring. However, the option of implementing e-proctoring could have caused a greater advancement in the possible globalization of Spanish universities and their services remotely and a greater advance in the future performance and sustainability of this process in the face of possible future pandemics, allowing a more reliable academic integrity and a higher quality in the evaluation process without requiring the physical presence of students.

This non-implementation was due to the key role of students in the acceptance and implementation of this tool. Students had not been taken into account before choosing this supervision method, and they refused its implementation in Spanish universities, alleging the non-possibility of having the necessary resources for its use and the violation of privacy. This meant that its implementation was not carried out in the vast majority of Spanish universities and that the "pressure or incentives from the government" factor became the most relevant if wanting to eliminate these allegations and if to implement e-proctoring in most Spanish universities.

Today, the distributors of these e-proctoring systems are already taking measures in this regard and have established guidelines for their operation based on compliance with the European standards of the General Data Protection Regulation (GDPR) to eliminate allegations of students regarding the violation of privacy, opening up a new opportunity in Spanish universities if they want to implement e-proctoring as a method of supervision in remote evaluation for the possible globalization of Spanish universities or for possible future pandemics.

This research was limited to the study of the determining factors in the decision of Spanish universities to accept and implement e-proctoring as a method of remote supervision in order to determine the necessary measures that must be taken to extend the use of e-proctoring in the Spanish university system. Now that the most influential factor has been ascertained, it would be interesting to carry out a more detailed study on this factor, on what students want to see in these norms (whether it coincides with the proposal of the distributors of these systems or not), and on what students want to see in terms of institutional/governmental incentives for them to accept said implementation without controversy. This would streamline the entire process and achieve the implementation of this tool without further delay.

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