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The Spin-Off as an Instrument of Sustainable Development: Incentives for Creating an Academic USO

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Abstract: In recent years, universities and public authorities have increasingly focused on creating USOs (university spin-offs) as a method of transferring research results to society and of achieving the sustainable development sought by European institutions. However, the success of these policies depends on the appeal of creating a USO for academics. The aim of this research was to examine the relative importance of certain factors that may boost academic entrepreneurship and, therefore, to guide public policies. To do this, a qualitative study was carried out among 42 researchers from Spanish universities and research centres to understand their motivations for creating a USO. A quantitative study was then carried out, based on Conjoint Analysis and with a sample of 1726 academics, to identify the relative importance of six conditions that influence their predisposition to become entrepreneurs. This technique is seldom used in the field of entrepreneurship and, to the best of our knowledge, has never been used before to analyse academic entrepreneurship. The results of the study show that personal economic benefit is clearly the factor that heightens the intention to create a USO the most. Research benefit, CV benefit, support programmes, teaching reduction and personal cost are of lesser importance. The study also concludes that there are few differences according to the academic's profile.

Keywords: academic entrepreneurship; conjoint analysis; policy makers; spin-off; technology transfer

1. Introduction

Over the last two decades, public research centres and higher education institutions have increased their focus on improving the transfer of their research results to society, especially to the productive system. We have begun to hear the term "entrepreneurial universities", which reflects their concern for contributing towards the sustainable economic development and societal impact [1–5] of their region and country. In this sense, one of the most important contributions of USOs is how it helps to create jobs. In Spain, where the unemployment rate is over 15% according to the National Statistics Institute, this type of companies could be a good way to improve the employment rate and to accomplish the smart specialization commitments proposed by the European Commission in the "Europe 2020 Strategy".

Smart specialisation is the capacity of regions to devise structural alterations in their economies through innovation, the detection of opportunities and the absorption of resources [6]. Therefore, it is a model of regional development that is based on innovation, derived mainly from the efforts in R&D and the creation of companies in accordance with said discoveries [7–9]. This concept is broadly in line with the definition, creation, mission and objectives of the USO. For that, academic entrepreneurs are in a great position to realise the areas of R&D and create companies in the way of smart specialisation, taking advantage of the resources available in their regions.

This type of business, based on knowledge and technology transfer, are so important for achieving the smart specialization objectives. Apart from this, USOs are innovative businesses that turn ideas into economic success, link education and industry and take advantages of knowledge and local potential, three pillars of the smart specialization concept. USO also contributes to smart specialization through the creation of relationships among the educational-scientific, industrial and institutional system, which has been called triple helix. This is one of the tenets of smart specialization, and USOs contribute to this in a resounding way.

This importance not only involves its contribution to sustainable economic development and job creation [10–12], but also the generation of new business opportunities and diversification of existing businesses [13], technological development, creation of new sectors, contribution to female employment [14] or attraction of talent and new entrepreneurs as a result of setting up USOs [13]. For all these reasons, USOs have been a great way to achieve sustainable development during the last two decades. This sustainability is based on the sectors that traditionally involved university research transfer, as technology and green sectors [15]. This transfer of knowledge has traditionally been carried out through patents and external collaboration agreements between researchers and companies. However, the development of academic entrepreneurship is becoming increasingly important for the creation of USOs [16,17].

An academic entrepreneur "could be viewed as that higher education actor who innovatively leverages internal and external opportunities to not only generate economic resources for their own profit or in support of their academic units and institutions, but also to create within the academy social and political change platforms" [18] (p. 444). Etzkowitz and Viale [19] (p. 600) defined them as experts in a specific scientific area, "with an eye on basic research as well as company problems [. . .] and divergence in awareness of commercial potential". A USO is the company resulting from this process, which is characterised by exploiting the research results of its founders and by being linked to the university institution from which it arises.

Motivated academics are necessary for the development of academic entrepreneurship [20], with the aim being to perform actions that go beyond their classical roles of teaching and research [21]. Identifying and understanding these motivations are essential for the people running the government and universities to design effective policies that contain enough incentives for academics to become academic entrepreneurs [22].

Miranda et al. [23] identified three main research areas in the field of academic entrepreneurship: individual characteristics, firm and institutional context, depending on the unit of analysis. When the analysis refers to the individual faculty member, the main area is "individual"; when the focus is on the USO itself, the area is called "firm"; and in cases where this analysis is related to the national or regional context where the USO is located and the economic and social impact of USO could have on it, the area is called "institutional context". The research presented in this article falls within the first research area, with the aim being to draw conclusions that can guide institutional support policies.

The antecedents or factors that influence entrepreneurial intention have been widely studied in the general literature on entrepreneurship. The theoretical framework adopted in our paper is based on the classical entrepreneurial intention model. However, these factors must be analysed for the specific case of academic entrepreneurs, as both the personal characteristics of the academics and the environmental factors are clearly different, as are the networks, players and institutions involved [24]. As indicated by Hoye and Pries [25] and Hannibal et al. [26], academic entrepreneurship is a subject that still needs to be researched in more depth.

In the case of Spain, the number of USOs created during 2010–2014 was 586—33% of which were participated in by the university of origin. Since 2006, this creation has grown significantly, reaching a figure of around 100 USOs created per year since then [27]. These data placed Spain in the group of "moderate innovators". This is the same group as, e.g., Portugal or Italy are found. In 2016, Spanish academics requested 559 new patents and 95 new USOs were created. This information shows us the importance of this type of business for Spain and for its sustainable development.

In this context, the main contribution of this paper is to identify which conditions or support measures have the most influence on the predisposition to create a USO, "*the bottom-up behaviors of individual academic scientists*", as it was called by Hmieleski and Powell [28]. This subject has still not been well researched but is important when it comes to guiding university research policies.

This research also offers the novelty of applying the Conjoint Analysis methodology to the study of academic entrepreneurship. This technique is widely used in the study of customer preferences but is hardly used in the study of the work preferences of employees or entrepreneurs.

Having discussed its relevance and novelty, the study is divided into various sections. The next section includes a review of literature on the factors that motivate entrepreneurial intention. The research objectives and methodology are then explained. The following section contains the results obtained in both the qualitative and quantitative research carried out. It finishes with the conclusions and implications arising from the results, the limitations of this study and the future areas to explore.

2. Theoretical Framework

According to the review of USO literature carried out by Miranda et al. [23], most studies have aimed to analyse the chief antecedents of academics' entrepreneurial intention, categorising them as individual or contextual factors. For example, Lam [29] examined intrinsic and extrinsic motivations and discusses their interrelationship.

Individual factors are those personal characteristics that influence the possibility of creating a USO and the business orientation of the researcher. They can be of a biological or cognitive nature, the result of their social interaction [30] or psychological factors [31]. Among the individual features that have been proven to impact on entrepreneurial intention are the individual's academic seniority, entrepreneurial personality, self-confidence, creativity, the perceived utility of entrepreneurship, the level to which the academic promotes the societal role of universities, gender or scientific productivity (see [11,32–41]).

In contrast, contextual factors refer to the external circumstances that are beyond the academic's control and are not inherent to them as an individual, but rather to the setting in which they carry out their professional activity [42,43]. We can distinguish between two levels of contextual factors. A general or macro-environmental factor, which has an influence on whether there is a greater or lesser incentive to become an entrepreneur and the support for such activity within a country or region [44]. This environment is common to all entrepreneurs, not only to academic entrepreneurs, although they may perceive it differently. Secondly, there is a specific environmental factor that only affects academic entrepreneurship and that is determined by the university policy adopted by those responsible for university education and those running each of the universities.

The general environment refers to the general economic position of the country or region, the existing entrepreneurial culture and the political and financial support for innovation and entrepreneurship. Although much less studied than individual factors, various research studies have evaluated their effect on the entrepreneurial intention of academics [37,43–45]. Given the objective of our work, we focus here on analysing the literature on those factors determining entrepreneurial intention over which university policy makers have an influence; that is, relating to the specific environment of the university [46–53].

Roberts and Malone [54] may be considered the precursors in the study of university policies to support academic entrepreneurship. They suggested that university strategies should be designed according to two variables: selectivity and support. From these, two opposing strategic scenarios can be adopted. The first is based on low selectivity and low support, aimed at creating the highest number of USOs with the least possible support. The second is based on high selectivity and high support, aimed at creating few USOs with a high level of support to ensure their success.

Some authors suggest that the support programmes or models will also determine the type of USO created. Differences in the degree of organisation and management of the resources available

and support activities could lead to USOs aimed at self-employment, economically profitable USOs or USOs aimed at success [55–58].

In some cases, the result is that the university environment is not key in the formation of an academic's entrepreneurial intention [23,59]. In a recent study, Fini et al. [60] (p. 361) showed that "*changes in the institutional framework conditions at both national and university level are conducive to the creation of more spin-offs, but that the increase in quantity is at the expense of the quality of these firms*".

Among the main university policy measures that may favour the entrepreneurial intention of academics are: providing financing in the early stages of the USO [61]; obtaining a research career benefit by placing value on entrepreneurial activity on the academic's CV [35]; the option to reduce the workload as a result of participating in the management of a USO [62–64]; and a reduction in the bureaucracy necessary to launch a USO [65].

Some authors show that the outgoing royalty settlement between academics and the university, as well as economic gain [11,32] is also essential for determining the USO creation performance [66–70]. However, some authors such as Stern [71] consider that the relationship between wages and science is doubtful.

Lam [29] considered that, aside from the distribution of economic gain, referred to as "gold" by the author, there are two more rewards that motivate academics to become entrepreneurs: "ribbon", defined as reputational or career rewards, and "puzzle", defined as intrinsic satisfaction at becoming entrepreneurs. Fini et al. [59] showed that the chance to access university infrastructures is one of the most important incentives for academics.

However, extra investments and endeavours made by some universities to generate additional mechanisms to sustain USOs are not noticed as further incentives. There are several studies that highlight the need for support to be provided through the protection of research results rather than through promoting entrepreneurial activity [72–80], as this is the element that can slow down the launch of a USO to a greater extent.

Finally, Fini et al. [81] demonstrated the need for academic entrepreneurship support programmes to be coordinated with the existing local and regional programmes. This coordination can increase their effectiveness.

In short, an examination of the literature demonstrates the influence of academic entrepreneurship support policies, referred to as the university environment, on the entrepreneurial intention of scientists. However, it is compulsory to highlight the necessity of examining the attitude of academics towards several support policy actions and, therefore, classify them in line with their effect on entrepreneurial intention. This paper attempts to shed light on that knowledge gap.

3. Objective and Methodology of the Study

The aim of the paper is to study the situations that can have the most impact on the predisposition of Spanish researchers to found a USO. This knowledge can guide university policies and involves:

1. Identifying the relative importance academics place on the different conditions or policies providing an incentive to create a USO. As indicated above, there are no existing studies focused solely on analysing this issue.
2. Identifying whether the conditions or incentives to create a USO are different according to the academic's profile—specifically, according to their gender, academic seniority, professional category, field of knowledge and the regional environment where they work. The selection of these variables to segment academics is justified by the results of previous studies that have demonstrated that they influence the intention to create a USO.

With regard to gender, studies such as those of Stuart and Ding [82], Whittington and Smith-Doerr [83], Abreu and Grinevich [84], Amoros and Bosma [85] and Miranda et al. [38] have revealed that female academics have a lower entrepreneurial intention than male academics. For this reason, we understand that female academics may also perceive academic entrepreneurship support actions differently.

There are also differences in entrepreneurial intention according to the scientific field the academic is researching. This is the conclusion of the studies by Fini et al. [81], D'Este et al. [86] and Miranda et al. [37]. Therefore, one can assume that their entrepreneurship support needs may also be different. The same occurs with academic seniority, although the results on its relationship with entrepreneurial intention are inconclusive. There are research studies that have shown that this intention increases with experience [21,87] while other studies find the opposite results [46,82,88].

We also find studies such as those of Stuart and Ding [82] and Colyvas and Powell [84] that reach the conclusion that professional category is a significant factor in the choice to create an USO, especially with regard to the stability obtained as a result of this and the need to achieve new goals that are different from academic ones, which have already been attained.

Finally, as indicated in the previous section, entrepreneurial intention can also be affected by the regional environment where the academic works. Therefore, this variable has also been included to analyse the data for our study in a segmented manner.

The use of the CA (Conjoint Analysis) method has been considered suitable to achieve the aims described above. This method studies the preference structure of individuals through a research study that contemplates the actual decision-making process they face when having to select among different goods or circumstances.

In contrast to research studies that demand a direct and independent assessment of each feature comprising a product, the Conjoint Analysis technique is decompositional. Participants are requested to provide a general evaluation of several products, each categorised by dissimilar levels of a set of characteristics. That is, it contemplates an actual selection scenario where the decision maker assesses a merchandise as a whole and not each of its attributes separately. From these global assessments, the method lets us detect the relative importance of each attribute.

The steps to be followed in conducting a research studying using Conjoint Analysis are the following:

- Step 1: Choice of characteristics including the merchandise or choice being analysed.
- Step 2: Choice of attribute levels.
- Step 3: Choice of the data collection process.
- Step 4: Choice of incentives. Each of the products offered to individuals for assessment is an incentive.
- Step 5: Method of managing the survey or data collection.
- Step 6: Choice of the technique for estimating partial utilities or partworths.

According to Hair et al. [89], the following "composition rule" tends to be used to estimate the total utility of each stimulus for the participants. This is the sum of the partworth utilities corresponding to each of the levels of the attributes that make up this stimulus.

$$U_{ijk} = \sum_{i=1}^{N_j} \sum_{j=1}^{m} V_{ij} D_{ij} \quad (1)$$

where

U_{ijk} = Total utility that the stimulus characterised by level i of attribute j provides to individual k.

V_{ij} = Partial utility (*partworths*) or importance assigned to level i of attribute j.

D_{ij} = Dummy variable that takes the value of one if the stimulus possesses level i of attribute j, and zero otherwise.

N_j = number of levels corresponding to attribute j.

m = number of attributes.

The importance of an attribute ($Imp\ P_j$) can be defined as the difference between the partworth utilities associated with the levels of the attribute. The greater is the difference, in absolute terms, between the highest and lowest partworth utilitiesthe more important is the attribute:

$$Imp\ P_j = \left|\max\left(V_{ij}\right) - \min\left(V_{ij}\right)\right|;\ \forall_i = 1 \ldots .m\ \forall_j = 1 \ldots .k_j \quad (2)$$

The researcher can identify the importance of an attribute in relation to the rest, i.e., its relative importance ($R\ Imp\ P_j$), through the importance of each attribute and using the following expression:

$$R\ Imp\ P_j = \frac{Imp\ P_j}{\sum_{i=1}^{I} Imp\ P_j} \times 100 \quad (3)$$

4. Experimental Design

The first stage in applying CA is to categorise the characteristics that describe the choice to found an USO. Based on the literature review, we have designed a qualitative study to help us select them.

During two training workshops on academic entrepreneurship, contributors were requested to reflect on the pros and cons of founding a USO, under which conditions they would do it and what aspects would prevent them from doing it. A total of 42 academics from 9 universities participated in these workshops.

The comments provided were compiled and grouped according to the topic which they referred to. Among the advantages of creating a USO, the following were mentioned:

1. Personal satisfaction and professional fulfilment. This is, by far, the main argument in favour of creating a USO. This was indicated through statements such as: "*working on your own project, something that is motivating*", or "*professional pride at seeing the results of our work applied in the real world outside the laboratory*".
2. The benefits arising from having the economic and material support provided by the university in the early years of the project, as well as enjoying the prestige it provides. Some statements that reflected these ideas were: "*being able to use the university infrastructure and facilities means a lower investment requirement and minimises risk*" or "*the number of contacts and opinion leaders that we can generate in the university environment*".
3. Learning gained from the business project which will help to improve the research carried out by the academic. Some academics even specified the learning that can be used in teaching: "*The participation of academics in USOs can enrich their teaching and research work by providing them with greater contact with reality*".
4. The self-financing of research and other research benefits. It can be argued that the USO will attract additional resources that can help the researcher continue their main activity. This has been expressed with phrases such as: "*you generate resources for more research*" and "*you can turn it into reality and even continue developing and expanding the research area that gave rise to the company without the rigidity, and above all the bureaucracy, that is sometimes a hindrance from the university*".
5. Improvement in the academic CV: "*you accumulate merits for promotion*".
6. The economic benefit for the researcher-developer: "*this can lead to an interesting professional and economic boost*".

In contrast, the main difficulties or disadvantages in founding a USO mentioned were:

1. The difficulty in balancing it with other academic activities. This refers to the time that must be spent on this task and its compatibility with the academic's own tasks. This idea was expressed with statements such as: "*although the project may be very exciting in the early stages, I think that finding time for all the additional work may become a big problem*", "*the time that needs to be dedicated to the company and the negative effect on academic research, which is what is considered for promotion*".

2. Lack of knowledge and training. The participants complained: "*we do not receive much training on creating companies, which can be resolved by creating a multidisciplinary work group*", "*we don't have the ability to market the product*" or "*we do not get legal or technical advice*".
3. Bureaucracy. This disadvantage also seems to be linked to the time constraints on university academics and their experience with bureaucratic obstacles in other research activities: "*the bureaucracy involved in any research-related procedure or initiative*".
4. Lack of market focus. It has been acknowledged that the research carried out at universities is sometimes out of touch with the reality of the market or that this requires activities that go beyond the work performed at the university: "*we researchers are somewhat removed from the reality of our sector*", or "*adapting the original idea to the real needs of the market can be one of the biggest difficulties*".
5. The economic insecurity or risk assumed when exploiting research work through a USO. This was expressed through ideas such as "*economic insecurity and many headaches unrelated to research*" or "*it would take years before the profitability of a company of this type would be sufficient for the company to be viable*".
6. Ethical rejection from the environment. The link between research and earning money seems to be frowned upon by some of the teaching staff: "*many of the university's employees have a negative perception of people who earn money with research*", "*we are used to the fact that the ethical thing to do is to research with few resources*".

Subsequently, six kinds of factors were selected that might have an impact on the predisposition to found a USO and these establish the characteristics to be included in the CA. Each can be presented in a positive or a negative way (see Table 1). Four of these conditions can be controlled to a large extent by university governing bodies and/or public organisations responsible for R&D policies:

- *Researcher benefit*. This denotes the capability to obtain resources for research through the USO, such as allowing them to apply for certain public grants.
- *CV benefit*. This denotes recognition within the professional promotion systems for being part of a USO.
- *Teaching reduction*. This denotes the possibility of reducing the teaching responsibilities of the founders of a USO.
- *Support programmes*. This denotes the training and advice on entrepreneurship offered by the university.

The other two factors selected as characteristics for the research denote aspects that cannot be controlled by the university but are instead specific to each business. This is, the *personal cost* (more working hours) and the *economic benefit* expected.

Table 1. Attributes and levels.

Attributes [Conditions for Becoming an Entrepreneur]	Levels	
Personal benefit	Yes	Increase in my income
	No	No increase in my income
Researcher benefit	Yes	Facilitates gaining of income for research
	No	Does not facilitate gaining of income for research
CV benefit	Yes	Included in professional promotion
	No	Not included in professional promotion
Support programmes	Yes	With institutional support
	No	Without institutional support
Teaching reduction	Yes	Teaching workload reduction
	No	No teaching workload reduction
Personal cost	Yes	Increase in work hours
	No	Maintenance of my work hours

Another methodological issue to resolve is choosing between various procedures to construct the stimuli that must be evaluated by the survey respondents. This decision will be determined by the statistical software used. The CONJOINT module of the SPSS program was used in our research, so the procedure chosen was the traditional full profile method. In this way, the survey respondent must evaluate a unique set of stimuli, where each stimulus is defined by all the previously selected attributes or conditions.

The next step is to choose the data collection procedure, which involves making two decisions. The first concerns the number of stimuli to be shown to survey respondents. In our case, the complete factorial design would have involved presenting the 64 possible stimuli [$2 \times 2 \times 2 \times 2 \times 2 \times 2$] to the survey respondents. However, this would lead to information overload, negatively affecting the quality of their responses. For this reason, an orthogonal fractional factorial design was used, which reduced the number of stimuli to just 8 (Table 2). This reduction was carried out in such a way that the information acquired from the use of the resulting subset would be similar to that which would have been acquired using all the stimuli. In particular, one ensures the presence of all the attributes and their corresponding levels with equal intensity in the stimuli with this design, without introducing a bias to any given level.

Table 2. Stimuli presented to the academics.

	Personal Cost	Personal Benefit	Researcher Benefit	CV Benefit	Support Programmes	Teaching Reduction
Situation 1	No	No	No	Yes	Yes	No
Situation 2	Yes	No	No	No	Yes	Yes
Situation 3	Yes	Yes	No	Yes	No	No
Situation 4	No	No	Yes	Yes	No	No
Situation 5	Yes	Yes	Yes	Yes	Yes	Yes
Situation 6	Yes	No	Yes	No	No	No
Situation 7	No	Yes	No	No	No	Yes
Situation 8	No	Yes	Yes	No	Yes	No

The second decision refers to the method of carrying out the evaluation of the set of stimuli presented to the survey respondents: ranking or evaluation (classification). In our case, the second choice was selected and the questionnaire participants had to assess the attractiveness of the 8 stimuli using a progressive scale from 1 (low incentive to create a USO) to 7 (high incentive). The stimuli were presented to the survey respondents through an online questionnaire.

To conduct the research, a database of almost 33,000 academics from the 82 Spanish universities was created and a census study was carried out. Responses were obtained from 5.2% of the population, with a total of 1726 individuals answering the questionnaire (Table 3). This study was conducted in January 2017, and the questionnaire was available for two weeks. Model estimation was done using an Ordinary Least Squares regression model.

Table 3. Quantitative study technical data table.

Study group	Academics employed at Spanish universities and research centres: 32,969
Sample size	1726 academics
Geographical scope	Spain
Fieldwork	January 2017
Type of survey	Self-administered online questionnaire

5. Results

Responses were obtained from academics from 50 universities and from 16 out of the 17 Spanish regions. Fifty-two per cent of the academics participating in the study are public servants whereas the remaining 48% are private employees. In terms of the years of professional experience, 7% of survey

respondents have less than 5 years, 31% have between 5 and 15 years and 62% have over 15 years. Sixty-one per cent are men, compared to 39% who are women. This figure is in line with the percentage of women at Spanish universities where they account for 40.5% of the total [90].

The universities were divided into three groups according to the "Regional Innovation Scoreboard 2016" prepared by the European Commission to compare innovation performance in the regions of the European Union. Universities located in regions included in the "Strong Level 1" category of this index were classified as from strongly innovative regions. Those located in regions rated as "Moderate Level 3" were classified as universities in average innovative environments. Those located in regions rated as "Moderate Level 2" and "Moderate Level 1" were classified as universities in weak innovative environments. Approximately 1% of the sample were located in a region classified by the European Union as having a strong innovation profile, 52% fell into the category of average profile regions and 47% weak profile regions. This distribution was similar to that of the population of Spanish academics [90].

The structure of preferences of the academics analysed is shown in Table 4. The consistency of the model was assessed through Pearson's and Kendall's Tau statistics. As both indices have values very close to 1, we can state that the model is an acceptable fit.

Table 4. Relative importance and estimated utilities.

		Estimated Utility	Relative Importance
Personal benefit	Increase in my income No increase in my income	0.770 −0.770	27.97%
Researcher benefit	Facilitates gaining of income for research Does not facilitate gaining of income for research	0.341 −0.341	16.19%
CV benefit	Included in professional promotion Not included in professional promotion	0.339 −0.339	15.82%
Support programmes	with institutional support without institutional support	0.300 −0.300	13.98%
Teaching reduction	Teaching workload reduction No teaching workload reduction	0.131 −0.131	13.53%
Personal cost	Increase in work hours Maintenance of my work hours	−0.088 0.088	12.51%
	[Constant]	3.631	

Pearson's R = 0.992; Kendall's Tau = 0.857.

6. Discussion

The results reveal that the condition that motivates Spanish academics to found a USO the most is the personal and economic benefit they obtain. This condition determines almost 28% of a researcher's structure of preferences. There are no such significant differences in importance among the other conditions. The second and third most motivating conditions are aspects that relate directly to research: the researcher benefit to attract resources that allow them to continue researching (16.2%) and the CV benefit. In contrast, the personal cost measured in terms of extra occupied hours that the entrepreneurial project would entail is the motivating factor to which they awarded the least importance (12.5%). As can be seen, the relative importance of the four conditions that can be controlled by public and university policies is very similar.

As expected, positive utilities are obtained when the conditions analysed are presented in a positive situation for the academic. Therefore, the ideal situation would be one where the USO generates extra income for the academic and allows them to obtain resources to continue researching, the university system gives them recognition for creating a USO and reduces the teaching hours of its developers, the university offers training and advice, and management of the USO can be done

without a marked increase in the academic's working hours; that is, it can be done within their usual working day.

After analysing the structure of preferences of the group of academics participating in the study, the study was then carried out separating the individuals according to their gender, academic seniority, professional category (public official contract or private contract), as well as their field of knowledge (life sciences, engineering, basic sciences and social and human sciences). The analyses were also carried out dividing the academics according to the innovative level of the region where their university is located.

In all cases, results very similar to the global ones were obtained. Economic benefit is always the factor with the greatest relative importance in the formation of the predisposition of academics to become entrepreneurs; and always with a percentage that ranges from over 25% to 29%. Furthermore, as seen with the results for the entire sample, the other five factors always have a much lower weight that is similar in each case. It can be said, therefore, that there are no differences in the evaluation of the different USO incentive measures on the basis of the academic's personal and professional profile.

7. Conclusions

Examining the results of this research involving Spanish academics leads to interesting conclusions from both theoretical and practical viewpoints, which we believe could be useful for the decisions of university managers and those in charge of public policies. Our study reveals that, contrary to what most researchers usually postulate [29,35], economic benefit is not only important but also occupies the first position among the aspects determining academic entrepreneurship.

Another contribution to the theoretical framework is the evidence that there is little need to segment academics when establishing policies designed to motivate entrepreneurship, as aspects such as region, gender and knowledge area do not lead to significant differences in the key elements considered when making the decision to found a USO based on research results. This provides a vision of academics as a homogeneous group with a shared culture, where the scale of values and hierarchy of evaluated elements largely coincide regardless of the sociodemographic and/or professional aspects. This contradicts some of the literature on the greater and different motivation of male and female entrepreneurship [38,91–93], as well as the differences in entrepreneurship according to professional category [88] or years of experience at the university [21,87]. In this way, academic entrepreneurship depends not so much on the individual's sociodemographic or professional characteristics, but on the policies implemented to promote it.

It can be inferred from the above conclusion that the results of this study are of interest both for university managers and for political decision-makers and those responsible for public policies. Contrary to that postulated in the literature, the hierarchy of elements evaluated by academics when deciding whether to create a USO is different from that proposed thus far. Our results suggest that university managers must promote the capacity of the system so that the researcher and CV benefits for the academics involved in creating USOs are higher. This undoubtedly involves the inclusion of entrepreneurship as one of the aspects evaluated by university assessment agencies in the same degree as teaching and research, and the recognition of this task as one that is part of academic life. Creating support programmes and giving management training for all academics could also be helpful in providing scientists with business development capabilities. One of the most important changes in political and management decisions is the sharing of benefits between scientists and the university, as shown by this study. In the same way, universities should revise the political practices in teaching reduction and personal costs, i.e. universities should let academics promoting an USO reduce their teaching and researching hours. Likewise, it does not seem necessary to create different programmes for sociodemographic or professional scale reasons, given that the motivations of the academics are similar.

These academic entrepreneurship support programmes can foster regional economic development based on the principle of entrepreneurial discovery as proposed in the smart specialization framework.

We agree with Varga et al. [9] that this role is especially relevant in regions like Spain where entrepreneurial development is hindered by many obstacles.

Despite all efforts made in designing this research, our study is not without its limitations. Firstly, a common restraint in this type of research arises from self-selection bias, as people already interested in the topic of the study are more likely to respond to this type of survey. In addition, the cross-sectional nature of this work suggests the need to conduct and replicate the study over time to determine the evolution of the relative importance of these factors and the influence that regulatory and management changes could have on this. Similarly, it may be interesting to carry out a geographical comparison with other countries in order to analyse whether the results of our work can be extrapolated to different economic and university environments.

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