



The value of the PhD degree in management science

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Abstract

There is no doubt that a PhD Degree is valuable, but its value is important from the perspective of university management, so measuring it using monetary theory is a useful way to illustrate and increase university outcomes. Universities generate and create value for stakeholders, but what actual value is generated by these highest university degrees? Furthermore, is the concept of value for measuring PhD degrees unique? The theory of value is more than 300 years old, but there is still a gap in the literature in terms of monetising entities' actions. There are a number of options which depend on what criteria are used to monetise value, including cost, price, opportunity costs and future benefits. We carry out a Delphi analysis based on 20 Management Science Experts, establishing consensus as the basis. We seek to contribute to the subjective theory of value in which value depends on users' perspectives. Our findings reveal first that it is indeed possible to monetise the value of a PhD degree and second that views of the concept of value differ and therefore so do the actual values. One final conclusion is that not only is it necessary to establish the value of such degrees but also to identify how to factor that value into the strategic plans of universities. This means that the criteria used need to be clarified, because when measuring and monetising a PhD degree properties are less important than individual views in achieving the desired objectives.

Keywords Integrated social value · Doctoral students · University · Monetary theory · PhD · Stakeholder

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Introduction

Organisations have been considered as generators of economic value since the beginning of the industrial era (Groth et al. 1996), but their social function has been largely overlooked or relegated to indeterminate background effects. Consequently, accounting systems have become increasingly sophisticated in identifying and conveying a fair image of organisations (for the purpose of our paper, an “organisation” is a university) with regard to their economic function (appointments) (Gas-senheimer et al. 1998). In the past few decades, universities have been presented as organisations that not only generate economic value (a consideration that extends essentially to a number of private universities) but also as entities capable of creating social value (in theory at least, this should be the key aim of public universities) (San-Jose et al. 2019; Ayuso et al. 2020). The relevant studies are all based on giving monetary value to actions and activities, including some that do not entail economic transactions. One of the main reasons for this is that accounting without measurement has no purpose, and in this day and age, where social aspects are also relevant, monetary aspects can be used to reflect the value of things (courses, activities, free accesses, discounts, free hours, queries for help, etc.) without explicit economic transactions. This brings matters back to the concept of value, its options and explanations, in this case from a university management view.

Acknowledging the role of universities means assessing the extent to which they create social value. Initially, this was done dichotomously, applying essentially positive and negative criteria to determine whether the social value created was positive or negative. This approach was strongly influenced by the vision of externalities, currently long-term maintained, based mainly on the concept of “ethical investment” and associated indices such as the FTSE4Good or DowJones Sustainability Index in the case of companies, and the Shanghai Index for universities (Academic Ranking of World Universities www.shanghairanking.com). Subsequently, a second phase arose that required progress in identifying the social value created by companies and proposed the development of balance sheets or social reports and a need for increasingly unified standards. The result has been a number of successful initiatives such as GRI homogenisation (see for example the studies in www.globalreporting.com). This second, indicator-based approach undoubtedly provides a much more detailed insight into the social value generated by organisations than mere exclusion versus inclusion criteria. However, its essentially qualitative nature has at least three undesirable consequences: the first is a broad interpretation as regards the value generated in accordance with management interests; the second is a failure to provide a comparative analysis of the social value generated by businesses, making it merely an objectification; and the third is that information on social value is not integrated with information on economic value; instead, they are considered as two interrelated but distinct subsystems of analysis and information (Fernandes et al. 2011).

Along these lines, there is a gap in the measurement of the value of the highest level university degrees, despite the undisputed interest of the matter not only

for scholars but also for managers. Indeed, measurement could improve its already inestimable value for managing positions. This paper therefore seeks to determine the value of a PhD degree (see Canal Dominguez and Muñiz-Pérez 2012 or Simpson and Sommer 2016 for an in-depth explanation of the professional doctorate and Baschung 2010 for changes in doctoral programmes). The subjective theory of value is used to explain the lack of unification, as the value of a PhD depends on users, clients and consumers. “Social value” is understood as the value distributed to interest groups or stakeholders, the main recipient being the doctorate itself in PhD degrees; then the subjective theory of value and the perception of users are used to assess these degrees. This value could be complementary to the social value perceived by other stakeholders, but we focus only on PhD holders as users. The research question is therefore as follows: if it is feasible to monetise a PhD, what criterion must be applied and how does it tie in with the subjective theory of value?

Literature addressing this question is scarce. Corner and Pio (2017) analyse tensions in supervising international students’ research and conclude that there is a need to vary supervision methods due to the importance of cultural issues in management research; they also highlight the importance of diversity. Technically, a “PhD was established to prepare an elite group of people to undertake highly specialised research work within a defined field of expertise” (Coates and Goedegebuure 2012: 885). PhDs are in general used to take up academic careers (there are some exceptions such as STEM fields), so holders contribute rigorously, efficiently and significantly to their expert fields in terms of improving systems, models and finally results. However, the attractiveness of PhDs to non-academic employers is increasing (Neumann and Tan 2011). The perception that a PhD is useful is expanding due the fact that society values it to some extent, but it is not known how it is valued, because not even academics and experts have studied this matter. It is essential, in the first place, to know what the experts think and how they value PhDs, so that their assessment can be transferred to society as a whole. Hence, the subject of this paper is of interest to university managers, but also to future professionals and employers and to society in general. With this in mind, we carried out a Delphi analysis between November 2016 and January 2017 involving 20 management experts (see Annex 1 for more information about them, including the selection criteria). The aim was to determine the value of a PhD degree, assuming that the social value of any degree is positive, and focussing on PhD holder themselves as users of the degree and the principal recipients of its main value.

Opinions regarding the value of PhD degrees vary, which makes it harder to understand their utility in society. There are no unique criteria for valuing PhD degrees. This broadens the possibilities and complicates communication, since users’ perceptions vary widely; the significance of studies such as this one depend on different perceptions, so their knowledge is important for efficient management. In short, this research opens up the possibility of developing not only the value of universities as tools for communication but also for integrated, efficient strategic planning at universities that may well be able to use PhD studies to increase the competences and reputation of specialists.

The rest of the paper is structured as follows. The introduction is followed by a review of possible methods for using monetisation to measure social value. Next

section describes the methodology applied, then the results are shown and, finally, a short discussion and some conclusions are presented, including limitations and future research lines.

The concept of value and monetising options based on the theory of subjective value

In our society, it is essential to measure actions, programmes and entities to establish references, benchmark and introduce improvements to boost social and economic results. This is a purpose shared by companies (Freeman 1984; Harrison et al. 2020). In this sense, any entity, or more precisely any action or part of an entity, can be valued monetarily with the ultimate aim of improving its value. It can be assumed that transaction prices indicate the minimum value of the good, service or action (Marx 1976; Keynes 1964; Rothein 1981), but when no economic transaction exists, determining the value is more difficult (Retolaza et al. 2016). This measurement is based on the ontological perspective of the stakeholder theory (Freeman 1984; Freeman et al. 2010; San-Jose et al. 2017), which considers firms as an interactive generator of and means for the receiving of value from an open set of stakeholders. Social accounting was developed in the 1970s, but in the twenty-first century assessing social value has become a key research issue (Vancaly and Esteves 2011). Social accounting sheds light on companies' social values, but this entails monetising variables identified and highlighted by stakeholders and triangulated by experts and academics (Retolaza et al. 2016; San-Jose and Retolaza 2016). Value is clearly dependent on stakeholders in the initial phase. This is followed by the identification of a generally accepted minimum and consolidated monetary value, determined by experts and scholars (from the theory of value).

There is ample literature addressing the theory of value. However, rather than reviewing the current situation, this paper seeks to make a further contribution. Marx posited that value and price are different, but are connected by the value of exchange (Marx 1954). The literature has also addressed the question of production costs and their impact on the prices of goods and services when costs change (Downward and Lee 2001). The work of Von Böhm-Bawerk (1891) [1881] contributed to the measurement of value, showing it as a quantifiable parameter. Moreover, there is a clear contribution in terms of the importance of price as a sign of value. Along these lines, “[m]any factors contribute to the determination of prices, but no price is viable unless it can be justified by the social actors involved. There is, in other words, no price without value” (Elder-Vass 2019: 1497). Alternatively, value could be considered as a ratio of perceived benefits to perceived costs (Mishan and Quah 1976). Attempts have also been made to unify the various theories of value (Grassl 2017).

There are many different views of value (Buchanan 1991; Davies 2011). Regardless of these varying definitions of value, the theory of subjective value clearly states that “an item’s value depends on the consumer” (Menger 1976 [1871]). It depends on its utility for stakeholders, which is essentially related initially to its use value, although it is later more concerned with its exchange value. Value based

on production costs is not universal, although it is applicable, (Smith 1794), and achieving the needs of stakeholders is an alternative. Although user value and social value could be different things (Boztepe 2007), we use the definition of Lazkano et al. (2019: 149) and define social value as the “utility provided by the set of social assets generated by an organization for the stakeholders or interest groups related to the organization”. This position has been used in many other papers (i.e. Ayuso et al. 2020).

Methodology: Delphi experts to show the value of a PhD degree in Spain

The Delphi method seeks to provide feedback, maximum consensus with moderate assessment of the group and a high communication flow, but with participant anonymity (Van Dijk 1990; Okoli and Pawlowski 2004; Bhattacharya et al. 2011; Pätäri 2010). These are the key reasons why it was selected for the purpose of answering the research question considered here. The Delphi method is also suitable when the contributions of experts are highly dispersed (as in this case, where experts are from varying origins) (e.g. Schmiedel et al. 2013). It is also relatively inexpensive (Okoli and Pawlowski 2004), and therefore useful for the purpose of our research, in which the opinion of scattered participants is important but there are budget constraints. Accordingly, we decided that an online survey was the most efficient way of communicating with academic experts.

The Delphi method is not new; indeed, it was first introduced in the 1960s (Turoff 1970; Tersine and Riggs 1976; Brown 1968). However, it was not until the twenty-first century that its application spread to the social sphere, and in particular to the resolution of business-based research questions (Landeta 2006; Schmiedel et al. 2013; Bhattacharya et al. 2011).

We used the Delphi Technique because of the need for consensus and to determine the possibility of unique or different values and the factors underlying them. The method is based on the results of questionnaires sent to a panel of experts, unknown to one another, in several rounds. When the questionnaires are sent out and the anonymous experts reply, their answers are collected and forwarded to the group after each round. There are multiple rounds of questions posed to a large number of experts. This review process and the direct relationship with the interviewer (Delphi organiser) enables the experts to be clear and transparent and eliminates any possibility of influence from other experts, thereby precluding group pressure whilst still allowing for interaction and feedback (Turoff and Linstone 2010). New technologies such as e-mail make for efficient application in terms of connection and speed. The replies of the participants are anonymous, so experts do not have to worry about any possible repercussions from their opinions. This makes the results more reliable.

Its main characteristics are as follows (Landeta et al. 2011): it is an iterative process; it preserves participants' anonymity; and feedback is controlled. The main objective of the Delphi technique was originally to obtain the most reliable consensus of opinion from a panel of experts by administering a series of questionnaires and obtaining controlled opinion feedback (Landeta 2006).

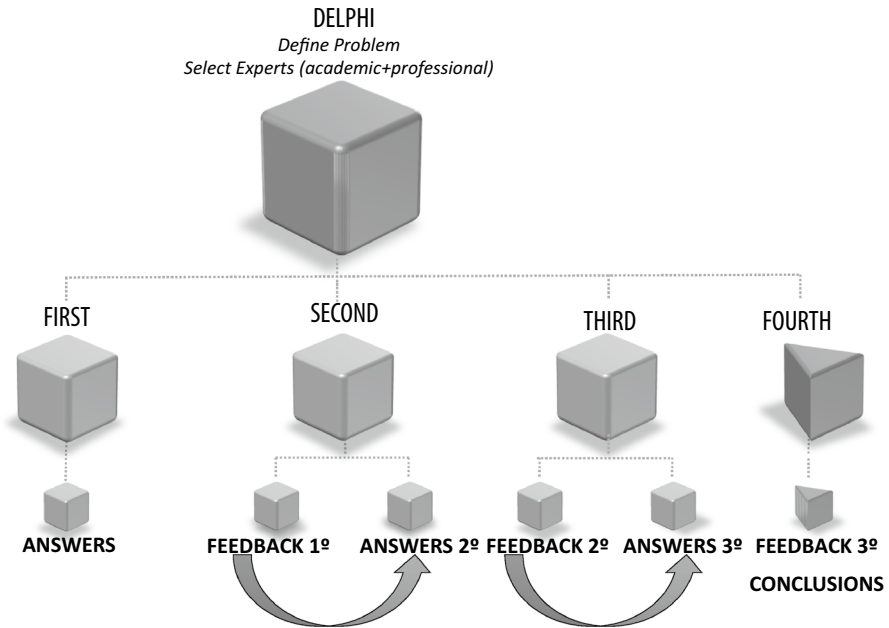


Fig. 1 Delphi method process. Source: own work

We sent three rounds of questions to experts to guarantee the efficiency of the methodology (Cyphert and Gant 1971). As stated above, the aim of this Delphi is to determine consensually the value of a PhD. The method is appropriate here because it allows for consensus among experts whilst enabling them to express their opinions regarding the value of degrees with no external influences. The Delphi method is particularly appropriate for this research question as there are no pre-established opinions and it allows for differing visions of value. The selection process was conducted with the utmost care to ensure significant results (Okoli and Pawlowski 2004). Essentially, the phases involved in a consistent Delphi method are as follows (see Fig. 1): stage one consists of defining the problem for analysis. Accordingly, a panel of experts that can contribute to all phases needs to be selected. Certain principles can be applied to select experts. They should be business and management experts (they are included in the Business and Economics area of the Web of Science Management Science Category), they should have more than 10 years of experience (the mean is 24.5 years), there should be a relative balance between academic and professionals (70% vs. 30%), and both PhD doctoral programme design experts and PhD students (70% vs. 30%) should be considered. 75% of the experts included here hold a PhD in a subject associated with value concepts (fair value, social responsibility measures, accounting for measurement, market values and social impact, for example). Once the experts were selected, we sent out the first questionnaire. The responses were analysed and a second questionnaire was drawn up, taking into account the results of the first. The process was repeated with a third questionnaire, the results of which were examined, leading to a number of conclusions.

Table 1 Delphi data collected and analysed. Source: own work based on the application and adaptation of Okoli and Pawlowski (2004)

Data collection	November 2016 till February 2017
Summary of procedure	We have sent a questionnaire to experts with 1 open question. Next, we designed another survey based on the responses to the first one. Then we finished with the third round, which was based on a rank questionnaire. We have made an extra round to establish at least the minimum level in which they agree; the four round
Representativeness of sample	The Delphi Panel experts were chosen using two criteria: Spanish Experts representing all the autonomies Academics and Professionals with experience in doctoral degree The sample: 10 Professors, 4 Associate Professor and 6 professionals with senior positions in companies of which 2 are doctors and 4 are studying a doctorate (at least second year)
Sample size for statistical power and significant findings	We selected 28 experts but 20 agreed to being our Delphi experts participants, so the Delphi panel is made up of 20 experts (see Annex 1) Autonomies: Catalonia, Madrid, Valencia, Andalusia, Basque Country, Cantabria and Canary Islands
Construct validity	It is guaranteed. Experts validate the interpretation and categorization of the variables. Apart of questions there is also an open place to explain their responds opinions or made some suggestions
Anonymity	All experts are anonymous in relation to one another, but never to the researcher
Dropout rate	There are only two dropouts; two experts did not take part in the first round because of their agenda. We provide the conclusions keeping this in mind
Round number	3 rounds + 1 extra round
Time to respond	An average of 2.37 days
Contact form	Email survey
Survey type	Structured survey

Experts participate anonymously, though naturally their names are known to the researcher. We worked with a group of 20 experts in management using the Delphi technique (see Table 1). 71.42% of those selected were covered, representing seven Spanish regional autonomous communities (Catalonia, Madrid, Valencia, Andalusia, the Basque Country, Cantabria and the Canary Islands). The Delphi surveys were conducted between November 2016 and February 2017. The inclusion of several regions ensures that the principal Spanish viewpoints are represented. Moreover, the validity of the construct is guaranteed, because in all rounds, the experts had the opportunity to explain their opinions, comment on the results and make suggestions free from any group pressure. They accepted the groups and words used and gave their assessments for each round. Fewer than five interactions failed throughout the process. Three experts failed to take part in the third round, but they re-joined the process in the fourth round. This is indicative of the participants' high degree of commitment and involvement. Apart from the high response rates, the speed of response (an average of 2.37 days) was also high, particularly considering the workload of faculty members.

Table 2 Delphi's rounds: questionnaire

Questions for dialogue with experts in the delphi process	
First round	Formed by two general questions: 1. What do you think that the value (in Euros) of a doctorate would be? 2. Why? What are the arguments to explain this monetary value? What are the reasons?
Second round	The second round questions are: 1. What you believe that would be the best criterion to estimate the value that the doctorate may have and if it would have to give you a concrete value which would be your approximate estimation. 2. Mark the degree of conviction with which you give your response (a single answer): 1: Very unconvinced; 2: Little convinced; 3: Suitable; 4: I'm pretty sure; 5: Very safe 3. Add any explanation that you wish.
Third round	Third round questions: 1. We have classified value understandings in 4 criteria; please consider the suitability of each of these criteria (cost, reference price, opportunity cost and future benefits) from 1 to 5. [1: nothing suitable; 2: not very suitable; 3: something suitable; 4: quite suitable; 5: very suitable] 2. Establish a value from 1 to 5 in terms of the degree of adequacy that you believe the proposed range has in relation to the social value of the PhD degree. [1: very inadequate; 2: not suitable; 3: something suitable; 4: quite adequate; 5: very suitable] 3. Add any explanation that you wish for each value.
Fourth round (extra)	Four round questions: 1. The minimum value based in the punctuations and typologies is €27,910. Do you agree with accept this value as Minimum Value of a PhD Degree? 2. Explain if you wish why yes /no

The data obtained in the first round were analysed and reviewed to check for similarities and differences. The questions were then sent back in the second round with the collective answers of the group of experts, and so on. We used a single question: What is the value of a PhD degree?¹ This question was repeated in each round (see Table 2).

The results from the panel of experts: assessing a doctoral programme in management science

In short, the process was as follows: once the first round was complete, the questions were collected and adapted. The questionnaires were modified in the subsequent rounds using participants' opinions and feedback. With a list of 29 values for PhD degrees, more specific answers were needed, so the second round included more

¹ Although the question is open, they agree that it will be valued on the basis of their experience in doctoral programmes in Management Science including all areas, such as accounting, finance, marketing, organisation and business.

specific questions. The final round focussed on obtaining the most precise, accurate answers.

All the experts not only explained their understanding of value but also presented detailed arguments for each case. Some difficulties were pointed out by experts in the course of the survey in determining what should be considered as social value. This was because a phenomenological approach (Husserl 1970) was applied to get an open analysis of social value, a real perceptions of interviewers. This obviously gives rise to some difficulties in relating the concept of social value, but primary data are obtained avoiding the noise of prior and pre-established perceptions, mostly from researchers.

One preliminary conclusion that could be reached is that if society has high expectations as regards value, then the effort and probably the funding for such degrees will be higher than if they are perceived otherwise. They also posed a number of questions prior to certain rounds. For example, two of the experts claimed that “social value and value are different concepts” and two more stated that “it is very difficult to determine a single number, and therefore I will specify a range”. Other experts explained that their valuations were general, but that the value would be different depending on the area in which a PhD was acquired. They therefore indicated a need to establish a grade depending on the area in which students obtain their degree. Country was a further criterion. In this case, our analysis was focussed on Spain, but values vary from one country to another. Furthermore, the participants’ expertise in Management Science means that we can assume that the findings will represent the value of a PhD degree in that area at least. All these key criteria were taken into consideration at each stage of the Delphi analysis. In three cases, the experts sent us an Excel sheet with all the calculations for determining a specific monetised number for valuing a PhD degree. One of them rightly indicated that this depended on the salaries could be expected in the future. It is important to explain his position for at least two reasons: first, this was the most positive position (that which gave the highest valuations); and second, his position was monetised with real data using results from his university. Thus, the future benefit view is explained at its extreme by a lecturer at a top management college were the cost of a PhD is aligned with expectations of future benefits that the degree will give students. He measured the value of a PhD with the updated expected extra salary obtained during the working period after becoming a PhD holder minus the costs required to obtain the degree, including opportunity costs. In his words, “I have assumed that a PhD translates into a salary increase of €30,000 per year, from 30 to 70 years. I have discounted it to 3% and I have subtracted the costs of acquiring the doctorate (tuition, maintenance cost and opportunity cost since I assume that you do not work during the doctorate)”. Panel experts were open to imagination because the Delphi process allowed them to assess PhDs freely using their imagination, with no constraints or influence from other experts. Experts were thus free to factor expected increases in future salaries into their assessment of PhDs. In Europe and the United States, there are no significant differences in salary levels between PhDs and non-PhDs, but in Asia, salaries are almost double for PhD holders (Cyranoski et al. 2011). Unfortunately, PhD holders are not happier than non-PhDs. Another argument concerning salary expectations is that most 55% of the experts believed that PhD degrees were

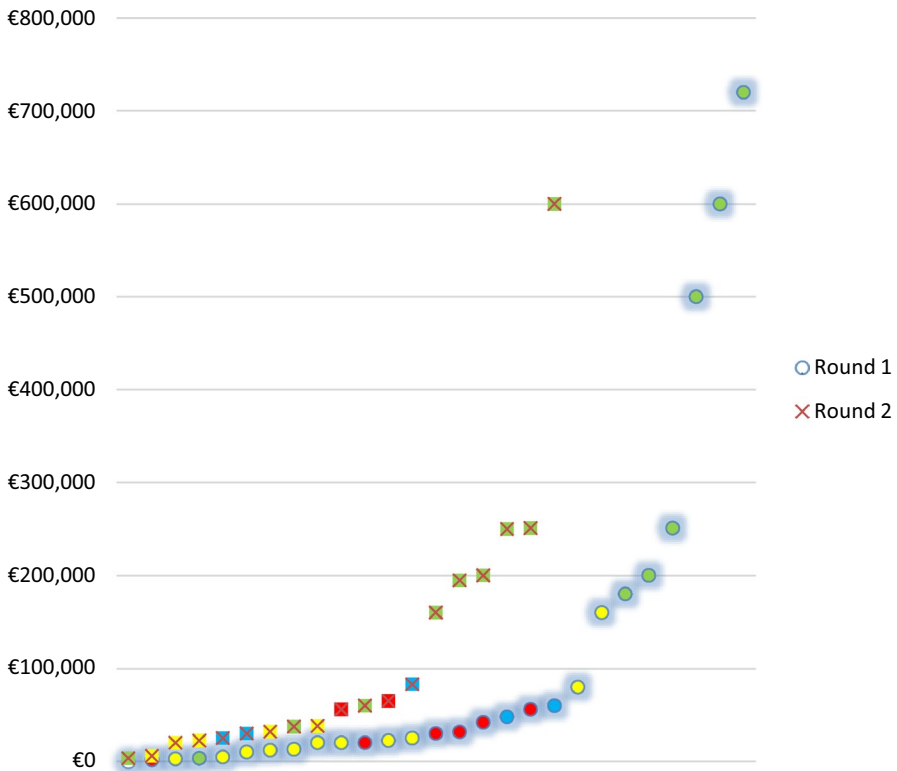


Fig. 2 PhD value in the first and second round of the Delphi analysis. Cost: yellow; Reference Price: red; Opportunity Cost: blue; Future Benefits: green. Source: authors' own work based on feedback from round 1 and 2

only for academics. This meant that expected salary was not a significant factor, as a PhD is a pre-requisite at university for becoming a tenured lecturer in Spain.

The first round obtained 27 possible values for PhD degrees. The data collected support the claim of measuring the social value of a PhD from experts' perceptions, even if they are different. With the aim of not only explaining but more importantly showing their views, we asked them to convert the social value that they allocated to a PhD into an economic assessment. This was done because this study seeks not only to show different perspectives of value but also to reflect them in an economic assessment because measuring with exact, monetary numbers makes perceptions stronger; numbers characterise the positions of experts more consistently, enabling us to perform a more rigorous, more effective analysis of perceptions. The value range was [€0–€720,000] and the value types were as explained below. Figure 2 shows the experts' responses in the first round.

The first finding in this round was that there were different visions of value, at least for a university degree such as a PhD. We detected four types: cost; reference price, opportunity cost and expected value or future benefits.

Table 3 Determination of value of PhD degree at university: round 2

Type of understanding	Min	Max	Conviction level (Likert 1–5)
Cost	€27,910	€34,000	3.8
Price	€59,800	€60,450	3.5
Opportunity cost	€37,500	€125,625	4
Future benefits	€121,557	€173,565	3.4
Mean by range	€89,916.40		3.7

1. Cost: value is considered as equal to the cost of production, so the costs incurred in attaining a PhD were calculated. This is in line with the classical theory of value (price).
2. Reference price: value is calculated according to other prices on the market (active markets); this is similar to fair value (assets with no referenced price of their own but market prices). It means the price that applicants are willing to pay. It is linked to the neoclassical theory.
3. Opportunity cost: this is similar to cost above, but it includes not only the official fees for PhD studies but also hidden costs such as time and other expenditure (travel, accommodation, etc.). It is linked to the classical theory incorporating reduction in income caused the non-productive use of time as cost.
4. Future benefits: value is calculated according to the future benefit that the PhD is capable of generating for the student. It is based on an option calculation methodology and involves a certain individual utilitarian component. It is associated with the rational expectations theory (Muth 1961; Lucas 1972).

Figure 2 shows that the range is smaller in the second round (€20,000–€600,000), but is still a long way from consensus. This is due to the varying interpretations of value, as set out above. This is important, because this interpretation of the value of degrees determines the effort and competences involved and the reputation of a PhD in society.

Table 3 establishes the range of values (means) for a PhD degree under each interpretation. Cost is clearly a fixed value that can be analysed in accordance with university data. Dispersion at this level is low and varies from one region to another in Spain. Based on a five point Likert scale, the average score is 3.7. A number of websites such as <http://www.phdportal.com/> provide these data: alternatively, they can be obtained from each university. The data obtained at this stage also indicate that the value of PhD studies should be the expected value (future benefits) of the competences acquired. This calculation gives the highest amount that can be obtained from such a degree (€121,557–€600,000) (not taking into account some outliers). Other results estimate the value of a PhD at less than €100,000. The mean value per type or range is almost €90,000 with a level of confidence of 3.7 out of 5.

Taking into consideration the level of consensus in round 2, the prudence concept can be followed, giving degrees a value of more than €23,650 but less than €300,000. Normality is just less than €100,000. We carried out a third round to

Table 4 Determination of value of Phd degree at university: round 3*

Type of understanding	MIN	MAX	Weight: suitability of criterion × degree of adequacy																
Cost	€27,910	€34,000	1	1	0	1	4	3	2	3	1	0	2	0	1	0	4	5	2
Price	€59,800	€60,450	1	1	0	2	3	5	1	2	1	1	5	0	1	0	4	2	1
Opportunity cost	€37,500	€125,625	2	0	1	5	1	2	3	2	4	0	2	1	1	0	1	2	1
Future Benefits	€121,557	€173,565	4	1	4	1	0	2	3	1	0	3	1	1	4	3	0	2	3

*There are in this third round three experts that not respond questions

Table 5 Determination of value of PhD degree at university corrected by Weights: round 3

Type of understanding	Weigh* (mean) W_t	Mean values V_t	Weighted mean $V_t \times W_t$	Weighted mini- mum $Min_t \times W_t$	Weighted maxi- mum $Max_t \times W_t$
Cost	1.79	€30,955	€55,355	€49,910	€60,800
Price	1.75	€60,12	€105,396	€104,826	€105,965
Opportunity cost	1.62	€81,563	€132,419	€60,882	€203,956
Future benefits	2.00	€147,561	€295,122	€243,114	€347,130
Sum (Sum/ W_t)	7.16		€82,110	€64,027	€100,193

*Weigh: it is the average degree of adequacy awarded by the experts (see Table 4)

establish closer valuations of the monetised value attributed by the experts to a PhD. In this case, the results were closer, though it is still hard to find a consensus. Table 4 shows the results of the third round, with the full weights based on conviction as to the rates established.

The divergence in views among experts in terms of conviction is shown with a single criterion. Only between 10.52% and 15.78% of the experts are certain in regard to each vision of the concept of value for PhDs in each case. It can therefore be concluded that there is no clear trend surrounding any particular interpretation (cost, price, opportunity cost or future benefits). Around 60% of experts are not sure (from 0 to 3 points). This means that they are not sure about the criterion or the conviction with which they make their valuations. However, despite their uncertainty after some round, they do not change their opinions even though other experts think differently (most of them explained in their first round that they had never considered monetising PhDs but they were sure in the last round the argument each used).

Due to this lack of consensus, we decided to take into account all the various interpretations of value, using weight as the differentiating factor. Table 5 shows the value once weight, suitability of the criterion and degree of adequacy are taken into account in reviewing values considering the opinions of experts and relativising them. This is an attempt to correct each extreme value without eliminating any of the types.

Based on these criteria, the weighted value is €82,110. However, we have attempted to establish a minimum level from minimum values, at least to show that there is a minimum consensus on the idea that a PhD has a value. To that end, we

carried out a fourth round with a single direct question relating to the acceptance by the experts of a minimum level. All but two of them agreed with the minimum value of €27,910. The two who disagreed stressed the need to increase this minimum value. We can therefore conclude that none of the experts considers the value of a PhD to be less than €27,910. One expert explained “I strongly disagree; if the intention is to estimate the value, assigning the cost would be erroneous. The prudence concept (as explained in the conceptual framework of financial accounting) would involve choosing the lowest of all equally possible outputs. To assimilate value to cost does not seem appropriate to me in this case. I think it is even more inappropriate to assimilate it to the price. Under no circumstances can the prudence concept involve the conscious underestimation of an asset”. He clearly expresses his opposition to the criteria of cost and price, and supports only the future benefits criterion, a concept which is becoming increasingly important in financial accounting. This quotation is a clear example of the divergent opinions found among the experts questioned and their determination not to change their minds, even when establishing the minimal minimum. This indicates their total confidence in their criteria, in their experience and in the value that should be assigned to a PhD. The other dissenting expert also expressed her disagreement with this minimum value and emphasised the importance of introducing the fair value concept into this analysis. She posited that the proposed minimum value from the minimum values “is too low and far from the values resulting from applying the fair value method and taking into account opportunity costs”. It is important to highlight that the other expert supported this minimum value but he was “more in agreement with the minimum value of the opportunity cost”. This could be because the minimum value of minimums offered seems to be more closely related to “accounting” (the cost of the project) than “financial-economic” issues (opportunity cost), but experts in the prudence concept offer a stronger defence of value related to opportunity costs or future benefits, than to price or cost. There seems to be an open window along these lines.

Discussion

It is important to highlight that the future benefits position, which can be seen in terms of “objective incomes” is one of the most extreme ways of monetising PhDs used by the experts, but is nonetheless significant. This expected incomes view reflects the updated value of potential future benefits (minus costs of use) as the fairest way of monetising the social or user value of a PhD. It takes into account the current level of salaries of PhD holders compared to non-PhDs.

We do not obtain a predefined model of outcomes because of the essentials and principles of the Delphi method. It is an open-minded technique for analysing opinions in a free context, eliminating any direct influence by other researchers or experts. The focus here is on what the social value is, with the aim of understanding what is for the experts. Of course, previous studies have contributed along these lines. A PhD degree may have different outcomes which can affect the value generated for PhD holders. In some studies, (Platow 2012; Coates and Goedegebuure 2012) PhDs are found to contribute with regard to competencies, skills and expected

results. Coates and Goedegebuure (2012) propose several strategies for building a future academic workforce and Platow (2012) focuses on items that measure PhD holders' attributes and compare them with items perceived by PhD supervisors. Other authors focus in depth on contributions to outcomes. Peters and Daly (2013) contribute to different categories of cost and make several recommendations to guarantee the success of degrees; some around admission, others around recruitment and others about academic community. They evidence aligned with this paper how increase expectations and success, and also how establish strategies for reducing and mitigating assumed costs for degrees. In this line, Mosykowski et al. (2017) set out three categories of values—interest, attainment and career utility—after their analysis of value and cost, comparing engineering PhD Returners with PhD Direct-Pathway students. Returning students perceived the cost of PhD as higher than direct-pathway students did, but returning students were also very convinced of their excellent skills and knowledge. Gender and race pose difficulties for women and some ethnicities, but these are in line with engineering degrees, which entail higher costs and greater difficulties. The most highly rated values among all PhD students are advancing in their career, getting a good job, earning a higher salary and increasing job security. Our research does not analyse the relationships between all these factors and PhD value, but they undoubtedly affect that value and the experts questioned here take this into account in their assessments. Along these lines, Mosykowski et al. (2017) finds that perceived academic costs are associated with lower expectancy of success. This means that not only perception but also the balance with other factors are relevant in valuing perceived costs. As mentioned above, we contribute to the issue of the value of PhDs by controlling the influence of other experts' opinions and getting experts to align in a consensus. Although there are limitations (depending on country, area or expectations, for example), it is a fact that all these factors are included in a complex algorithm that each Delphi panel expert holds in their mind. They do not consider it as impossible. Evidence of this is that they give a monetary value. Anecdotally, their conviction changed during the Delphi process: they were doubtful at the beginning and after some time and reflexion, they were unable to change their value perspectives (cost, price, opportunity cost or future benefits). However, they considered it useful and necessary to give a value to PhDs that permitted a minimum consensus, albeit not a unique value. Thus, factors and outcomes affect the specific value of a PhD, but it is possible to align perceptions including all those factors as unique, which is useful for measuring the value of a PhD.

All of these factors are included in the value perceived by stakeholders at society level (social value). However, we focus our research on different value options independently of competencies, knowledge or expected skills, because it is important for university managers to know from a conceptual viewpoint the prospective value of use for each PhD holder. This is highly relevant for managing universities. The reason is clear: PhD degrees are essentially focussed on qualifying academics at research level, but in the last few years, many holders are using their degrees to improve their skills, knowledge and competencies. This analysis could help in university strategy planning, because it is important to know, given the huge cost of a PhD, whether the university context does not stand to reap any benefit from it even

if it has a value. This range of values can help to include PhD degrees efficiently in the strategic plans of universities, and to understand the different positions of preceptors. There is a value in holding a PhD and that value is understood in different ways. Our research furthers the contribution of Cyranoski et al. (2011) because the valuation perspective influences satisfaction, and therefore the PhD value. Our findings also reveal that not only skill and competency factors, or indeed context factors (e.g. country) and personal factors (gender or race) affect assessment results (Platow 2012; Coates and Goedegebuure 2012): the perceptions of users are also influential. Thus, the four perspectives explained in this paper can include them in future analyses of PhD holders. Our findings once more show the importance of the subjective theory of value.

Furthermore, the opinion of the experts questioned illustrates that the value of a PhD is not, in most cases, based on future expected increases in income. The lack of consensus and low weight of this view compared to others make the value of a PhD less than it could potentially be. One reason could be that “everyone tends to look at the future of the PhD labour market very pessimistically” (Cyranoski et al. 2011: 279). There is a huge range for the value of a PhD, so the minimum value is very conservative. This could result in undervaluation, reflecting in turn the lack of increase in salaries of PhD holders. In most countries, “many graduates are now turning to doctoral studies...it is a way to land jobs and increase their income” (Cyranoski et al. (2011: 279); however, results in Europe do not show this expected increase.

In the future, it is expected an increase of income of PhD holders, but it is not clear if it is because the PhD degree itself, or because of the general spread of the master holders, and therefore it supposes little differential for qualify people. Moreover, PhD holders are, in general, constant people, hard-working and tenacious, allowing companies to place them in management positions with responsibilities and more pressure positions. It is not fair to evaluate this PhD degree only for their cost or for its opportunity cost, and then it will be important to highlight the potential link with future benefits or incomes. A priori, there is a positive and exponential relationship. Then, it is not only relevant to evidence the importance of the PhD with a higher income, but also with a fair recognition by society.

Concluding remarks

“Value” seems to be a simple concept, but this proves not to be the case when one attempts to provide a monetary value. We have introduced different points of view in an attempt to shed greater light on the concept. This paper contributes to bridging the gap in literature by indicating the value of a university degree based on social accounting by stakeholders and using a Delphi process in which consensus is the key. Its contribution is to improve the understanding of value by directly valuing a degree at a university. It is new contribution to the subjective theory of value.

The Delphi analysis conducted features 20 management science scholars, financial economics and accounting specialists from the field of management, drawn from 7 Spanish regions. The findings confirm that there are different

interpretations of value, and help assign material value to one type of university degree: the PhD. This in turn enables us to state that the experts involved interpret “value” in various ways, based on cost, price, opportunity cost and future benefits. In spite of these different ways of understanding, the concept of value at universities, consensus is possible at least on a minimum level when ranges and fuzzy sets are used for each criterion. However, what is most important is that this process leads to PhDs being valued more highly not only amongst the academic community but also amongst specialists in business. The method could be applied to university studies as a whole. In some aspects, the Delphi technique is recommendable, while in others, proxies (values established “officially” but not directly for this concept) suffice.

Our analysis of the Delphi technique employed and the results for the value attributed to PhD degrees enable us to draw a number of conclusions that contribute to literature and future research in this field. It is possible to determine a value for a PhD, but when the perception of experts (like that of other citizens) is open to imagination various interpretations of “value” are applied; they all need to be considered when addressing academia, society and the business community. It is possible to establish and argue the reasons that determine the value of a PhD, but determining a single value is a complex issue, so establishing a range seems more appropriate. These different views can help university managers to understand the diverse perceptions of citizens, for example, when they want to explain what the university is doing, and can help managers in business when they want to hire a person with a PhD. A proper valuation of PhDs is also likely to enable improvements to be made to them and extend their use as an indicator for communication and reputation among managers, professionals and society in general. Our contribution is therefore twofold: first, it enables a comparison to be drawn between the values of university degrees, using money as the unit of measurement. We show that it is possible to monetise the value of a PhD, and this could help in terms of the recognition of this highest level qualification or of comparing it with other degrees or studies. Second, we make a clear contribution to stakeholders with an interest in this matter, clarifying the value of PhDs and enabling that value to be managed more efficiently. This assessment can help university managers to establish efficient strategic planning to improve and complete the education map considering the perceptions of business specialists and different value systems, rather than focussing solely on academics and cost assessment, as PhD have traditionally done. This could be the first step towards changing the utility of PhDs at universities and making them more generalizable in society. However, the first requirement is to understand that value is based not only on cost and price but also on opportunity cost and future benefits.

There are clearly a number of limitations, starting with the need for more data and to determine what criteria influence the value of a PhD degree. But also, giving experts the option to use their own perceptions about the social value of PhDs with no pre-definition has its pros (open to imagination and any positive concept of value to society could be acceptable) but also cons such as the bias that it could create. Moreover, competencies are not taken into account in value, and nor are other criteria such as the level of universities, and these are relevant points in determining

the final value of PhDs. As a final point, it is necessary to position value as a future criterion to avoid possible misunderstandings in communications.

Several issues could be studied in future research. First, the value of all degrees could be analysed. Second, in some organisational aspects, the Delphi technique is a suitable method for doing this. Third, social accounting for stakeholders could be applied to universities, and appears to be a logical next step. Finally, making an analytical review of value could be an option, in which determining the value range of PhDs depends on gender, salary and country effect for example.

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Compliance with ethical standards

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

Ethical approval The paper is based on opinion data for which anonymity is guaranteed. The study is not based on any personal variable.

Informed consent Experts were agree to participate as Delphi Experts. All the information has organised in unique computer which access is limited to the corresponding author of this paper. Then, there is anonymity guarantee. Moreover, they have made us the consent to publish their name, just because prudency we have deleted from the paper.

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