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Intention to enroll and recommend a higher education institution for STEM degrees: a brand valuation approach

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Abstract

Taking as a framework the brand valuation model proposed by the National Service of Intellectual Rights of Ecuador, the purpose of this study was to evaluate whether the variables that reside in the consumer's mind, such as brand awareness, associations, and evaluation of choice determinants, are significant in explaining the intention to enroll and recommend a higher education institution. After applying a generalized least squares regression analysis to a sample of 227 potential students of science, technology, engineering, and mathematics (STEM) degrees, it was found that the evaluation of the choice determinants is the only factor that explains the intentions. The high level of consumer involvement with the higher education service could justify this finding.

Keywords: enrollment; recommendation; brand awareness; brand associations; choice determinants.

La intención de enrolarse y recomendar una universidad para carreras STEM: un enfoque de valoración de marcas

Resumen

Este estudio tomó como marco de referencia el modelo de valoración de marcas propuesto por el Servicio Nacional de Derechos Intelectuales del Ecuador, y se propuso evaluar si las variables que residen en la mente del consumidor como la conciencia de marca, las asociaciones de marca y la evaluación de los determinantes de elección son significativas para explicar la intención de matricularse y recomendar una universidad. La muestra incluyó 227 estudiantes potenciales de carreras de ciencia, tecnología, ingeniería y matemáticas (STEM, por sus siglas en inglés), y se aplicó un análisis de regresiones con mínimos cuadrados generalizados. Los resultados sugieren que la evaluación de los determinantes de elección es el único factor que explica las intenciones. Este hallazgo se justificaría por el alto grado de involucramiento del consumidor con el servicio de educación superior.

Palabras clave: enrolamiento; recomendación; conocimiento de marca; asociaciones de marca; determinantes de elección.

Intenção de se matricular e recomendar uma universidade para carreiras STEM: uma abordagem de avaliação de marcas

Resumo

Usando como quadro de referência o modelo de avaliação de marca proposto pelo Serviço Nacional de Direitos Intelectuais do Equador, o objetivo deste estudo foi avaliar se as variáveis que residem na mente do consumidor, como o conhecimento de marca, as associações de marca e a avaliação dos determinantes de escolha, são significativas para explicar a intenção de se matricular e recomendar uma universidade. Usando uma amostra de 227 alunos potenciais em ciências, tecnologia, engenharia e matemática (STEM) e aplicando uma análise de regressão de mínimos quadrados generalizados, descobriu-se que a avaliação dos determinantes de escolha é o único fator que explica as intenções. Essa descoberta seria justificada pelo alto grau de envolvimento do consumidor com o serviço de ensino superior.

Palavras-chave: matrícula; recomendação; conhecimento de marca; associações de marca; determinantes de escolha.

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1. Introduction

Whether public or private, higher educational institutions (HEI) aim to increase enrollment rates, reduce retirement rates, build a strong reputation and corporate image, raise more funds, and beat the competition through performance measurements (Williams & Omar, 2014). In marketing terms, brand equity literature postulates that perceptual and attitudinal factors in customers' minds precede their behavior towards a brand (Aaker, 1991; Keller & Brexendorf, 2019; Mourad et al., 2020). For HEIs, it may be useful to identify and measure these factors to manage them correctly, attracting more applicants to their classrooms and increasing the HEIs' brands financial value.

Since 2008, Ecuadorian HEIs have been subject to a mandatory evaluation process established to depurate and improve the higher education system, as indicated in the Constitutional Mandate No. 14, issued by the National Constitutional Assembly (Consejo Nacional de Evaluación y Acreditación [CONEA], 2009). The evaluation process was guided to "recover government's regulating, directing and supervising role over higher education institutions..." (CONEA, 2009, p. 1). The evaluation assignment was delegated to CONEA, which remitted a report declaring that "Ecuadorian higher education institutions evidence themselves, according to the report, as a fragmented group by multiple gaps: academic, democratic, investigative, technologic..." (CONEA, 2009, p.1). As a result of the evaluation, HEIs were categorized according to their level of compliance with quality standards dictated by the regulatory body. Eleven universities were classified with an A rank (best ranked), 9 with a B rank, 13 with a C rank, 9 with a D rank, and 26 with an E rank (lowest ranked) (Consejo de Evaluación, Acreditación y Aseguramiento de la Calidad de la Educación Superior [CEAACES], 2014). The report suggested depurating the Ecuadorian university system from e-ranked institutions (CONEA, 2009).

The Organic Law for Higher Education (OLHE) was reformed in 2010, whereby CEAACES was formed to replace CONEA, beginning its operations in 2011 as the responsible organism for driving evaluation, accreditation, and quality assurance processes of higher education (CEAACES, 2014). The third transitional provision welcomed CONEA's report recommendation about HEIs classified in the E category, setting a new evaluation process 18 months after the law's enactment and pointing out that those HEIs that do not meet the evaluation requirements must disappear (Pazmiño, 2018). Fourteen institutions did not succeed in this evaluation and were forced to close as they were cataloged as "non-acceptable." CEEACES launched a new evaluation, accreditation, and categorization process for HEIs in 2013 while, between 2015 and 2016, 12 institutions were voluntarily re-classified (Vega & Moreno, 2018). OLHE was reformed again in 2018, giving rise to the Higher Education Quality Assurance Council (CACES) to replace CEEACES with a new purpose, arguing that the former reform put more emphasis on external evaluation, while the new reform was focused on self-evaluation as a key component for quality assurance (Vega & Moreno, 2018). This summary of the evaluation process in Ecuadorian higher education illustrates that those reforms initiated in 2008 caused concerns among HEIs to fulfill quality standards that allow them to obtain accreditation or a better categorization, in some cases even appearing in international rankings, and therefore enhancing their local and international reputation. However, we raise the need to know whether the potential consumer considers quality parameters to be the determining factor in their choice of an HEI or whether other factors influence their decisions.

Based on these antecedents, the primary purpose of this study is to determine whether the variables that reside in the consumer's mind, such as brand awareness, associations, and evaluation of choice determinants, are significant in explaining the decision of applicants to enroll and recommend the HEI. For this purpose, a brand valuation model proposed by the National Service of Intellectual Rights (SENADI) was considered as a reference framework, which is conceptually based on the brand equity literature, suggesting that these variables located in the consumer's mind trigger behaviors that affect the brand's financial value. Macías et al. (2021) evaluated the mentioned model for two agricultural brands, using the brand repurchase intention and the intention to recommend it as dependent variables. Purchasing and recommendation are consumer behaviors that influence brand income and, ultimately, the brand's financial value. In the context of higher education, similar dependent variables would be the applicants' intention to enroll at an HEI and the intention to recommend it to third parties.

The study scope is the HEI's segment, which offers science, technology, engineering, and mathematics (STEM) undergraduate programs in Ecuador. STEM degrees are associated with greater positive externalities in terms of wages compared to other degrees (Winters, 2014). The Ecuadorian Innovation and Technologic Chamber (CITEC) has estimated that STEM graduates have a monthly average income of USD 1,300, above Ecuadorians' average income (Dávalos, 2019). Bianchi and Giorcelli (2020) affirm that STEM graduates tend to generate patents in STEM fields, such as medicine, chemistry, and IT. Some graduates from these fields achieve management positions in private companies related to patent production, and more talented graduates are attracted to non-patent production fields, such as the financial industry (Bianchi & Giorcelli, 2020). Some Ecuadorian experts claim that more graduates with STEM degrees intend to contribute to enterprises in the digital transformation era, applying skills such as programming, technological project management, interface design, data analysis, and mathematics (Dávalos, 2019). Moreover, promoting and achieving greater enroll-

ment and completion rates in STEM degrees is a priority for several governments to contribute to countries' development and compete in a globalized and technology-intensive marketplace (Li, 2020).

HEIs must be aware of those aspects that applicants analyze when choosing an institution to obtain a STEM degree, to guide marketing activities promoting the institution's attributes demanded by their target market, or to improve their weaknesses. Thus, brand and organization values can be increased. Despite previous studies analyzing brand equity dimensions on HEIs, research in this field is limited (Walter et al., 2022). According to the literature review, we consider that the gap is even more significant in studies relating consumer-based brand equity (CBBE) variables with behavioral key variables for brand financial value, such as enrolling and recommendation intention. Given these antecedents, from the perspectives of graduates, employers, and public policy, we believe it is relevant to delve into the literature on the branding of HEIs offering STEM degrees.

The remainder of this paper is organized as follows: the second section shows a literature review on brand equity, brand valuation approaches, and the SENADI's model, emphasizing the study's variables. The third section describes the methodology, divided into quantitative and qualitative analyses. The fourth section shows the study results. And the last section discusses the findings and presents conclusions.

2. Theoretical framework

2.1 Brand equity

Brand equity is defined as the differential effect of brand knowledge over consumers' responses to organizational marketing activities (Keller & Brexendorf, 2019). According to this definition, these responses are related to consumer perceptions, attitudes, and behaviors towards any brand, and they become more positive when the consumer is familiarized with a brand and has built unique, strong, and favorable associations with it (Keller & Brexendorf, 2019). Many authors identify brand equity as a multidimensional construct (Buil et al., 2013; Mourad et al., 2020). Keller & Brexendorf (2019) assert that brand knowledge is based on two dimensions: brand awareness and brand image. On the other hand, Aaker (1991) suggests four dimensions from the consumers' perspective: brand awareness, brand associations, perceived quality, and loyalty.

Salinas (2009) adds that brand equity can also be conceived from a firm's perspective, summarizing definitions from various authors that propose that brand equity corresponds to the differential financial value generated from any branded good/service in comparison to the same good/service, but unbranded. Consumer and company perspectives are linked since favorable consumer perceptions, attitudes, and behaviors regarding a brand translate into more sales, earnings, and financial value for the brand and the firm that owns it (Kumar et al., 2021).

Mourad et al. (2020) explain that developing brand equity in universities, achieving a differential image and a high-quality service perception, reduces current students' and applicants' perceived risk regarding the service, positively affecting university enrollment. In addition, HEIs offering STEM degrees could achieve a differential perceived value among prospective students compared to other HEIs, as these programs prepare graduates for high-demand and better-paid jobs (Li, 2020), which in turn are desired criteria for choosing a university (Mourad et al., 2020). Furthermore, universities could benefit from more funding if they offer STEM degrees and achieve higher graduation rates in these fields, as governments in several countries have made it a priority to encourage and increase the number of STEM students in higher education (Li, 2020).

Previous research has addressed various facets of brand equity and the selection process of higher education institutions, as summarized in Table 1. Scholars have analyzed the relationship of various brand equity dimensions with loyalty (Pinar et al., 2020) and overall brand equity (Pinar et al., 2014; Khoshtaria et al., 2020). Other research has been conducted to identify the determinants of preference, willingness to pay a price premium , and choice intention (Aggarwal et al., 2013), as well as the determinants of attitudes and enrollment intentions (Nagoya et al., 2021).

Royo-Vela and Hünermund (2016) have examined how marketing efforts affect key aspects such as awareness, trust, and attitude formation toward HEIs. Nuseir and El Refae (2022) identify the dimensions underlying the selection of a university, although they do not provide a process model. Previously, a comprehensive framework has been proposed that encompasses the decision-making process of international students, considering factors such as institutional image and program evaluation as determinants in this context (Cubillo et al., 2006). Mourad et al. (2020), in their comparative study between the USA and Egypt on brand equity dimensions, conclude that the determinants of brand equity reported in the literature may vary depending on the higher education industry maturity, as well as the country and cultural contexts. Therefore, more research on this topic is recommended in new contexts to identify those characteristics of the higher education service that are relevant for potential students' decision making and the HEI's brand value.

2.2 Brand valuation approaches and models

Brands have become very valuable assets for companies (Kumar et al., 2021), representing, on average, 20% and 17% of equity and total firm market values, respectively (Knowles, 2017).

Table 1. Studies on HEI brand equity and choice.

Authors	Objective	Results	Country
Cubillo et al. (2006)	To propose a theoretical model that integrates the different groups of factors that influence the decision-making process of international students, analyzing different dimensions of this process and explaining those factors that determine the students' choice.	The proposed factors for purchase intention are: institution image (faculty quality, facilities on campus, prestige and international recognition), program evaluation (program recognition, specialization and suitability, cost), country image (cultural proximity), city effect (city image, cost of living), and personal reasons (personal improvement, advice).	Not empirically tested
Aggarwal et al. (2013)	(1) How do the various independent and dependent measures of customer-based brand equity (CBBE) relate to each other in business school brand decisions? (2) How well can the brand equity measures predict the actual ranking of business schools as done by external agencies?	Overall, brand assessment and program recognition are the main factors that explain preference. Familiarity (defined as brand awareness) and value for money play important roles in willingness to pay a premium fee. For choice, overall brand assessment and program recognition are significant factors.	India
Pinar et al. (2014)	To present a framework and scale measurements of university brand equity and its dimensions	Core dimensions: perceived quality (faculty), emotional environment, brand loyalty, awareness. Supporting dimensions: library services, student living, career development, physical facilities. Both core and supporting dimensions significantly correlate with overall brand equity.	USA
Khoshtaria et al. (2020)	To examine the impact of brand equity dimensions on the overall university reputation in Georgian higher education.	The results show that, beyond brand awareness and brand image, specific attributes of the HEI infrastructure (physical infrastructure and services such as library and canteens) and the expected future development of graduates influence the overall evaluation of the HEI.	Georgia
Mourad et al. (2020)	To empirically test the multi-dimensionality aspect of the brand equity (BE) model, encompassing brand awareness and brand image in the Higher Education (HE) market and investigating two diverse country samples: USA and Egypt.	In the Egyptian market, BE is driven primarily by social image and price, and, to a lesser extent, by promotion. In the American market, BE is driven primarily by social image, brand personality, perceived quality, and historical image. The results have shown that the determinants of BE reported in the literature may vary depending on the HE industry maturity, as well as the country and cultural contexts. A further qualitative study reveals that perceived quality, job market success, and social image are key factors for choosing a university in both countries.	USA and Egypt
Pinar et al. (2020)	To investigate, from the students' perspective, the role of interactions of brand equity dimensions in creating a strong university brand.	Reputation, brand trust, and brand awareness significantly impact brand loyalty.	Turkey
Nagoya et al. (2021)	To explain the intention to enroll in a university, using a stimulus-organism-response framework (SOR).	University quality and university image (stimulus) influence affective attitude (organism), and affective attitude influences intention to enroll (response). Also, the quality affects the university's image.	Indonesia
Nuseir & El Refae (2022)	To determine the factors that the students deeply consider when choosing/selecting a university to attend in the UAE and identify the level of importance that each factor carries.	The findings show that several factors, such as academic reputation, grants and funding, location and proximity, facilities and services, and promotional and marketing channels, are dimensions of university choice for students in the UAE.	UAE
Walter et al. (2022)	To estimate the multivariate influence of the different CBBE factors (brand awareness, perceived quality, brand associations, and brand loyalty) on the three dependent factors: brand value, willingness to pay, and brand preference.	There are positive impacts of brand equity on brand preference, brand value, and willingness to pay. The study proves the significance of universities creating a positive brand image to differentiate from the competition and attract prospective students.	Netherlands

Source: own elaboration

There are three approaches to calculating a brand's financial value: cost, market, and income approaches (International Organization for Standardization [ISO], 2010; Salinas, 2009). The cost approach proposes that brand value corresponds to the cumulated historical costs derived from the brand's creation, or the estimated costs that must be assumed to develop a similar brand currently. The market approach calculates a brand value from market values observed from similar brands traded in a relatively brief time. Finally, the income approach determines the brand's value by calculating the present value of the economic income attributable to the remaining useful economic life of the brand, using a discount rate adjusted for the risk of the intangible asset.

The income approach is the most accepted, as it includes the brand's capability to generate future earnings (Macías et al., 2021). In contrast, the cost approach is criticized as it does not contemplate any potential future benefit that the brand would generate nor consider any added value for the brand's management besides historical incurred costs (Salinas, 2009). On the other hand, the market approach's criticism lies in the difficulty of finding transactions for brands with similar characteristics within a short period (ISO, 2010).

Many models have been developed under the three mentioned approaches. Macias et al. (2021) compare the models detailed by Salinas (2009) with the one proposed by SENADI in Ecuador, concluding that most models are based on the income approach and contain a marketing component that seeks to estimate a brand strength factor, which is mainly based on CBBE. Macias et al. (2021) also found that few models include a brand's legal risk assessment. According to the ISO norm, there must be a connection between marketing, legal and financial components. For example, the Interbrand (2022) model contains a factor named Brand Strength (BS), which measures CBBE variables (also called external factors) and internal factors, including brand legal protection. Interbrand asserts that for a higher BS, a lower discount rate must be applied to brand economic revenues, which results in a higher financial value. The Brand Finance (2022) model also contains a Brand Strength Index (BSI), which also includes a component related to brand equity. Brand Finance affirms that a stronger BSI leads to an increase in brand-attributable income (applying a higher royalty rate), reducing the discount rate and increasing brand value. The valuation model proposed by SENADI in Ecuador is also framed within the income approach and is described below.

2.3 Official brand valuation model in Ecuador and study variables

On February 27th, 2015, SENADI issued the Methodological Manual for Intellectual Property Intangible Assets Valuation (MVAIPI for its acronym in Spanish) by resolution No. 095-2014-DE-IEPI, published on Ecuadorian Official Record N°277. The model follows the ISO 10668 norm, which in turn is conceptually grounded on brand equity literature and is composed of the following elements:

1. Economical and financial: economic environment analysis, including the market in which the brand operates, and analysis of the firm's financial statements. The economic and financial analysis allows for estimating growth rates and deriving the cash flow attributable to the brand. In addition, this component estimates discount rates for valuation purposes.
2. Marketing: consumer-driven market research to determine the Brand Factor (BF), which integrates the perceptions and attitudes of potential consumers towards the brand that trigger consumer behavior. Based on the brand equity theory, the MVAIPI calculates the BF using the following variables: brand awareness, brand associations, and brand evaluation of choice determinants. There is a negative relationship between the brand discount rate and the BF, indicating that a stronger brand carries less risk in generating cash flow and thus increases its financial value.
3. Legal: analysis of the intangible asset's strengths and legal risks in each relevant jurisdiction, which affects the monetary value the brand could reach.

This study delves into the marketing component of the MVAIPI, analyzing whether the proposed variables are related to the applicants' desired behaviors, such as the choice of the HEI and its recommendation to third parties. These behaviors are closely related to the revenues and cash flow that a brand can generate.

2.3.1 Brand awareness

Brand awareness is the extent to which a consumer can recognize and recall that a brand belongs to a certain product category (Homburg et al., 2010). In the MVAIPI, brand awareness is conceptualized according to Aaker (1991) and is described in four possible levels, from the highest to the lowest:

1. Top of Mind (TOM): the brand is the first brand that spontaneously comes to the consumer's mind when a product category is triggered.
2. Brand recall: the brand comes to the consumer's mind spontaneously but in a different position from the first or TOM.
3. Brand recognition: the brand has not been remembered spontaneously as in the two previous indicators but is recognized in an assisted way (by reading its name or seeing its logo, for example) as a brand belonging to its product category.
4. The consumer is unaware of the existence of the brand.

2.3.2 Brand associations

According to the Associative Network Model, a consumer's memory stores information in networks (Teichert & Schöntag, 2010). These networks contain nodes that are connected to each other. Specifically, brand associations refer to the connections related to the brand node. Brand associations store information about attributes, benefits, sensations, experiences, and other relevant factors associated with a branded product or service and could have different levels of strength, distinctiveness, and favorability (Aaker, 1991; Keller & Brexendorf, 2019). Various triggers like advertising, mentions, or encountering the brand at a point of sale can activate these associations in the consumer's mind.

2.3.3 Choice process and its determinants

Generally, the consumer evaluates the competing brands within the consideration set preceding a purchase decision. Consumers can elaborate on the evaluations for that decision making, or the assessment can be based on pre-existing evaluations (Blackwell et al., 2006). Some processes are more elaborated, while others may be impulsive, which could be explained by the level of product involvement (Macias et al., 2021), defined as the product category's relevance or importance for the consumer (Coulter et al., 2003), determined by the extent the consequences related to the purchase or choice of that product connect with the personal needs, goals or values (Laaksonen, 1994). And more involved consumers use more criteria when deciding, seek more information, accept fewer alternatives, and process relevant information in greater detail (Baker et al., 2002).

When evaluating the MVAIPI in the agricultural sector, Macías et al. (2021) show that the evaluation of purchase determinants was significant in explaining repurchase intention in those products purchased less frequently and representing greater monetary investment, while in products of routine purchase and lower monetary outlay, the purchase decision was not based on a detailed evaluation of determinants, but was guided by the brand in the Top of Mind. According to the MVAIPI, the determinants of choice may vary according to the product or service category.

In the higher education sector, Royo-Vela and Hünermund (2016) describe the decision process of students in three stages: (1) predisposition to brands due to personal and environmental factors (family, peers), (2) search, where the marketing efforts of HEIs have an influence, and (3) evaluation, where the attributes or determinants of the choice of HEIs are analyzed. Among the main determinants commonly mentioned in several studies are:

- Academic quality: program quality and recognition by society and future employers (Aggarwal et al., 2013; Cubillo et al., 2006; Mourad et al., 2020; Nuseir & El Refae, 2022), quality of teachers (Cubillo et al., 2006), appearance in higher education rankings (Royo-Vela & Hünermund, 2016).
- Overall brand assessment: perceived brand value by prospective or current students (Aggarwal et al., 2013).
- Location and infrastructure quality (Aggarwal et al., 2013; Cubillo et al., 2006; Nuseir & El Refae, 2022).
- Cost, funding, or perceived value for the cost (Aggarwal et al., 2013; Cubillo et al., 2006; Nuseir & El Refae, 2022).

The MVAIPI proposes that brand awareness interacts with brand associations to determine the BF. This means that higher brand awareness will result in a stronger effect of brand association on consumer behavior. Then, the consumers' evaluation of choice determinants would directly influence their behavior (Figure 1).

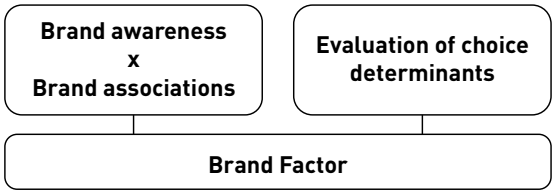

Figure 1. MVAIPI Brand Factor (SENADI, 2015).

2.4 Enrollment and recommendation intention

Deciding to enroll in an HEI and recommending it to others increase the brand's consumer base, impacting its revenues, cash flow, and, ultimately, its financial value. Therefore, it is argued that these behaviors would be good proxies of brand value (Macías et al., 2021). In this study, the intention of applicants to carry out these behaviors is analyzed, considering that intention is a good predictor of behavior (Li et al., 2020).

Brand awareness plays an important role in consumer decision making for several reasons, according to Keller (1993). First, the greater the brand awareness, the more likely it is to be spontaneously remembered and part of the consideration set during the decision to choose an HEI or to recommend it to others. Second, there may be situations in which brand awareness can influence the choice of a brand within the consideration set, even when there are no other brand associations. Macias et al. (2021) found this phenomenon in brands of agricultural inputs with high purchase frequency and low cost, where being Top of Mind was the predominant factor in choosing a brand, while associations had no significant effect. However, we do not consider this to be as likely in the decision to enroll in an HEI, as it is described as a complex decision process involving cognitive, emotional, and rational aspects that demands effort and time from the applicant during the consideration and evaluation of alternatives (Stein et al., 2011).

On the other hand, brand awareness functions as a signal that the brand has been present in the market for a long time and has achieved success (Aaker, 1991). Aggarwal et al. (2013) show that brand familiarity (defined as brand awareness) influences the willingness to pay a premium in the cost of an HEI. Other studies report a positive and significant association between brand awareness and an overall brand equity construct reflecting the HEI reputation among students (Pinar et al., 2014; Khoshtaria et al., 2020), as well as with attitude to being loyal (Pinar et al., 2020). With this background, the following hypotheses are proposed:

H1.1: Brand awareness is positively associated with the intention to enroll in an HEI.
H2.2: Brand awareness is positively associated with the intention to recommend an HEI.

Another argument in favor of brand awareness, agreed upon by Keller & Brexendorf (2019) and Aaker

(1991), is that it influences consumer decision making by affecting the formation and strength of associations. The better established the brand node is in the memory, the more accessible the brand associations are to the consumer. Precisely, this is what MVAIPI argues to propose an interaction effect between brand awareness and associations, which determines favorable behaviors. Therefore, the hypotheses are:

H2.1: The interaction between brand awareness and associations positively relates to the intention to enroll in an HEI.
H2.2: The interaction between brand awareness and associations positively relates to the intention to recommend an HEI.

Brand associations shape the image of the HEI in the consumer's mind. These associations may refer to service attributes, sensations, or consumer experiences (Aaker, 1991; Keller & Brexendorf, 2019). The more associations are stored in the consumer's mind, the stronger the brand is and the more likely it is to recall it in different situations, such as when choosing an HEI or recommending it to others (French & Smith, 2013). Nagoya et al. (2021) show that the perception of quality and the overall image of the university influence the affective attitude as a mediator of the intention to enroll in the HEI. Walter et al. (2022) conclude that a positive brand image leads potential students to perceive a differential value with respect to competitors and attracts them to their classrooms. According to these theoretical and empirical antecedents, it is hypothesized that:

H3.1: Better brand associations are related to a greater intention to enroll in an HEI.
H3.2: Better brand associations are related to a greater intention to recommend an HEI.

As previously explained, choice determinants are those relevant factors of a product or service category that consumers evaluate to make their purchase decision (Royo-Vela & Hünermund, 2016). If a brand is well evaluated on choice determinants, a preference is generated in the consumer's mind, which triggers desired behaviors such as choice, willingness to pay a price premium or recommending the brand to others (Buil et al., 2013).

Cubillo et al. (2006) propose choice factors such as the prestige of the HEI, the quality of the teachers, the quality and fit of the curriculum to the student's needs, the infrastructure of the HEI, and the tuition cost. Considering that the focus of Cubillo et al.'s study is on international students, factors such as cultural proximity, the image of the city, and the cost of living are also added. In an empirical study, Pinar et al. (2014) show positive and significant correlations between factors such as HEI reputation, environment, HEI infrastructure and services, and expected professional development with an overall brand equity construct. Along the same lines, Khoshtaria et al. (2020) show that, beyond brand awareness and brand image, specific attributes of the HEI infrastructure (physical infrastructure and services such as library and canteens) and the expected future development of graduates influence the overall evaluation of the HEI. Aggarwal et al. (2013) show that curriculum recognition is a relevant determinant of choice in most of the universities included in their study and, to a lesser extent, value for money paid. Finally, Nuseir and El Refae (2022) state that academic reputation, funding, location and proximity, and university facilities and services are factors students analyze when choosing a university. Therefore, the hypotheses are:

H4.1: There is a positive relationship between the evaluation of choice determinants and the intention to enroll in an HEI.
H4.2: There is a positive relationship between the evaluation of choice determinants and the intention to recommend an HEI.

3. Methodology

3.1 Research design and methods

A mixed design was used: exploratory and conclusive. The purpose of the exploratory phase was to identify the determinants of HEI choice according to the target audience, defined as potential students of STEM programs in the coastal region of Ecuador. For this purpose, interviews were conducted with a small sample of thirteen prospective students.

The purpose of the concluding phase was to test the study hypotheses by applying regression models to the dependent variables, intention to enroll and intention to recommend the HEI, using as independent variables brand awareness (H1.1 and H1.2), the interaction between brand awareness and associations (H2.1 and H2.2), brand associations (H3.1 and H3.2), the evaluation of the choice determinants (H4.1 and H4.2), and the following control variables to capture the heterogeneity of the respondents: type of school, city of residence, monthly family income, gender, and age.

To collect the data, an Internet survey was applied to high school graduates aspiring to enroll in an HEI in the coastal region. Convenience sampling was performed, obtaining a final sample of 227 respondents. Convenience sampling is justified in this case, considering the limitation to determining the sampling frame, given that there was no access to high school graduates' databases. The HEI used as the target brand is a polytechnic school located in the coastal region.

3.2 Variables measurement

Following MVAIPI guidelines, brand awareness was measured with three consecutive questions: (1) "Mention the first higher education institution that comes to your

mind" (if the respondent does not mention the HEI under study, the next question is shown). (2) "Mention other higher education institutions that also come to your mind" (if the respondent does not mention the HEI under study, the third question is shown). (3) "Do you know that [HEI brand name] is a higher education institution? " (YES/NO). There were no observations at the fourth level of brand awareness, i.e., there were no respondents who did not mention the HEI in the first two questions and answered NO in the third question.

For the estimation of the models, we used two dichotomous variables or dummies (D_{TOM} and D_{RECALL}) representing the first three levels of brand awareness: D_{TOM}=1 if HEI was mentioned in the first question, D_{RECALL}=1 if HEI was mentioned in the second question. When both dummies take the zero value, the observation corresponds to the base case defined as recognition (third level of awareness). Since there was no observation at the fourth level, a third dummy was not necessary.

With respect to associations (ASSO), the MVAIPI reflects the conceptualization presented in this study, contemplating that consumers' open-ended expressions about a brand can be favorable, neutral, or unfavorable and can be specific or general. In this sense, an open-ended question where the respondent is asked to express what comes to mind when hearing the brand name was included. A qualitative analysis was conducted to identify the valence and extremism of the responses, based on the Rocklage and Fazio (2015) study. Two researchers coded each response between 1 and 5, where 1 means "Extremely negative" and 5 means "Extremely positive" (3=Neutral). When coders disagreed, the response was submitted to a third researcher's opinion.

HEI's choice determinants identified in the exploratory study (n=13) were cost, quality of education, proximity to the applicant's home, future employment opportunities, international reputation, and physical infrastructure. In the survey, respondents were asked to assess the brand on each determinant with a score ranging from 1 to 4 (1=Very bad; 4=Very good). For the regression models' estimation, a variable EVAL was coded, averaging the scores that each respondent gave to the six choice determinants.

Intention to enroll and recommend the HEI were measured with the questions "Would you apply to study at [HEI brand name]?" and "Would you recommend someone you know to apply to study at [HEI brand name]?", respectively, using 5-point Likert scales, where 1=Definitely no, and 5=Definitely yes.

3.3 Regression models

The regression models were estimated using generalized least squares (GLS) with robust standard errors for heteroscedasticity using the statistical software STATA (version 15.1). Equations (1) and (2) show the empirical models for testing this study's hypotheses:

$$Enroll_i = \beta_0 + \beta_1 D_{TOM} + \beta_2 D_{RECALL} + \beta_3 D_{TOM} * ASSO + \beta_4 D_{RECALL} * ASSO + \beta_5 ASSO + \beta_6 EVAL + \beta X + u_i \quad (1)$$

$$Recom_i = \gamma_0 + \gamma_1 D_{TOM} + \gamma_2 D_{RECALL} + \gamma_3 D_{TOM} * ASSO + \gamma_4 D_{RECALL} * ASSO + \gamma_5 ASSO + \gamma_6 EVAL + \gamma X + e_i \quad (2)$$

Where β_1 and β_2 represent H1.1. For H1.1 to be accepted, both β_1 and β_2 must be significant and positive, and $\beta_1 \geq \beta_2$. β_3 and β_4 represent H2.1 (β_3 and β_4 positive; $\beta_3 \geq \beta_4$). β_5 and β_6 represent H3.1 and H4.1, respectively (β_5 and β_6 positive). In Eq. (2), γ_1 and γ_2 represent H1.2 (γ_1 and γ_2 positive; $\gamma_1 \geq \gamma_2$); γ_3 and γ_4 represent H2.2 (γ_3 and γ_4 positive; $\gamma_3 \geq \gamma_4$); γ_5 and γ_6 represent H3.2 and H4.2, respectively (γ_5 and γ_6 positive). β and γ are two coefficient vectors describing the relationships of the control variables (X) with the dependent variables in Eqs. (1) and (2), respectively. Finally, μ_i and e_i are the error terms for both models.

4. Results

4.1 Descriptive statistics of the sample

Table 2 shows the main descriptive statistics of the variables used in the study. More than one third of the sample has the focal brand in the TOM. Overall, brand associations, evaluation of choice determinants, and intentions have good average levels. It is observed that the intention to enroll in the HEI is lower than the intention to recommend it. Regarding the control variables, the average age of the applicants is close to 18 years, most of them come from private schools, the family income is mainly in the two lower ranges, and about 80% of the applicants are from Guayaquil, the main city of the Ecuadorian coast and location of the HEI, and 47% of the respondents are women.

4.2 Models' estimation

Table 3 provides the results of the model estimates for each dependent variable. To analyze the robustness of the estimates, outcomes with and without control variables are compared. The results are similar for the two dependent variables, and there are no significant changes once the control variables are included. The brand awareness dummies (D_{TOM}, D_{RECALL}) are not significant, so H1.1 and H1.2 are rejected. Associations (ASSO) and the interaction of brand awareness with associations are also not significant, contrary to hypotheses H2.1, H2.2, H3.1, and H3.2. In contrast, the evaluation of choice determinants (EVAL) did show a positive and significant relationship with intentions to enroll and recommend HEIs ($p < 0.01$), supporting H4.1 and H4.2. Additionally, among the control variables, only gender was significant for intention to recommend. Specifically, women are more likely to recommend compared to the rest of the sample. The next section, therefore, moves on to discuss these findings.

Table 2. Variables descriptive statistics.

	Study variables			
	Average	**S.D.**		
Associations (1-5)	3.91	0.89	Brand awareness	%
Determinants evaluation (1-4)	3.39	0.43	*Top of Mind*	37.4%
Intention to enroll (1-5)	3.88	1.28	*Recall*	27.8%
Intention to recommend (1-5)	4.38	0.82	*Recognition*	34.8%
	Control variables			
	Average	**S.D.**		
			Monthly family income	%
Age	17.59	1.63	*Less than or equal to $750*	42.3%
			$751 - $1,300	32.6%
School type	%		*$1,301 - $2,200*	15.0%
Private	62.1%		*$2,201 - $3,200*	6.2%
Other	37.9%		*Higher than $3,200*	4.0%
City of residence	%		Gender	%
Guayaquil	76.7%		*Women*	47.1%
Other	23.3%		*Men*	51.1%
			Other/I prefer not to say	1.8%

Source: own elaboration

Table 3. Regression analysis results.

	Intention to enroll		**Intention to recommend**	
	(I)	**(II)**	**(I)**	**(II)**
D_{TOM}	-0.9755	-0.8965	-0.6020	-0.5163
	(1.0140)	(1.0377)	(0.9865)	(0.9737)
D_{RECALL}	-0.2190	-0.2134	-0.1435	-0.1948
	(0.8090)	(0.8238)	(0.5368)	(0.5611)
D_{TOM}*ASSO	0.4490*	0.4329*	0.1571	0.1508
	(0.2443)	(0.2487)	(0.2315)	(0.2293)
D_{RECALL}*ASSO	0.1379	0.1373	0.0704	0.0838
	(0.2113)	(0.2150)	(0.1330)	(0.1420)
ASSO	0.0500	0.0333	0.0834	0.0796
	(0.1640)	(0.1678)	(0.0942)	(0.0969)
EVAL	0.7202***	0.7632***	0.5744***	0.5764***
	(0.1897)	(0.2018)	(0.1369)	(0.1351)
Age		0.0279		0.0138
		(0.0311)		(0.0241)
Private		-0.0467		-0.0470
		(0.1766)		(0.1038)
Guayaquil		-0.1625		-0.0902
		(0.1790)		(0.1143)
Women		0.1405		0.2471**
		(0.1553)		(0.0999)
Income		-0.0686		0.0545
		(0.0787)		(0.0418)
N	227	227	227	227
R^2	0.2471	0.2578	0.1453	0.1753

Note: *10% significance level, ** 5% significance level, *** 1% significance level
Robust standard errors in brackets.
Source: own elaboration

5. Discussion and conclusions

The present research evaluated whether the variables that reside in the consumer's mind, such as brand awareness, associations, and evaluation of choice determinants, are significant in explaining the intention to enroll in and recommend a higher education institution. These behaviors serve as proxies for the financial value of a brand. In this sense, the results of this study show that neither brand awareness nor spontaneous associations significantly explain the intentions to enroll in or recommend an HEI for STEM degrees. In contrast, the evaluation of choice determinants was statistically significant, showing a positive relationship with intentions. These findings are discussed further below.

This study takes as a framework the brand valuation model issued by the intellectual property authority in Ecuador, which is based on consumer-based brand equity theory. The study conducted is relevant, considering that research on brand management, specifically brand valuation, in the context of higher education is still limited (Walter et al., 2022). It is also relevant to test brand valuation models since this practice commonly receives criticism because the proposed models are not clear in arguing the variables used and their relationships (Salinas, 2009; Macías et al., 2021).

Regarding the non-significance of brand awareness and spontaneous associations and the significant effect of choice determinants found in this study, we can argue that the higher education service is a very relevant decision for the consumer because of the effort and cost required to pursue a degree for several years and because it determines their future profession and income level. In this sense, it can be considered that the average

prospective student has a high level of involvement with this service, according to the definition of product involvement by Coulter et al. (2003) and Laaksonen (1994).

It has been proved that product involvement influences consumers' cognitive and behavioral responses, such as seeking more detailed information on product attributes and making more product comparisons for quality and value (Nijssen et al., 1995). Although potential university students have some higher education brands stored in their memory, they likely do not consider this factor as the most relevant when deciding. Instead, they search for information and analyze the alternatives based on factors considered relevant for a decision to which they will allocate a great effort (cognitive, monetary) for several years, and that will condition their working life (Nuseir & El Refae, 2022), which coincides with what is predicted by the three-stage model described by Royo-Vela and Hünermund (2016). This would explain why the level of brand awareness and spontaneous associations are not significant, but the reasoned evaluation of choice determinants relevant to this service is.

It is important to highlight that most of the determinants extracted from the qualitative phase (cost of the program, quality of education, proximity to the applicant's home, future employment opportunities, international reputation, physical infrastructure) coincide with the main determinants reported in previous studies in the higher education context (Aggarwal et al., 2013; Cubillo et al., 2006; Royo-Vela & Hünermund, 2016; Mourad et al., 2020; Nuseir & El Refae, 2022).

Our findings are also consistent with the work of Macías et al. (2021), validating the same valuation model in agricultural brands in Ecuador, in which the authors conclude that, for product categories with lower purchase frequency and higher monetary investment, the reasoned evaluation of determinants gains relevance in consumer decision making, instead of awareness and brand associations. Further work is required to establish the significance of these brand equity variables for decision making outcomes in other product or service categories.

An implication that emerges from these findings is that higher education institutions should identify these choice determinants and periodically asses how the brand is perceived in each of them (brand tracking). These organizations should also discern which factors they should work on and communicate their efforts and achievements to their target audience to improve perceptions in the consumer's mind and influence decision making in their favor.

The results show that it is not enough to create awareness of the institution's name since, at the moment of decision making, the consumer performs a search and analysis of information (choice determinants) to conclude whether the institution in consideration meets the required standards. It is also suggested that research on determinants be directed according to the different target populations of HEIs. In this paper, the target audience was the population of high school graduates from the region of influence of the institution under study who were seeking an undergraduate degree in STEM areas. However, the determining factors may vary from the perspective of applicants from other knowledge areas, other levels of education such as postgraduate or executive education, or even from international students (Cubillo et al., 2006).

Identifying these determinants, working to improve them, and correctly communicating that the higher education institution meets these parameters and adjusts to the demands of the target audience is crucial to improving the positioning of its brand in the minds of potential students and attracting them to their classrooms.

Conflict of interest

The authors declare no conflict of interest.

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Intention to enroll and recommend a higher education institution for STEM degrees: a brand valuation approach
La intención de enrolarse y recomendar una universidad para carreras STEM: un enfoque de valoración de marcas
Intenção de se matricular e recomendar uma universidade para carreiras STEM: uma abordagem de avaliação de marcas

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