The Building Blocks of Student Innovation: Exploring Fundamental Behaviours

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Abstract

In an increasingly dynamic and competitive business environment, organizational agility has become essential for sustaining competitiveness. Human resources are central to the achievement of organizational goals, particularly because they represent a strategic asset that is difficult to imitate. Consequently, fostering innovative behaviour among employees is of critical importance. This study seeks to identify and validate the key components that encourage innovation behaviour among management students within an academic context. In addition, it aims to examine how education in entrepreneurship and innovation can strengthen these components, positioning Higher Education Institutions as pivotal environments for the development of innovation behaviour. The study further intends to propose recommendations designed to stimulate and reinforce innovation behaviour among both students and faculty across diverse disciplinary fields. Based on a survey conducted at a Portuguese Higher Education Institution, the findings highlight the significance of integrating creative and innovative supervision with innovative pedagogical methodologies in educational contexts. Such an approach enables students to recognise the substantial role of soft skills in promoting innovative behaviour within organizational settings. This perspective is particularly relevant for Higher Education Institutions responsible for educating future leaders, as well as for organizations seeking to cultivate innovation behaviour among their workforce.

Keywords: Innovation, Creativity, Soft skills, Innovative behavior, Higher Education.

Introduction

Organizations widely acknowledge that Human Resources can constitute a distinctive and difficult-to-imitate source of competitive advantage [1]. As the stakes associated with talent management continue to rise, organizations must equip themselves with effective tools to attract, retain, and motivate their employees [2]. At the same time, companies face the complex challenge of managing four coexisting generations in the workforce, each characterised by distinct expectations, behaviours, skills, and motivational drivers [3]. In order to design sustainable strategies and support business growth and development, organizations must continuously innovate their value propositions. Such innovation may be achieved through the development and implementation of new products and services, processes, marketing strategies, organizational structures, and business models [4].

Nevertheless, this multifaceted dynamic is strongly shaped by the prevailing culture of innovation, within which leadership plays a pivotal role [5]. In this context, fostering an entrepreneurial mindset, encouraging continuous learning, promoting effective communication, and supporting collaborative practices are particularly important [6]. Higher Education Institutions, as key partners in the generation of knowledge and in the preparation of students as future leaders for the labour market, therefore assume a fundamental role in this process [7]. The more effectively these institutions are able to motivate students to engage in learning and to develop innovation behaviour, the greater their potential for professional success [8].

This study seeks to identify and validate relevant components that foster innovation behaviour among management students within an academic setting. Furthermore, it aims to examine how education in entrepreneurship and/or innovation can strengthen these components, while positioning Higher Education Institu-

tions as critical environments for the cultivation of innovation behaviour. Finally, the study proposes recommendations designed to stimulate and reinforce innovation behaviour among students and academic staff across diverse disciplinary domains.

The research is structured as follows: it begins with a review of the relevant literature, followed by the presentation of the research methodology and empirical results. The paper concludes with a detailed discussion of the findings, the study's limitations, and directions for future research.

Literature Review

Creativity and innovation are widely recognised as critical drivers of organizational success in the contemporary economic landscape. Empirical evidence provided by Hussain et al. (2023) indicates that innovation behaviour plays a mediating role in the relationship between employee creativity and organizational innovation. Creativity constitutes the basis for the generation of novel ideas related to innovative products, services, solutions, and processes [9]. Innovation, in turn, emerges when organizations effectively nurture, support, and develop these creative ideas within a conducive environment [10].

An increasing number of scholars have turned their attention to the attitudinal factors that underpin innovation, acknowledging that innovative actions stem not only from inherent individual characteristics but also from work-related attitudes and contextual influences [11]. Among these factors, employee engagement has gained particular relevance. It is defined as the intensity and direction of the cognitive, emotional, and behavioural energy that individuals invest in their work activities, with all three dimensions being essential for managing the demanding process of innovation [12]. Despite its importance, research has highlighted a limited and fragmented understanding of the wide range of individual and situational determinants that influence employee engagement specifically in relation to innovation behaviour [13]. Although existing studies provide valuable insights, they often remain restricted to isolated research streams, thereby offering only a partial and non-integrated perspective. Consequently, a comprehensive understanding of the relevant variables, their interrelationships, and the underlying theoretical frameworks is necessary to advance knowledge in this field [14].

In addition to these attitudinal factors, the literature has identified several skills as essential for individuals engaged in innovative activities. These include critical thinking and problem-solving abilities, problem-solving skills, as well as leadership and responsibility competences. Entrepreneurship, which is fundamental to behavioural innovation, is also highlighted as a key component in this context [15-23].

Previous studies have consistently emphasised these components. Table 1 summarises selected researchers who have conducted in-depth analyses of these themes.

Table 1: Some previous studies related to crucial components that promote innovative behavior.

Alt et al., 2023; Budur et al., 2024	Knowledge sharing-giving: empirical evidence indicates that knowledge- sharing practices exert a direct and statistically significant positive effect on innovative culture, quality of work life, and innovation behaviour. Further findings reveal that participants' awareness of future challenges, confidence in generating creative ideas, and perceived innovation behaviour improved significantly by the end of a future problem-solving programme when compared to its initial stage.
Alenezi, 2023; Zinchenko et al., 2023	Learning culture: digital transformation in higher education extends beyond mere technological advancement, encompassing cultural, procedural, and pedagogical changes. Existing research has addressed this transformation in a fragmented manner, often lacking comprehensive and integrative approaches. Nevertheless, evidence suggests that the development of an inclusive digital learning environment can substantially enhance the effectiveness of future education, equipping learners with the skills needed to address the complex challenges of an information-driven society.
Gkontelos et al., 2023; Ma et al., 2023	General self-efficacy: research findings indicate that the creative self- efficacy of postgraduate students is strengthened through collaborative, cross-disciplinary initiatives. An integrated cultivation model has been shown to contribute to the development of a transformative tutor team while simultaneously establishing a supportive mentoring community. Moreover, the direct influence of self-efficacy, together with the mediating effects of irrational beliefs and burnout, highlights the complexity of innovative work behaviour and the multiple factors shaping teachers' performance.
Imbaquingo, & Cárdenas, 2023; Patiño et al., 2023	Active methodological support: the results are particularly relevant for trainers, academics, researchers, and policymakers with an interest in open education. When designing open education initiatives, training and development interventions should prioritise the promotion of diverse open education practices, including the use, production, dissemination, andmobilisation of open educational resources. Empirical findings also underline the pivotal role of educators in fostering the development of reading skills, particularly among students in the early stages of education. Project-Based Learning (PBL) emerges as an active and innovative pedagogical approach that enhances student engagement and improves reading comprehension skills. Accordingly, the implementation of PBL has been shown to exert a positive influence on students' English language reading performance.

Akbari et al., 2021; Moraes et al., 2023; Musenze, & Mayende, 2023	Executive leadership: research demonstrates that entrepreneurial leadership has a strong and positive effect on innovative work behaviour (IWB) among employees in small and medium-sized ICT enterprises. In this relationship, employees' creative self-efficacy and leaders' encouragement of innovation function as mediating mechanisms. Additionally, managerial support is identified as a critical factor in fostering an organizational culture conducive to innovation and corporate entrepreneurship. Notably, in academic environments with a strong entrepreneurial orientation, perceptions of rewards do not appear to significantly influence university professors' innovation behaviour. Recent findings further indicate that ethical leadership is positively associated with innovative work behaviour through perceived organizational support, suggesting that the promotion of IWB requires integrated approaches grounded in ethical leadership practices and supportive organizational climates.
Dzimińska, 2023; Zhang et al., 2023	Innovation culture: The findings reveal that academics conceptualise an ideal-type university as an institution that actively creates conditions favourable to innovation. Such an environment promotes an organizational culture characterised by openness, diversity, creativity, and constructive dialogue, thereby encouraging interdisciplinary collaboration beyond traditional academic boundaries. This model of the university fosters a culture of innovation aimed at unlocking the potential of academic staff by strengthening their capabilities, initiative, self-confidence, and entrepreneurial spirit. More broadly, organizational culture is recognised as a critical intangible asset that can be strategically leveraged to achieve innovation-related objectives. A supportive social context, effective governance systems, adequate innovation resources, and a culture that promotes psychological safety collectively contribute to enhanced innovation efficiency and improved innovation performance.

Source: own elaboration

Methodology

The selected methodology and research methods were designed with the primary objective of identifying and validating the key components that foster innovation behaviour among management students within an academic context. A quantitative and descriptive research design was adopted due to its capacity to enable precise measurement, comprehensive description, replicability, generalisation, and objectivity, thereby strengthening the methodological rigour of the study [24]. Data were collected through a questionnaire, developed within a constructivist research paradigm [25]. This approach is grounded in the assumption that students actively shape the future they aspire to by developing and creating opportunities aligned with their beliefs and personal aspirations [8]. Students' subjective motivation to engage in classroom activities is influenced by their emotions, perceptions of reality, and their ability to anticipate the potential consequences of their choices, which are in turn shaped by their prior experiences [26].

The population examined in this study consists of students enrolled at the Polytechnic University of Cávado and Ave (IPCA), Portugal, specifically from the Higher School of Management. To fulfil the research objectives, a mixed approach was adopted, incorporating convenience sampling. A quantitative methodology was implemented through a survey administered to students from the programmes of Business Management, Finance, Public Administration, E-Commerce, Insurance Management, Taxation, and Touristic Activities Management.

"The final version of the data collection instrument comprised a total of 78 closed-ended items, organised into four sections: (i) sociodemographic characteristics, (ii) fundamental factors promoting student innovation, (iii) soft skills, and (iv) entrepreneurship. Of these, 33 items were specifically used to measure innovation success factors and soft skills and were included in the quantitative analysis using a five-point Likert scale."

Data Collection and Results

Between January 2024 and March 2024, a questionnaire survey was conducted online "to examine the success factors related to instead of instead of innovation behaviour among higher education students in an academic context". The study utilized a quantitative research method and collected 183 valid responses. To identify the success factors, a literature review was conducted by selecting systematic reviews. The survey questionnaire consisted of 33 questions that rated the perceived importance level of the success factors using a five-point Likert scale, ranging from 1 (least important) to 5 (most important). The success factors included Knowledge sharing - giving (KSg), Knowledge sharing - asking (KSa), Learning culture (LC), General self-efficacy (GSE), Active methodological support (AMS), Executive instead of Leader & Responsible (LR). The scale was based on the study of Rattanawichai et al. (2022). In addition to these factors, some of the soft skills based on the UNESCO Framework for Transversal Competencies were also included in the survey, namely: Innovative & Creative (ICR), Critical thinker & Problem solver (CTh), Problem-solving (PS), Leader & Responsible (LR), and Collaborative skills (CS). A predictive/explanatory PLS (partial least squares) model was utilized to analyze the data.

Socio-demographic data

Female respondents constituted most of the sample, representing 51% of the participants. (Figure 1).
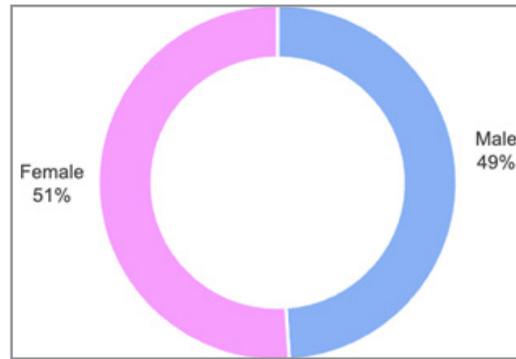
Figure 1: Gender of respondents.

Respondents aged 18–22 constituted the largest age group (58%), while those aged over 36 represented 32% of the sample (Figure 2).
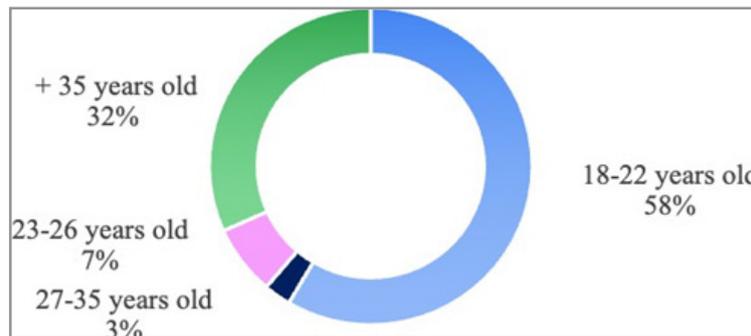

Figure 2: Age of respondents.

The sample was predominantly composed of students from management programmes (45%), followed by engineering (33%), tourism (11%), and design (5%) (Figure 3).
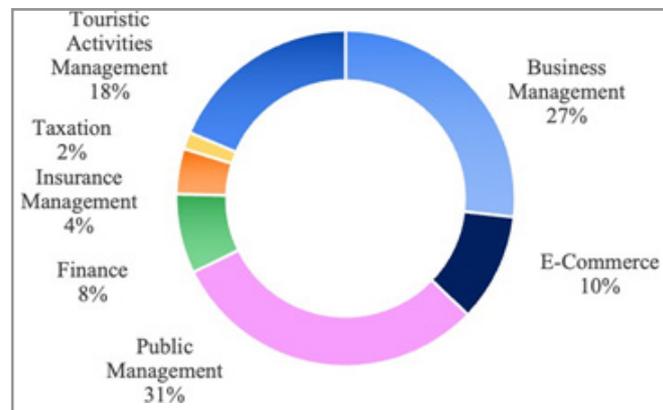

Figure 3: Courses attended by respondents.

Of the total respondents, 51% reported having no professional experience. Among those with work experience, 45% had less than one year, 25% reported between one and two years, and 22% between two and five years of experience. Only 7% of the respondents indicated having more than five years of professional experience.

Success Factors and soft skills
A quantitative research approach was adopted to identify and validate the essential components that foster innovation behaviour among management students within an academic context. The study began with a review of systematic literature reviews to identify the relevant success factors. Based on these findings, a survey questionnaire comprising 33 items was developed to assess respondents' perceptions regarding the importance of these success factors. The questionnaire items were rated on a five-point Likert scale ranging from 1 (least important) to 5 (most important) for factors such as Knowledge sharing - giving (KSg), Knowledge sharing - asking (KSa), Learning culture (LC), General self-efficacy (GSE), Active methodological support (AMS), Executive leadership (EL), and Innovation culture (IC). These factors were based on the study conducted by Rattanawichai et al. (2022). Additionally, some of the soft skills based on the UNESCO Framework for Transversal Competencies were included in the survey, namely: Innovative & Creative (ICR), Critical thinker & Problem solver (CTh), Problem-solving (PS), Leader & Responsible (LR), and Collaborative skills (CS).

To validate the seven factors (reflective latent variables) measuring students' perception of the importance/weight of their in-

novative behaviors in the academic context, and the influence of five soft skills on this perception of innovation, a predictive/explanatory PLS (partial least squares) model was used. Two of the soft skills were measured as formative latent variables. The result is shown in Figure 4.
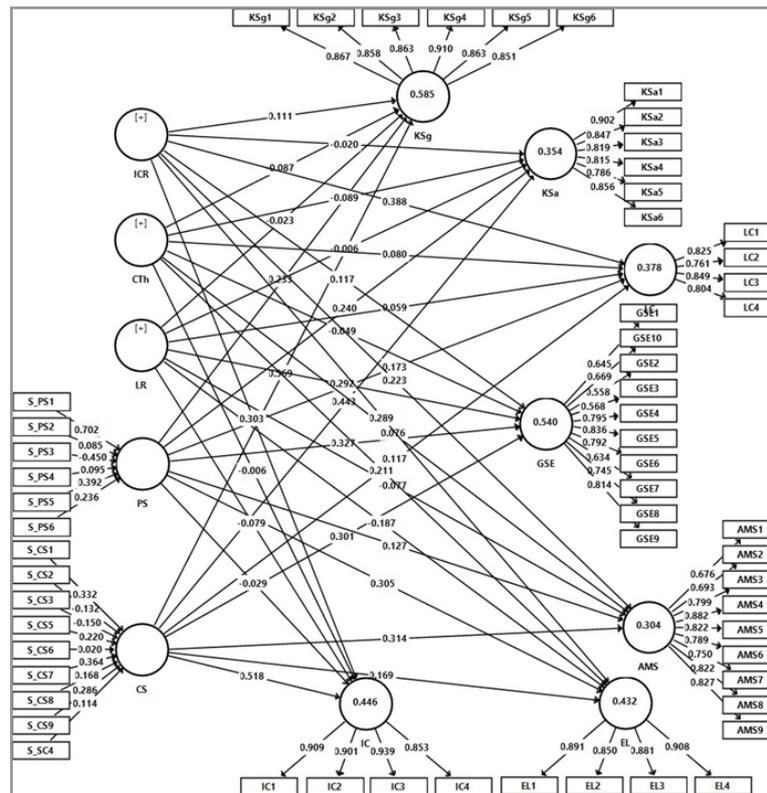

Figure 4: PLS model with loading values, impact coefficients, and R2 values.

All loading values from the measurement model had quite overwhelming values. Cronbach's alpha values varied between 0.827 and 0.935 and the composite reliability index between 0.884 and 0.949, which were very good values (values greater than 0.8). These results point to very good reliability of the factors and support their convergent validity.

Likewise, AVE (average variance extracted), Fornell-Larcker classifications (Fornell &Larcker, 1981) and the heterotrait-monotrait (HTMT) correlation ratio support good discriminant validity of the factors [27]. The AVE (average variance extracted) presented values between 0.508 and 0.812 (values must be greater than 0.5), supporting the discriminant validity of the factors. Fornell-Larcker classifications were provided for all seven factors (the square ratio of the AVE value proved to be superior to the cross-correlations), being yet another indicator that supports good discriminant validity. The heterotrait-monotrait (HTMT) correlation ratio should be less than 0.9 or according to other authors, less than 0.85. The values varied between 0.311 and 0.821, all values below 0.85 [27].

The significance of the model was estimated by bootstrapping with 5000 subsamples. The significant impact coefficients for a 5% level are in bold in Table 1. The effect size f^2 measures, for each exogenous variable, its relative contribution to the value of R2 [28]. Values greater than 0.35 are high, between 0.15 and 0.35 moderate, and between 0.02 and 0.15 weak, with the remaining values being very weak [28, 29]. In the same Table 2, moderate to high values are in bold. Non-significant impact factors at 5% and whose effect size proved to be very weak are not tabulated.

Table 2: Structural model coefficients, bootstrap p-values and f^2.

	Path coefficient	P value	f square
CS -> AMS	0.314	0.001	0.071
CS -> EL	0.169	0.058	0.025
CS -> GSE	0.301	0.000	0.099
CS -> IC	0.518	0.000	0.244
CS -> KSa	0.443	0.000	0.153
CS -> KSg	0.569	0.000	0.392
CTh -> EL	0.211	0.031	0.062
ICR -> AMS	0.223	0.007	0.041
ICR -> EL	0.289	0.000	0.085

ICR -> IC	0.303	0.000	0.096
ICR -> LC	0.388	0.000	0.140
LR -> EL	-0.187	0.003	0.043
LR -> GSE	0.292	0.002	0.129
PS -> EL	0.305	0.001	0.097
PS -> GSE	0.327	0.003	0.138
PS -> KSa	0.240	0.023	0.053
PS -> KSg	0.233	0.002	0.077

It is worth highlighting the negative and significant impact of LR (Leader & Responsible) on EL (Executive leadership). However, the effect size turned out to be weak ($f2 = 0.043$). The only variable independent of soft skills that has a moderate to high effect in explaining innovation factors is CS (Collaborative skills).

Success Factors, Soft Skills, and Entrepreneurship
To examine the extent to which the analysed factors are associated with entrepreneurship, a logistic regression analysis was conducted using the dichotomous variable "Do you see yourself as your own boss in the future, that is, having your own business?" as the dependent variable. Of the respondents, 145 students answered affirmatively and 38 responded negatively. The independent variables included the seven innovation factors, the five soft skills, and the presence or absence of professional experience.

The results of the model identified three statistically significant predictors (Table 3): executive leadership, critical thinker and problem solver, and leader and responsible. Specifically, for each additional unit of importance attributed to the executive leadership factor, the odds of a student intending to become an entrepreneur decreased, on average, by approximately 70%. Conversely, each additional unit in which a student perceived themselves as a critical thinker and problem solver increased the odds of entrepreneurial intention by an average factor of approximately 4.8. Similarly, for each additional unit in which a student perceived themselves as leader and responsible, the odds of intending to become an entrepreneur increased by an average factor of approximately 2.7.

The remaining variables included in the model did not exhibit a statistically significant effect on entrepreneurial intention.

Table 3: Coefficients, p-values and odds ratios in logistic regression.

	Beta	p-value	Exp(Beta)
EL	-1.212	< 0.001	0.298
CTh	1.579	< 0.001	4.850
LR	1.004	0.002	2.730

The reasons underlying the entrepreneurial intentions of the 145 students are illustrated in Figure 5. Each bar represents the number of affirmative responses for each of the five reasons included in the questionnaire.
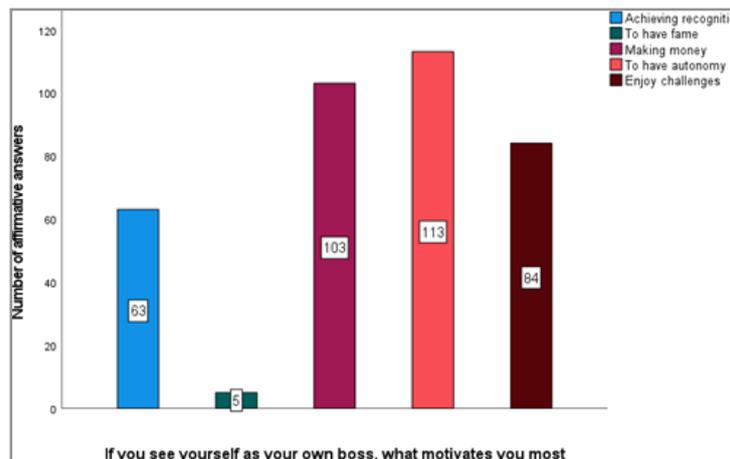

Figure 5: Reasons why students want to work for themselves.

Overall, the seven factors are perceived differently by respondents. Figure 6 compares their average values (range from 1 to 5).
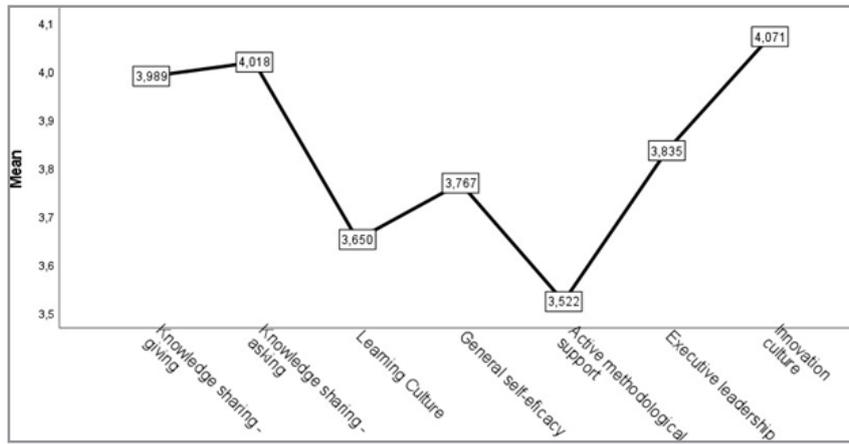
Figure 6: Average innovation factors.

All survey participants rated seven factors as important in fostering innovation behaviour among students. The factor receiving the highest mean score was innovation culture (M = 4.071), followed by knowledge sharing – asking (M = 4.018) and knowledge sharing – giving (M = 3.989). The factor with the lowest mean score was active methodological support (M = 3.522) [28-31].

By relating these mean values to the respondents' academic programmes, a further analysis was conducted to examine how education in entrepreneurship and innovation may contribute to strengthening these factors. This approach supports an assessment of the role of Higher Education Institutions in promoting the development of innovation behaviour among students. Figure 7 compares the mean values obtained by business management students with those reported by students enrolled in other programmes. Overall, business management students presented higher mean scores across all seven factors, with innovation culture showing nearly identical values in both groups. Statistically significant differences were observed only for the variables knowledge sharing – giving (p = 0.026) and active methodological support (p < 0.001). However, after applying the Bonferroni correction for multiple comparisons, active methodological support remained the only statistically significant variable [32-35].
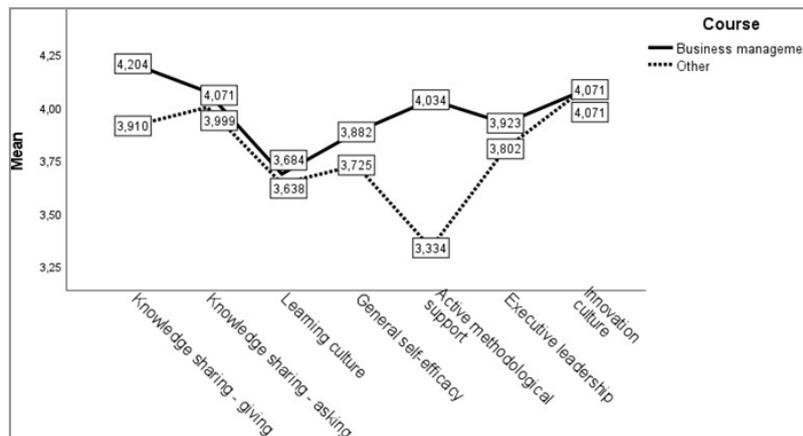

Figure 7: Average innovation factors by course.

According to the findings, students enrolled in business management programmes identified knowledge sharing – giving as the most significant factor (M = 4.204), whereas students from other academic fields attributed greater importance to innovation culture (M = 4.071). The results further indicate that the most pronounced differences between the two groups concern active methodological support and knowledge sharing – giving. These differences may be partially explained by the structure of the business management curriculum, which includes a course unit dedicated to Creativity and Business Innovation. This curricular component places strong emphasis on creativity, problem-solving, critical thinking, collaboration, and teamwork. In addition, it incorporates the use of digital platforms, co-creation projects, design thinking approaches, collaborative learning, and peer-learning strategies to support active learning methodologies Overall, all seven innovation factors were perceived as important by respondents, with innovation culture obtaining the highest mean score. As Figures 6 and 7 illustrate, business management students consistently reported higher mean values across most factors, particularly in active methodological support, reflecting the influence of innovation-oriented curricular structures [36-39]".

With regard to soft skills and their influence on innovative behaviour, the findings also show that the five soft skills are perceived differently by respondents. Figure 8 presents a comparison of their mean values, measured on a scale ranging from 1 to 5 [40].
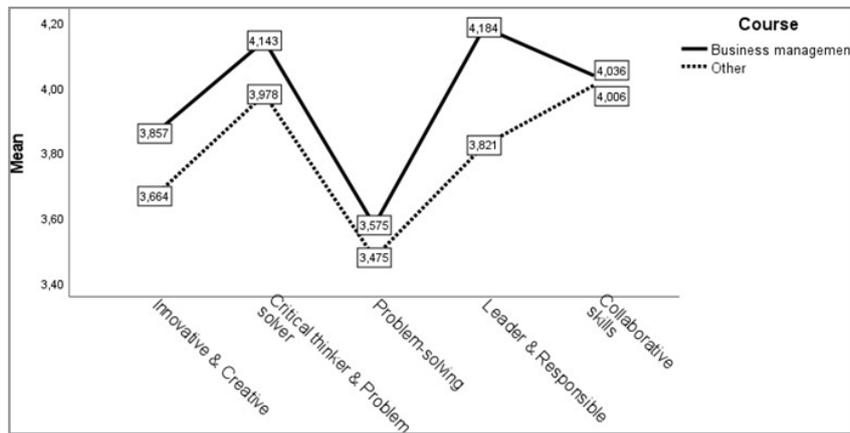
Figure 8: Soft skills averages.

Figure 9 compares the mean values obtained by business management students with those reported by students from other academic programmes. Business management students exhibited higher mean scores across all five soft skills. Statistically significant differences were observed only for the variable leader and responsible ($p = 0.007$). The application of the Bonferroni correction did not alter these conclusions [41].
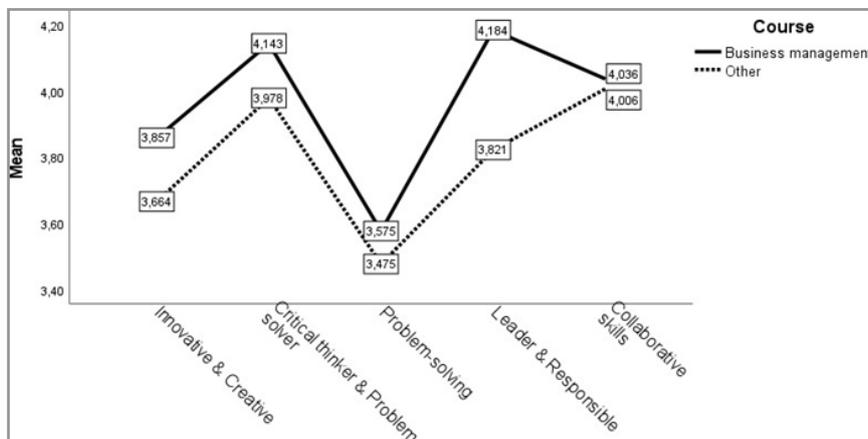

Figure 9: Soft skills averages by course.

Conclusion

In today's fast-paced and constantly evolving environment, organizations are increasingly exposed to frequent and rapid change. To remain competitive, they must demonstrate agility and effectively mobilise the resources required to achieve their strategic objectives. Among these resources, human capital represents one of the most difficult assets to imitate. Consequently, the promotion of innovation behaviour becomes a critical priority requiring sustained attention [42-47].

The findings of this study indicate that collaborative skills exert a positive influence on several key factors, including active methodological support, executive leadership, general self-efficacy, innovation culture, and knowledge sharing, both in terms of giving and asking. In addition, critical thinking and problem-solving skills were found to have a positive effect on executive leadership. Similarly, innovative and creative skills positively influence active methodological support, executive leadership, innovation culture, and learning culture. Conversely, leadership and responsibility skills demonstrate a negative relationship with executive leadership, while exerting a positive effect on general self-efficacy. Furthermore, problem-solving skills positively impact general self-efficacy, executive leadership, and knowledge sharing practices, both giving and asking [48-55].

The results further suggest that students who benefit from creative and innovation-oriented supervision, supported by innovative methodological practices, are better able to recognise the role of soft skills in fostering innovation behaviour. Encouraging innovation behaviour is therefore essential, as it contributes not only to the development of individual capabilities but also to the sustained competitiveness of organizations. Practical implications of these findings include the promotion of collaborative learning environments, the systematic development of critical thinking and problem-solving skills, the encouragement of creativity, the provision of balanced leadership training, the integration of innovation-focused education, and the expansion of research efforts to assess the applicability of these findings across different contexts and disciplines [56-58].

"These findings reinforce the role of Higher Education Institutions as key environments for the systematic development of innovative behaviour. By integrating collaborative learning, innovation-oriented methodologies, and structured leadership development, institutions can better prepare students to respond to complex organisational challenges and to act as future innovation-driven professionals."

Despite its contributions, this study presents certain limitations, particularly with regard to sample size and methodological ap-

proach. Although the methodology can be replicated, the inclusion of qualitative methods, such as interviews, could provide deeper insights into the observed results. To strengthen the findings and enhance understanding of the factors most effective for business management students, future research should further examine variables such as instructors' profiles, curricular content, and specific teaching methodologies. Moreover, it would be valuable to investigate whether similar patterns emerge across other fields of study and areas of expertise [59-61].

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