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The loyalty journey of BBA and MBA alumni in Indonesia: a strategic alumni marketing perspective

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Alumni loyalty reflects the long-term educational impact and plays a strategic marketing role in supporting institutional branding and sustainability. However, despite its importance, limited study explores the comprehensive alumni loyalty journey, particularly on how the educational experience translates into post-graduate loyalty, and how this differs across program levels such as Bachelor of Business Administration (BBA) and Master of Business Administration (MBA). This study investigates strategic alumni marketing perspective of Higher Education Service Quality (HEISQUAL), experience value, alumni satisfaction, and relationship quality in influencing loyalty. Employing Partial Least Square—Structural Equation Modeling (PLS-SEM) with Multi-Group Analysis (MGA), the study surveyed 201 alumni from a leading Indonesian business school. Results show that HEISQUAL significantly influences experience value and satisfaction but not to relationship quality. Experience value strongly affects both satisfaction and relationship quality, while only relationship quality directly drives alumni loyalty. Additionally, MBA alumni exhibit higher loyalty than BBA alumni. Although limited to a single business school, this study contributes to relationship marketing literature and emphasizing the importance of alumni as the brand advocates for business schools, especially through continuous communication strategies, such as recognizing loyal alumni through personalized appreciation programs and public acknowledgment initiatives.

KEYWORDS

experience value, HEISQUAL, Indonesian business school, alumni satisfaction, relationship quality, alumni loyalty

1 Introduction

Higher education institutions (HEIs), including business schools have encountered significant performance challenges in recent years, driven by shifting global market demands, increasing competition from emerging institutions, and a growing need to adapt to rapidly evolving educational and technological landscapes (Tamásy et al., 2024; Williams, 2021). The economic downturn and declining enrolment rates pose significant threats to the growth and long-term sustainability of business schools worldwide. For instance, business schools face a crisis due to outdated curricula failing to meet global market demands and highlighted declining MBA enrollments caused by employment challenges, high tuition fees, and criticisms of curricula relevance to industry needs (Phillips et al., 2016; Fahim et al., 2021). For so many years, business schools successfully produce high-quality alumni who are workforce-ready, entrepreneurial, and equipped with self-discipline, confidence, maturity, interpersonal, and problem-solving skills for professional success (Landrum et al., 2010; Schworm et al., 2017). Therefore, their contributions can be of considerable significance to the business school, as

they have the potential to return and generate substantial positive effects, both in terms of financial and non-financial contributions (Youseff et al., 2024; Iskhakova et al., 2017; Khukalenko and Zemtsov, 2023; Freeland et al., 2015; Pedro et al., 2020a,b; Chen, 2018).

In Indonesia, the government also prioritizes higher education internationalization to enhance graduate outcomes and boost global competitiveness (Lambey et al., 2023). Additionally, Amalia and von Korflesch (2021) argue that entrepreneurship education, a core part of business schools, is increasingly emphasized in Indonesian higher education, indicating a rising demand for business education. However, previous studies often focus on alumni from general academic programs or universities as a whole, with limited exploration of their specific roles within business schools, which possess unique characteristics such as competitive market positioning, high expectations for return on educational investment, and strong ties to industry (Pedro et al., 2020a,b; Gaier, 2005; Cownie and Gallo, 2021). This gap is particularly relevant when considering alumni loyalty in business schools, as understanding the unique contributions and engagement of business school alumni is crucial for fostering long-term relationships (Iskhakova et al., 2017; Snijders et al., 2019).

Furthermore, the concept of alumni loyalty, is typically examined only after alumni have graduated and established their careers, focusing on how they sustain themselves in the professional or entrepreneurial market (McNamee, 2021; Pedro and Andraz, 2021; Salovaara, 2022; Youseff et al., 2024). In fact, Oliver (1999) outlined the four stages of loyalty—cognitive, affective, conative, and action, beginning during students' academic journey, yet studies rarely explore its formation during this phase. This limited approach ignores the formative student journey that significantly influences alumni loyalty. Understanding the transition from student to alumni reveals how experiences during academic years shape long-term engagement (Unangst, 2020; Cownie and Gallo, 2021). This study explores the comprehensive of alumni journey, highlighting critical moments that influence loyalty within the context of business school alumni in Indonesia.

As part of the alumni journey, this study uses the Customer Relationship Marketing concept (Sarkis et al., 2024; Jain et al., 2022) that integrates HEISQUAL (Abbas, 2020; Woodall et al., 2014), along with experience value to better understand the factors influencing alumni satisfaction and relationship quality (Hennig-Thurau and Klee, 1997; Latif et al., 2022), in creating alumni loyalty (Snijders et al., 2019). Thus, this study aims to explore the pathways through which HEISQUAL and experience value shape satisfaction, relationship quality, and ultimately, ultimately strengthening long-term connections with the business school. It also considers the journey of BBA to MBA journey can strengthen the long-term alumni loyalty within an Indonesian business school.

2 Literature review and research hypotheses

As the part of Customer Relationship Marketing (CRM) Theory (Hennig-Thurau and Klee, 1997; Harridge-March and Quinton, 2009; Jain et al., 2022) and service quality in higher education (Teeroovengadam et al., 2019; Abbas, 2020; van Dat, 2020), this study emphasizes the importance of building, maintaining, and enhancing

long-term relationships between HEIs and their stakeholders (such as alumni). Therefore, the journey of alumni can be explained further.

2.1 The journey of alumni as a student

As a student, alumni discover their journey in two pivotal concepts such as HEISQUAL and experience value. HEISQUAL is a framework for evaluating service quality in HEIs, focusing on student expectations and satisfaction in the educational context (Clemons and Jance, 2024; Abbas, 2020). HEISQUAL assesses service quality in HEIs in such dimensions such as Lecturer's Profile, which assesses faculty qualifications and teaching effectiveness; curriculum, focusing on the relevance and comprehensiveness of academic offerings; Infrastructure and Facilities, evaluating the adequacy of physical resources; Management and Support Staff, examining the quality of interactions and administrative efficiency; Employment Quality, addressing the institution's role in enhancing student employability; Safety and Security, focusing on the adequacy of safety measures; and Students' Skills Development, emphasizing the importance of extracurricular activities and personal growth opportunities (Abbas, 2020).

Since this journey focuses on alumni during their student years, they evaluate HEISQUAL based on their experiences as students. Thus, HEISQUAL has the potential to enhance students' perceived experience value and improve the overall quality of the student experience, thereby generating a synergistic effect that supports institutional success (Clemons and Jance, 2024). Similarly, HEISQUAL can increase student satisfaction, which may lead to higher retention rates and positive word-of-mouth referrals, ultimately generating favorable outcomes for the business school in the future (Teeroovengadam et al., 2019; Ali et al., 2016). In further, HEISQUAL actively enhances relationship quality among students and alumni by fostering meaningful and positive experiences throughout their academic journey. This sustained connection leads to long-term loyalty and an ongoing relationship that benefits both the business school and its graduates (van Dat, 2020; Teeroovengadam et al., 2019; Mohd Yusof et al., 2022; Abbas, 2020). In short, HEISQUAL and experience value are interconnected elements in an alumni's journey as a student, each enhancing the other to improve the overall educational experience (Clemons and Jance, 2024). Good service quality directly contributes to the perceived experience value by ensuring that students encounter high-quality academic support, relevant to international business curricula, international networking, and engaging international environments (Lambey et al., 2023; Unangst, 2020). Therefore, we formulate the following hypotheses:

H1: HEISQUAL positively affects experience value.

H2: HEISQUAL positively affects alumni satisfaction.

H3: HEISQUAL positively affects relationship quality.

In addition to HEISQUAL, alumni experience their student journey through a combination of academic and non-academic activities (Clemons and Jance, 2024). These are closely related to their experience value that refers to the perceived worth derived from an individual's interaction with a service or product,

encompassing service encounters, functional (utilitarian) and emotional (hedonic) benefits (Woodall et al., 2014). Traditionally, this concept has been extensively studied in retail and hospitality sectors, where service encounter significantly influences customer satisfaction and loyalty (van Dat, 2020; Guo et al., 2024; Prebensen et al., 2016; Chen and Chen, 2010; Kusumawati and Rahayu, 2020). Hence, experience value is measured by several dimensions of service encounters, hedonic value, and utilitarian value (van Dat, 2020). Service encounters, such as student-business school interactions (e.g., management, faculty, staffs, campus' partner, industrial people, alumni, security, cleaning service, and all people related) can enhance new experience in business school (van Dat, 2020; Ng and Forbes, 2009; Prebensen et al., 2016). Whilst, hedonic aspects emphasize enjoyable such as friendship bonds during the company visit, alumni-student bonds during the mentoring session, student board activities, and other memorable learning experiences that foster emotional engagement (Chen and Vanclay, 2021; van Dat, 2020). Additionally, utilitarian value highlights the practical benefits of education, such as skill acquisition and career preparation, ensuring students perceive their education as both enjoyable and beneficial (van Dat, 2020). In turn, a positive experience fosters higher levels of satisfaction, which strengthens the relationship between the institution and its students, both during their studies and after graduation (Jonbekova, 2024; Rahardja et al., 2021; Widaryanti, et al., 2016). Therefore, the following hypotheses can be formulated as follow:

H4: Experience value positively affects alumni satisfaction

H5: Experience value positively affects relationship quality

2.2 The journey of alumni: satisfaction, relationship quality, and loyalty

The journey of alumni after graduating from business school plays a crucial role in shaping their loyalty. Factors such as satisfaction and relationship quality, integral components of CRM, are essential considerations for business schools aiming to foster long-term alumni loyalty (Zegullaj et al., 2023). The previous study establishes a direct link between student satisfaction and loyalty, indicating that higher levels of satisfaction lead to increased loyalty among students (Shahsavari and Sudzina, 2017). In other words, satisfied students are more likely to continue their studies at the same institution and recommend it to others (Kool et al., 2016; Snijders et al., 2019). Similarly, Borishade et al. (2021) indicates that satisfied students are more likely to remain enrolled at their institution and recommend it to others, which is a key indicator of loyalty in the educational sector (Borishade et al., 2021; Shahsavari and Sudzina, 2017). This loyalty is reflected in their continued use of the platform and their willingness to recommend it to others (Pham et al., 2019; Dangaiso et al., 2022; Borishade et al., 2021).

Furthermore, some previous studies profound that another CRM concept that can embrace loyalty is relationship quality (Iskhakova et al., 2016; Snijders et al., 2019; van Dat, 2020; de Rosa and de Oliveira, 2022; Wardley et al., 2024). According to Wardley et al. (2024) enhancing relationship quality in higher education leads to increased student loyalty through the establishment of trust and

support, the creation of positive experiences, and the promotion of engagement and involvement (Wardley et al., 2024). The previous studies also confirm that relationship quality can embrace the student and alumni loyalty (Iskhakova et al., 2016; de Rosa and de Oliveira, 2022). In other words, when alumni feel valued and supported, they are more likely to engage with business school, which enhances retention and establishes a foundation for future alumni loyalty. As students transition into alumni, the strong relationship quality developed during their studies fosters ongoing contributions, engagement, and advocacy—thereby reinforcing a cycle of mutual loyalty between alumni and the institution (de Rosa and de Oliveira, 2022; Snijders et al., 2020).

Based on this explanation, business schools can adopt these concepts to facilitate the transition from student to loyal alumni and validate the following hypotheses:

H6: Satisfaction positively affects alumni loyalty

H7: Relationship quality positively affects alumni satisfaction

2.3 Moderation effect of level of education

This journey highlights the diverse experiences alumni encounter. Previous studies suggest that demographic factors actively influence and moderate key relationships that contribute to alumni loyalty (Luque-Martínez et al., 2023). In business schools, the levels of education typically include BBA (Undergraduate level) and MBA (Post Graduate Level), which may differ in terms of expectations and behavior toward their HEIs (McKee and Morgan, 2024). The level of education can serve as a moderating variable in the relationship between satisfaction and loyalty. For instance, students who are pursuing higher levels of education (e.g., master's or doctoral programs) may have different expectations and experiences compared to undergraduate students. Their prior educational experiences can shape their perceptions of satisfaction with the current educational environment (Akareem and Hossain, 2016). Positive interactions and support can enhance students' satisfaction, which in turn fosters loyalty (Akareem and Hossain, 2016; Luque-Martínez et al., 2023; Baumann and Halpern, 2024). The level of education can moderate the relationship between relationship quality and loyalty through perceived value (Baumann and Halpern, 2024). Similar to that, the level of education can moderate the effect of satisfaction on loyalty by influencing expectations and experiences, while the quality of relationships within the educational environment significantly impacts students' loyalty through perceived value and satisfaction with participation (Akareem and Hossain, 2016; Luque-Martínez et al., 2023). These dynamics underscore the importance of actively fostering satisfaction, building strong relationships, and addressing the diverse needs of alumni based on their educational backgrounds. Such efforts contribute to strengthening alumni loyalty and provide support for the validation of the following hypotheses:

H8a: Level of education (BBA vs MBA) moderates the relationship between satisfaction on alumni loyalty.

H8b: Level of education (BBA vs MBA) moderates the relationship between relationship quality on alumni loyalty.

2.4 Theoretical framework

The theoretical framework on [Figure 1](#) highlights how these constructs actively interact to drive alumni loyalty in business schools.

3 Research methods

3.1 Sample and data collection

This study applies random sampling to select participants from the alumni of a prominent business school in Jakarta, Indonesia. The sampling process involves providing equal opportunities for all 300 alumni to participate in the study. Out of the total alumni, 201 respondents voluntarily complete the questionnaire, representing a significant portion of the population and ensuring diverse perspectives for the research. According to [Hair et al. \(2019\)](#), a sample size of at least 100–200 respondents is adequate for conducting PLS-SEM analysis. With 201 respondents, this study meets the recommended threshold, ensuring sufficient statistical power and reliability to analyze the relationships between variables effectively.

3.2 Description of variables (outer model analysis)

The outer model in PLS-SEM evaluates the reliability and validity of the measurement model by examining the relationships between latent constructs and their corresponding indicators ([Hair et al., 2019](#)). This study assesses the outer model through several key criteria, including indicator reliability, internal consistency reliability,

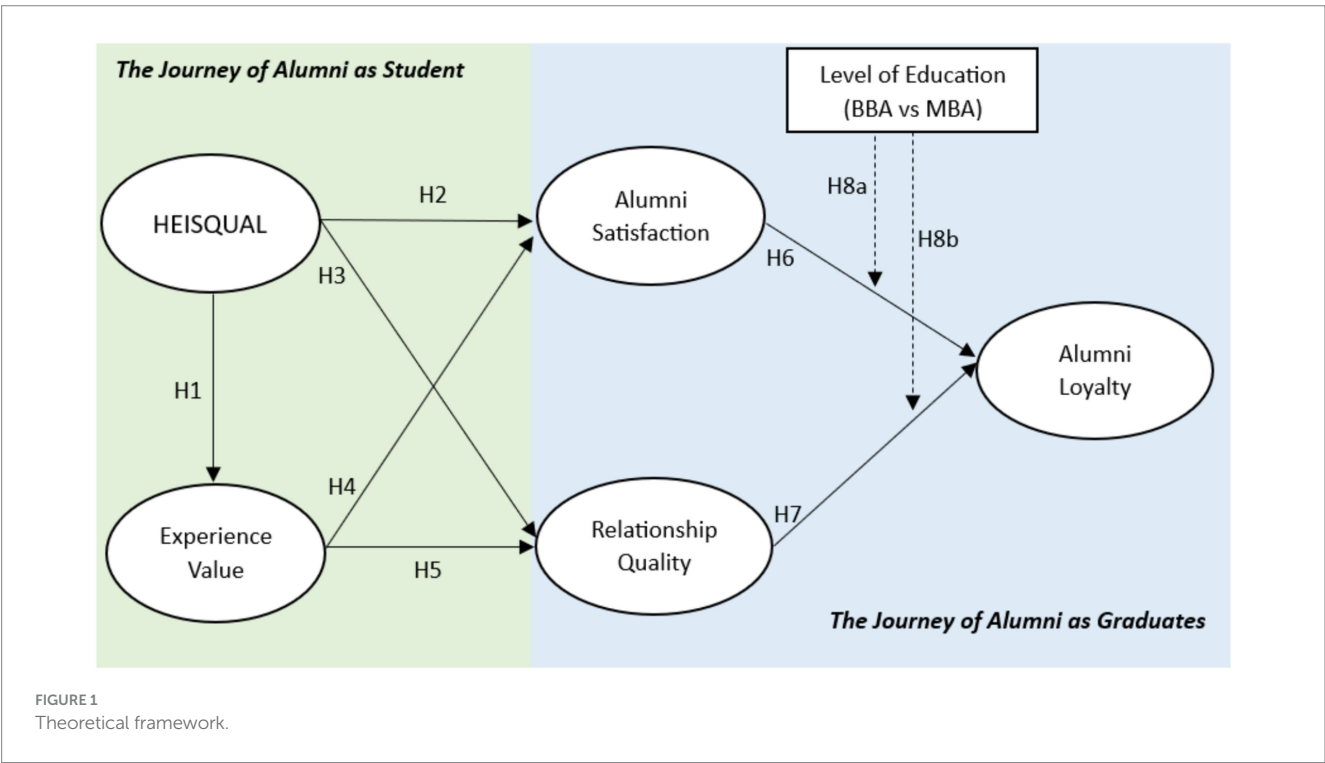
convergent validity, and discriminant validity ([Ringle et al., 2023](#); [Hair et al., 2019](#)).

3.3 PLS-SEM inner model analysis

After completing the outer model evaluation, the analysis proceeds to the inner model, which assesses the structural relationships between latent constructs ([Hair et al., 2019](#)). The inner model includes key indicators such as R^2 , Q^2 , and t-statistics. R^2 measures the proportion of variance in the dependent variables explained by the independent variables, with higher values indicating stronger explanatory power ([Ringle et al., 2023](#)). Q^2 evaluates the model's predictive relevance through the blindfolding procedure, where values greater than zero confirm the model's ability to predict data accurately. t-statistics, obtained through bootstrapping, determine the significance of the relationships between constructs, with t-values above the critical threshold (in this case, the study employs 1.96 at a 5% significance level) indicating statistically significant paths ([Ringle et al., 2023](#)). These metrics collectively validate the inner model and provide insights into the strength and relevance of the structural relationships ([Ringle et al., 2023](#); [Hair et al., 2019](#)).

3.4 Multi-group analysis (MGA)

To distinguish the journey of BBA and MBA graduates in achieving their loyalty, this study applies Multi-Group Analysis (MGA) within the context of PLS-SEM. MGA is a statistical technique that evaluates whether the relationships between constructs differ significantly across distinct groups ([Cheah et al., 2020](#)). It is



particularly useful when testing moderation effects, as it allows researchers to compare the structural model across groups defined by categorical variables, such as gender, education level, or other demographic factors. MGA typically uses non-parametric approaches, such as the PLS-MGA method or permutation tests, which do not require the assumption of normal data distribution (Matthews, 2017). A significant p -value (typically less than 0.05) in the MGA results indicates that the relationship differs significantly between the groups. By using MGA, researchers gain insights into the heterogeneity of effects across subpopulations, enabling more tailored managerial implications and strategies. Emphasize the robustness and flexibility of MGA in handling complex moderation effects in PLS-SEM (Cheah et al., 2020; Matthews, 2017). MGA involves dividing the dataset into subgroups and estimating the structural model for each group separately. The technique then assesses the differences in path coefficients across the groups to determine whether the relationships between constructs are statistically different. For example, in this study, the level of education (BBA vs. MBA) serves as a moderator, and MGA identifies whether the strength of the relationships (between satisfaction and alumni loyalty; relationship quality and alumni loyalty) varies between these groups.

4 Results and discussion

4.1 Demographic data

The survey was initially distributed to 300 alumni of a prominent business school in Jakarta, Indonesia. Hence, there are 201 participants responded by completing the questionnaire, resulting in a response rate of 67%. The socio-demographic analysis of these respondents reveals a diverse profile. The majority graduated from the MBA/EMBA program (64%), while the remaining 36% are BBA graduates. Male respondents dominate the sample (63%), with females comprising 37%. The age distribution indicates that 35% of respondents are aged 20–30 years, 17% are 31–40 years, 21% are 41–50 years, and 26% are over 51 years old. Professionally, technology (23%) and marketing/advertising (18%) are the most common fields, followed by finance and banking (15%), education (8%), and management consulting (11%). Regarding current positions, 30% hold manager or division head roles, 27% are in staff or junior-level positions, and 18% occupy director or CEO roles. Additionally, most respondents report monthly expenses of IDR 15,000,001–20,000,000 (55%), reflecting a relatively high economic standing.

4.2 Outer model results

The second order analysis include in HEISQUAL (Abbas, 2020; van Dat, 2020) and experience value (Rahardja et al., 2021; van Dat, 2020). Table 1 shows the results of the outer model and confirm the validity and reliability of all latent variables in the study analysis (both for second order analysis and first order analysis). The results also show the acceptance level of loading factor which exceeded 0.7 (Henseler et al., 2015). Therefore, Cronbach's alpha values for each variable range from 0.772 to 0.950, indicating high internal consistency, as all values exceed the commonly accepted threshold of 0.7. Similarly, composite reliability (ρ_c) values range between 0.850

and 0.955, demonstrating strong construct reliability for all variables. Furthermore, the average variance extracted (AVE) values for the latent variables surpass the threshold of 0.5, confirming that the constructs explain more than half of the variance of their respective indicators. These results validate the reliability and convergent validity of the measurement model.

Furthermore, Table 2 shows the results of overall outer model results. HEISQUAL exhibits the highest Cronbach's alpha (0.950) and composite reliability (0.955), reflecting its strong internal consistency and construct reliability. The construct of experience value and alumni loyalty, while reliable (Cronbach's alpha: 0.900 and 0.899, respectively), exhibit relatively lower AVE values (0.528 and 0.555), which are still acceptable but suggest room for potential refinement in some indicators. Variables such as Relationship Quality (AVE: 0.781), Utilitarian Value (AVE: 0.736), and Alumni Engagement (AVE: 0.759) demonstrate high levels of convergent validity, further strengthening the measurement model. Collectively, these findings ensure the robustness of the latent constructs and provide a solid foundation for structural model PLS-SEM evaluation.

4.3 Inner model results

4.3.1 R-squared and Q-square results

The R-squared (R^2) values indicate the amount of variance in the dependent latent variables explained by the independent latent variables in the model. The R^2 values range from 0 to 1, where a higher R^2 signifies that the independent variables explain a larger proportion of the variance in the dependent variables (Hair et al., 2019). Based on the Figure 2, the R-square values presented the explanatory power and model fit of the latent variables in the study. The R-square values suggest that the model explains 54.3% of the variance in alumni loyalty, 73.6% in Experience value, 42.1% in Relationship Quality, and 70.3% in Satisfaction. Experience value has the highest R-square, suggesting that it is the most strongly explained by the model, while Relationship Quality has the lowest R-square, indicating that other factors not included in the model may also contribute to its variance. Overall, the model appears to explain a significant portion of the variance in the key constructs, with alumni loyalty being moderately explained by the model.

The Q^2 values are calculated using the formula $Q^2 = 1 - (SSE / SSO)$, where SSE denotes the sum of squared errors and SSO denotes the sum of squares of the observed data. These values indicate the predictive relevance of the model for each latent variable. As shown in Table 3, the Q^2 value for alumni loyalty is 0.295, suggesting a moderate level of predictive relevance. Experience value has a higher Q^2 value of 0.382, indicating stronger predictive relevance. Relationship Quality and Satisfaction have Q^2 values of 0.313 and 0.370, respectively, both indicating moderate predictive relevance. Overall, the Q^2 values demonstrate varying levels of predictive power across the constructs, with experience value and satisfaction showing the highest predictive relevance within the model (Henseler et al., 2015; Hair et al., 2019).

4.3.2 Hypotheses results and discussion

This study tested the hypotheses using SmartPLS version 4.3.10, applying a cutoff value of 1.96 for T-statistics and a significance level of 0.05 (Hair et al., 2019). The findings examine the interconnection among HEISQUAL, experience value, satisfaction, relationship

TABLE 1 Loading factor results.

Latent variable	Observed variable	Weight	Status
HEISQUAL	Curriculum	0.749	Valid
	cr1. Intellectual abilities	0.813	Valid
	cr2. Future job prospects for students.	0.839	Valid
	cr3. International standard	0.908	Valid
	Lecturer's profile	0.684	Valid
	lp1. Qualified business knowledge.	0.850	Valid
	lp2. Lecturing in an easy-to-understand way	0.847	Valid
	lp3. Good English teaching skills	0.816	Valid
	lp4. As expected from students	0.830	Valid
	Infrastructure and facilities	0.758	Valid
	if1. Expected classroom	0.851	Valid
	if2. Library facilities at BS are adequate	0.820	Valid
	if3. The Wi-Fi facilities have high speeds.	0.835	Valid
	if4. The BS campus has cleanliness in every aspect.	0.761	Valid
	Administrative staffs	0.852	Valid
	as1. Deals with students appropriately.	0.816	Valid
	as2. Deals with students fairly.	0.883	Valid
	as3. Appreciates student feedback.	0.843	Valid
	as4. Responding quickly to student needs.	0.715	Valid
	as5. The administrative process is well structured.	0.843	Valid
	as6. Willing to solve student problems.	0.789	Valid
	Future warranty	0.774	Valid
	fw1. Holds activities that connect with the world of work.	0.863	Valid
	fw2. Having a promising career.	0.884	Valid
	fw3. BS's reputation is very good in the world of work	0.876	Valid
	fw4. BS's network with alumni is very strong for student career advancement.	0.830	Valid
	Security and protection	0.822	Valid
	sp1. Staff are professionally trained.	0.783	Valid
	sp2. Adequate number of fire extinguishers.	0.807	Valid
	sp3. Adequate number of first aid equipment.	0.871	Valid
	sp4. Feel safe to be around campus	0.816	Valid
	Skills and Competencies	0.935	Valid (Highest loading)
	sc1. Leadership orientation	0.776	Valid
	sc2. Ability to make wise decisions.	0.806	Valid
	sc3. Think logically	0.800	Valid
	sc4. Communication skills	0.797	Valid
	sc5. Improving English skills.	0.774	Valid
	sc6. Confident for students	0.812	Valid
	sc7. Responsibility for students	0.741	Valid
	sc8. Improving creativity	0.767	Valid
	sc9. Time management	0.731	Valid

(Continued)

TABLE 1 (Continued)

Latent variable	Observed variable	Weight	Status
Experience value	Service encounter	0.873	Valid
	se1. Polite service	0.793	Valid
	se2. Special uniqueness service	0.838	Valid
	se3. Friendly service.	0.843	Valid
	se4. Excellence service	0.702	Valid
	Utilitarian value	0.873	Valid
	uv1. Fair scholarship	0.807	Valid
	uv2. Best decision	0.903	Valid
	uv3. Worth it to study at	0.860	Valid
	Hedonic value	0.878	Valid (Highest loading)
	hv1. New business experience	0.897	Valid
	hv2. Pleasant experience	0.837	Valid
	hv3. Exploring new network	0.858	Valid
Satisfaction	sat1. Satisfied with the intellectual services provided by BS lecturers	0.829	Valid (Highest Loading)
	sat2. The curriculum at BS meets expectations.	0.775	Valid
	sat3. Satisfied with the facilities at BS	0.750	Valid
	sat5. Future as an BS alumnus will be more secure	0.612	Valid (Can be Acceptable)
	sat6. Satisfied with the security at BS	0.667	Valid (Can be Acceptable)
Relationship quality	rq1. Always establishes good relations with alumni through their media.	0.878	Valid
	rq2. Got recognition as a loyal alumnus.	0.930	Valid (Highest Loading)
	rq3. Valued as an alumnus.	0.840	Valid
Alumni loyalty	Positive word of mouth	0.857	Valid
	pmw1. Definitely recommend the BS campus.	0.863	Valid
	pmw2. Given positive comments about BS to my family and friends.	0.896	Valid
	pmw3. Encouraged others to study at BS.	0.729	Valid
	Alumni Engagement	0.882	Valid
	ae1. Actively participate in giving comments on BS's social media.	0.880	Valid
	ae2. Proactively attend Campus event.	0.890	Valid
	ae3. Given innovative ideas for the progress of BS in the future.	0.843	Valid
	Cross buying	0.913	Valid (Highest Loading)
	cb1. Donating to other programs offered by BS	0.776	Valid
	cb2. Participating in another program offered by BS	0.863	Valid
	cb3. Funding relatives to join the program offered by BS	0.847	Valid

BS represents the Business School.

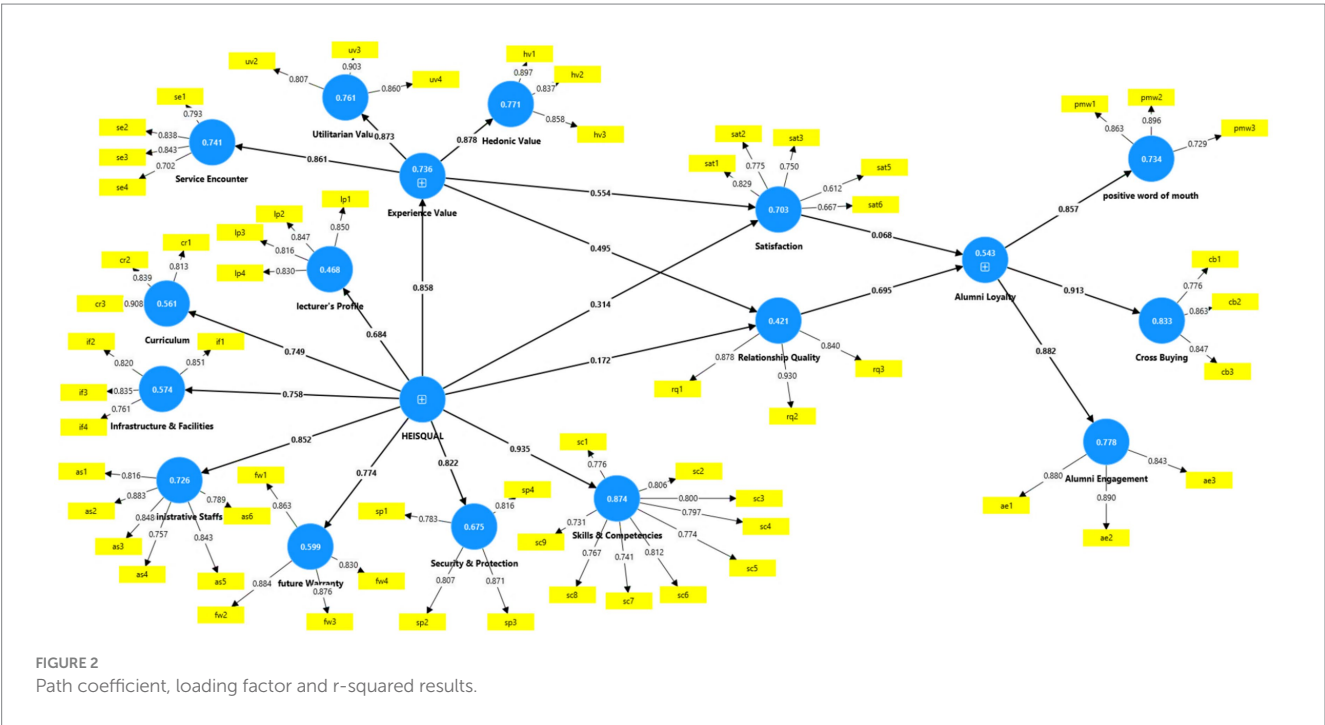
quality, and alumni loyalty, providing insights into how these constructs interact within the context of alumni engagement and loyalty (Iskhakova et al., 2017; Iskhakova et al., 2016; Snijders et al., 2019; Baumann and Halpern, 2024; Pham et al., 2019). Also, this study computes the moderation effect of level of education (BBA vs. MBA) to the relationships on alumni loyalty (Prebensen et al., 2016). The following table and figures posit the results of proposed hypotheses in this study. The results indicate that some hypotheses were rejected due to low levels of significance, offering valuable insights into the alumni journey. These findings suggest that certain factors previously assumed to be influential may play a less significant role, prompting a reevaluation of how alumni relationships and loyalty are formed. This

shift provides a new perspective on the dynamics of alumni engagement and highlights areas for further exploration.

The result of H1 was accepted, which posits that HEISQUAL positively affects experience value, is strongly supported with a path coefficient of 0.859, T-statistic of 36.664, and *p*-value of 0.000. The data clearly demonstrate that the quality of higher education services significantly enhances the value alumni derive from their experiences (Clemons and Jance, 2024). This result aligns with the perspective that well-designed curriculum, competent faculty, high-quality facilities, secure environment in campus, future guarantee, and enhancing skills for students contribute to alumni perceiving their education as valuable (Abbas, 2020). When institutions consistently deliver on

TABLE 2 Overall outer loading results.

Latent variables	Cronbach's alpha	Composite reliability (rho_c)	Average variance extracted (AVE)	Outer model results
Administrative staffs	0.905	0.927	0.678	Valid
Alumni engagement	0.841	0.904	0.759	Valid
Alumni loyalty	0.899	0.918	0.555	Valid
Cross buying	0.772	0.868	0.688	Valid
Curriculum	0.815	0.890	0.730	Valid
Experience value	0.900	0.918	0.528	Valid
HEISQUAL	0.950	0.955	0.503	Valid
Hedonic value	0.830	0.899	0.747	Valid
Infrastructure and facilities	0.834	0.889	0.668	Valid
Relationship quality	0.860	0.914	0.781	Valid
Satisfaction	0.778	0.850	0.534	Valid
Security and protection	0.837	0.891	0.673	Valid
Service encounter	0.805	0.873	0.634	Valid
Skills and competencies	0.919	0.933	0.606	Valid
Utilitarian value	0.819	0.893	0.736	Valid
Future warranty	0.886	0.921	0.745	Valid
Lecturer's profile	0.856	0.903	0.699	Valid
Positive word of mouth	0.774	0.871	0.693	Valid



quality, alumni recognize the long-term benefits of their education, leading to an elevated sense of value (Clemons and Jance, 2024; Baumann and Halpern, 2024; Chen and Chen, 2010).

Therefore, HEISQUAL is also positively affects alumni satisfaction (accepting H2) with a path coefficient of 0.305, T-statistic of 3.595, and *p*-value of 0.000. These results underscore the importance of delivering high-quality education in meeting alumni expectations (Schlesinger

et al., 2023; Gaier, 2005; Hsu et al., 2016). The findings suggest that satisfaction arises when institutions (in this case of the business school) ensure excellence in their academic offerings of enhancing skills and competencies, administrative services, and overall student experience (Dove et al., 2022). In addition, it highlights that alumni satisfaction is largely influenced by the perception of receiving value for the time and resources invested in business school (Ali et al., 2016;

TABLE 3 Predictive relevance—Q2.

Latent variables	SSO	SSE	Q ² (=1-SSE/SSO)
Alumni loyalty	1809.000	1275.280	0.295
Experience value	2010.000	1241.486	0.382
Relationship quality	603.000	414.272	0.313
Satisfaction	1005.000	632.951	0.370

Mohd Yusof et al., 2022). When students experience high service quality during their study, they are more likely to develop a strong emotional connection to the institution and fosters a positive sentiment towards the institution, which can lead to continued engagement post-graduation (Pham et al., 2019). Furthermore, the results show the higher loading factor is skills and competencies during their study as student can empower graduates to navigate their careers more effectively, enhancing their professional journey and reinforcing their positive perception of the institution long after they have completed their studies (Pham et al., 2019; Lawson, 2018).

In contrast, this study rejects the connection between HEISQUAL on relationship quality (rejecting H3) that show its path coefficient of 0.127, T-statistic of 1.051, and *p*-value of 0.147. This indicates that service quality of the business school alone does not directly strengthen alumni relationships with their alma mater. While HEISQUAL builds satisfaction (Pham et al., 2019), the data suggest that relationship quality depends on additional factors (e.g., experience value), such as the institution's efforts to engage alumni after graduation (Rahardja et al., 2021; Mo and Zhu, 2022). Alumni satisfaction and relationship with the institution may depend more on the overall experience value derived from their educational journey, including aspects like social connections, personal growth, and professional opportunities, rather than solely on perceived service quality (Attan et al., 2024; Mo and Zhu, 2022; Chen and Chen, 2010). Hence, alumni might perceive relationship quality as stemming from their direct interactions with faculty, staff, or peers, rather than the overall quality of institutional services (Ng and Forbes, 2009). Previous research supports this logic by emphasizing that alumni bonds are nurtured through continuous interaction, networking events, and personalized outreach rather than just the quality of education received (van Dat, 2020; Ng and Forbes, 2009).

Therefore, this study finds evidence that in an Indonesian business school, experience value affects most of the relationship such as satisfaction and relationship quality (accepting H4 and H5). These findings confirm the critical role of enriching and memorable experiences in shaping alumni perceptions (Ng and Forbes, 2009; van Dat, 2020; Gallarza et al., 2024). Alumni satisfaction and relationship quality in the business school are enhanced when their time at the institution is marked by engaging activities, real-world learning opportunities, and strong faculty-student interactions (Luque-Martínez et al., 2023; Gaier, 2005; Woodall et al., 2014). These experiences create lasting emotional and professional connections, reinforcing both satisfaction and loyalty over time.

Henceforth, this study surprisingly rejects the relationship between satisfaction and alumni loyalty (rejecting H6) with a path coefficient of 0.082, T-statistic of 0.997, and *p*-value of 0.159. The rejection of H6 indicates that satisfaction alone is insufficient to ensure alumni loyalty (Schlesinger et al., 2023). Loyalty requires more than

meeting expectations during the academic phase—it demands a sustained emotional connection and consistent engagement post-graduation. Previous studies have highlighted that loyalty is often driven by deeper relational bonds, trust, and shared values between alumni and their alma mater, suggesting that institutions must prioritize post-graduation interactions and ongoing involvement (Schlesinger et al., 2023; Shalihati et al., 2025). Hence, The study indicates that satisfaction alone is insufficient to create loyalty because while satisfaction can lead to positive feelings about a program, it does not necessarily translate into a deeper commitment or loyalty. This is primarily because loyalty involves a stronger emotional and behavioral attachment that goes beyond mere satisfaction with services received (Cachón-Rodríguez and Prado-Román, 2020). Thus, the need of a longitudinal study tracing student loyalty to alumni loyalty can also enhance the understanding that satisfaction and loyalty are dynamic constructs that require deeper analysis over time (Snijders et al., 2022). Also, among the indicators of alumni satisfaction (Table 1) are only implemented in a specific business school, these indicators capture important aspects of the educational experience, they may reflect short-term or transactional satisfaction rather than deeper emotional bonds. This distinction may account for the non-significant relationship between satisfaction and loyalty, the latter of which encompasses enduring behaviors such as cross-buying, sustained engagement, and positive word-of-mouth advocacy. In the case of the business school, alumni consider factors beyond just satisfaction when evaluating their overall experience. Elements such as emotional connections, continuous connection with alumni through relationship quality, and the value derived from their interactions with the institution often hold equal or greater importance than a single satisfaction point (Snijders et al., 2020). These additional dimensions shape their long-term loyalty, engagement, and willingness to maintain ties with the school (Dangaiso et al., 2022; Iskhakova et al., 2017; Lee and Anantharaman, 2015).

Therefore, this study finds to accept H7 such as relationship quality plays a significant role to influence alumni loyalty (a path coefficient of 0.679, T-statistic of 9.300, and *p*-value of 0.000). This result highlights the significant influence of emotional bonds on alumni loyalty (Agrawal et al., 2013). When alumni feel valued and connected to their alma mater, their bonds with the school enhances positive recommendation and engagement (El-Awad et al., 2024; Cownie and Gallo, 2021; Pedro et al., 2020a,b). This logic aligns with studies that emphasize the importance of fostering long-term, meaningful relationships through active communication, recognition, and collaborative opportunities between alumni and their institution (Pedro et al., 2020a,b; Jain et al., 2022). Iskhakova et al. (2016) emphasizes that a strong relationship quality between alumni and their universities is essential for fostering loyalty. Focusing on key factors such as the quality of student experiences and continuous relationships enables alumni to maintain strong connections and actively contribute to the business school. This study suggests that the school should enhance international networking, offer overseas business opportunities, and involve alumni in meaningful ways to foster long-term loyalty. By prioritizing these initiatives, the institution can strengthen alumni engagement and ensure lasting contributions.

These findings reveal that the journey of alumni from the business school extends beyond their academic experiences (as summarized on Table 4, Figures 2, 3). While high-quality education lays the foundation for satisfaction, the development of strong relationship quality

emerges as the key driver of loyalty (Iskhakova et al., 2016). This study posits that alumni loyalty depends on continuous engagement, emotional connections, and a sense of belonging fostered through tailored initiatives. Institutions that invest in maintaining strong alumni relationships will not only enhance loyalty but also create a network of advocates who contribute to the institution's long-term success.

4.3.3 Level of education as moderators on alumni loyalty

In order to comply with the BBA and MBA alumni journey at the business school, this study emphasizes the importance of testing moderation effects using Multi-Group Analysis (MGA). MGA enables researchers to compare structural models across different subgroups, in this case the level of education (BBA vs. MBA) (Matthews, 2017; Cheah et al., 2020; van Dat, 2020). The method's robustness lies in its non-parametric nature, including approaches like PLS-MGA or permutation tests, which accommodate non-normal data distributions (Matthews, 2017). The results from the study on Table 5 highlight significant differences in the influence of relationship quality on alumni loyalty across educational levels, showcasing the value of MGA in uncovering nuanced relationships within diverse populations.

The findings underline the robustness and flexibility of MGA in handling complex moderation effects in PLS-SEM. The previous study supports the insignificant moderation effect of education level on loyalty (Cachón-Rodríguez and Prado-Román, 2020). This study

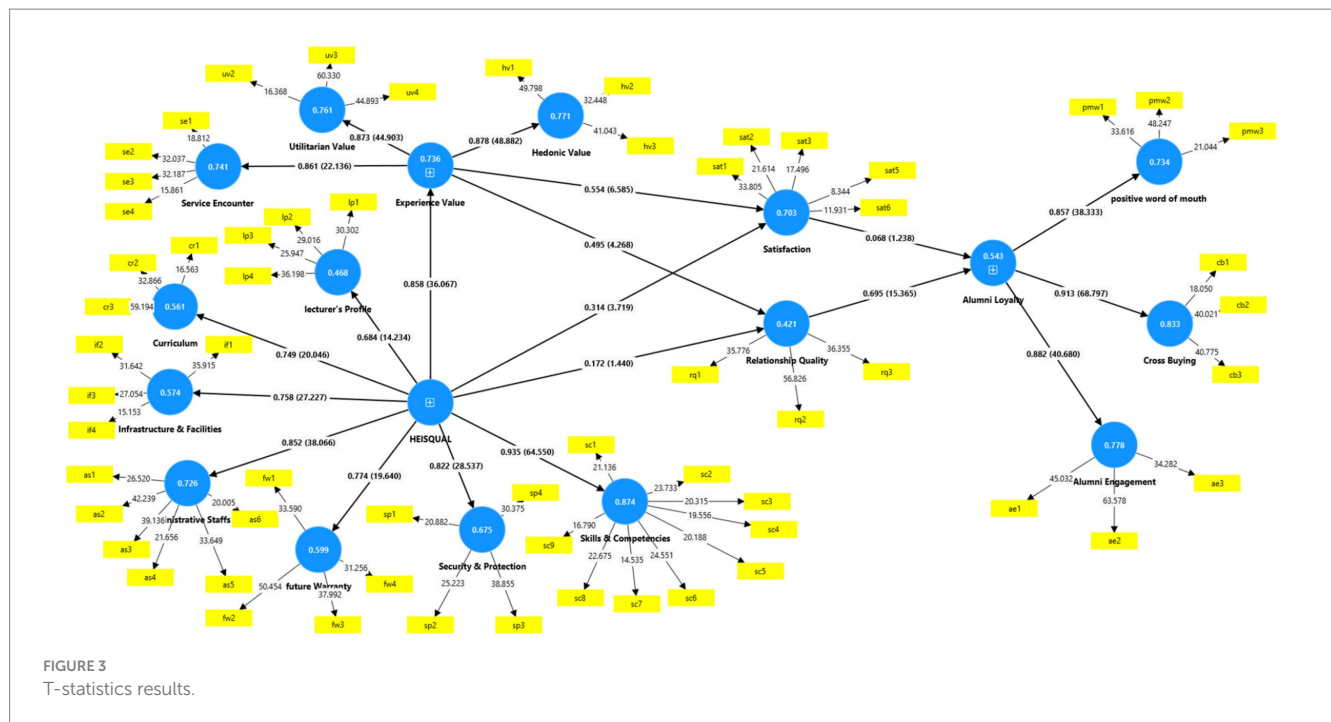
confirms the significant moderating effect of education level (BBA vs. MBA) on the interconnection between relationship quality and alumni loyalty (accepting H8b) demonstrates the heterogeneity of alumni behavior (Luque-Martínez et al., 2023; Iskhakova et al., 2016). The level of education can significantly moderate the relationship between relationship quality and alumni loyalty by influencing the nature of alumni experiences and their perceptions of value (Iskhakova et al., 2016). Alumni from graduate programs (MBA), often have more intensive and personalized interactions with faculty and staff, which can enhance their perception of relationship quality (Lee and Anantharaman, 2015). These deeper engagements may lead to a stronger sense of loyalty, as graduate alumni are likely to appreciate the mentorship and networking opportunities provided by their institutions. In contrast, undergraduate alumni may have less direct interaction, which could result in a weaker connection to the business school, thereby diminishing the impact of relationship quality on their loyalty. Moreover, MBA students can enhance their relationship quality with the business school by prioritizing key enablers such as openness, conscientiousness, and self-efficacy to improve their interpersonal skills and foster stronger connections with peers and faculty (Chatterjee and Poovathingal, 2020). This emphasizes the importance of a supportive learning environment that encourages collaboration, mentorship, and open communication, which cultivates a sense of belonging. Additionally, implementing continuous feedback mechanisms from the MBA Program allows students to voice their concerns and feel valued, ultimately creating an enriching educational experience that strengthens their ties to the institution and enhances

TABLE 4 Hypotheses results summary.

Hypothesis	Path coefficient	T-statistics	p-values	Result
H1: HEISQUAL positively affects experience value	0.859	36.664	0.000	Accepted
H2: HEISQUAL positively affects alumni satisfaction	0.305	3.595	0.000	Accepted
H3: HEISQUAL positively affects relationship quality	0.127	1.051	0.147	Rejected
H4: Experience value positively affects alumni satisfaction	0.291	2.996	0.001	Accepted
H5: Experience value positively affects relationship quality	0.432	3.414	0.000	Accepted
H6: Satisfaction positively affects alumni loyalty	0.082	0.997	0.159	Rejected
H7: Relationship quality positively affects alumni satisfaction	0.679	9.300	0.000	Accepted

TABLE 5 Moderation of education level on alumni loyalty.

Hypothesis	BBA (Bachelor's)	MBA (Master's)	Overall results
H8a: Education level moderates satisfaction on alumni loyalty	-0.021 ($t = 0.141$, $p = 0.444$)	0.162 ($t = 1.42$, $p = 0.078$)	No significant difference between BBA and MBA
H8b: Education level moderates relationship quality on alumni loyalty	0.659 ($t = 4.654$, $p = 0.000$)	0.823 ($t = 7.711$, $p = 0.000$)	The moderating effect of education level is significant on the influence of relationship quality on alumni loyalty, with MBA moderating more strongly than BBA.



their overall performance (Chatterjee and Poovathingal, 2020; McKee and Morgan, 2024).

However, this study also rejects the moderating effect of education level on the relationship between satisfaction and alumni loyalty (rejecting H8a). As part of the analysis explaining why the moderating effect of education level (BBA vs. MBA) on the relationship between satisfaction and alumni loyalty was not supported, it is important to consider the differing nature of alumni engagement across these two groups. Although MBA alumni may generally exhibit higher levels of institutional loyalty, this may not necessarily be driven by satisfaction alone. In contrast, BBA alumni may still be in earlier stages of their professional journey and less inclined to express loyalty behaviorally due to limited resources, evolving affiliations, or lack of long-term loyalty (Akareem and Hossain, 2016; Darwin, 2015). To conclude, MBA alumni in the business school exhibit a stronger influence of relationship quality on loyalty compared to their BBA alumni. This distinction underscores the need for tailored alumni loyalty strategies, as in business school levels appear to foster deeper relational ties and loyalty.

5 Conclusion, future scope and managerial implications

The findings of this study provide a comprehensive view of the student-to-alumni journey in the business school in Indonesia, highlighting the importance of key constructs such as HEISQUAL (Higher Education Institution Service Quality), experience value, relationship quality, and alumni loyalty. HEISQUAL emerges as a crucial driver of experience value and alumni satisfaction, underscoring the significance of delivering high-quality education services to ensure meaningful student experiences (Teeroovengadum et al., 2019; Abbas, 2020). However, its direct effect on relationship quality was not significant, suggesting that service quality alone may

not foster deep, enduring relationships with alumni. Instead, institutions must adopt a broader approach that integrates additional relational and emotional dimensions to strengthen alumni loyalty (Pedro et al., 2020a,b; Jain et al., 2022).

The positive influence of experience value on both alumni satisfaction and relationship quality highlights the pivotal role of enriching student experiences in shaping long-term outcomes (Rahardja et al., 2021; Mo and Zhu, 2022). Students who perceive high value in their educational journey are more likely to develop satisfaction and foster strong relationships with the business school. This finding underscores the importance of implementing experiential learning opportunities, practical exposure, and personalized support during the academic phase to enhance the perceived value of the education at the business school. The schools can ensure that students leave with a lasting impression that promotes loyalty.

Interestingly, satisfaction does not significantly influence alumni loyalty, indicating that satisfaction alone is insufficient to ensure long-term commitment from alumni (Cachón-Rodríguez and Prado-Román, 2020). This aligns with prior study suggesting that loyalty often requires a deeper connection built on trust, shared values, and meaningful relationships (Lee and Anantharaman, 2015; Iskhakova et al., 2016). In this context, relationship quality plays a critical role, as it not only strengthens alumni satisfaction but also directly drives loyalty (Dangaiso et al., 2022; Agrawal et al., 2013). The findings demonstrate that fostering strong, relational bonds with alumni can significantly enhance their willingness to maintain connections and contribute to the institution. This highlights the importance of post-graduation engagement strategies focused on relationship-building activities, such as alumni events, networking opportunities, and mentorship programs.

The study further reveals significant differences in the moderating effect of education level on the relationship between relationship quality and alumni loyalty (Retamosa et al., 2020). MBA alumni exhibit a stronger influence of relationship quality on loyalty compared

to BBA alumni. This could be attributed to the unique characteristics of MBA alumni, who are typically more experienced and professionally advanced, leading to a greater appreciation for relational aspects (Chatterjee and Poovathingal, 2020). In contrast, BBA alumni, being at the early stages of their careers, may rely less on institutional relationships and more on individual growth opportunities (Lawson, 2018; Schworm et al., 2017; Kool et al., 2016). These insights suggest that the school must tailor their alumni engagement strategies to address the distinct needs and expectations of different education levels.

In conclusion, the journey from student to alumni at the business school shaped by a combination of service quality of the business school (HEISQUAL), experience value, and relationship quality. While HEISQUAL and experience value play essential roles during the academic phase, relationship quality emerges as the cornerstone of alumni loyalty in the post-graduation phase. The school must adopt a holistic approach that prioritizes enriching experiences, fosters strong relationships, and tailors engagement strategies to different alumni groups (Akareem and Hossain, 2016). It is believed that the business school shall build a robust alumni network that actively supports and contributes to their long-term success. This study reinforces the importance of understanding the nuanced pathways to alumni loyalty, offering valuable insights for international business school aiming to strengthen their alumni relations and attain its future success.

As a future scope, this study offers valuable insights into the student-to-alumni journey, yet acknowledges limitations that may affect generalizability. First, the study relies on a single business school in an international context, which may limit the generalizability of the findings to other institutions with different educational models, geographic locations, or cultural contexts. The specific characteristics of the institution, such as its teaching methods, faculty, and industry partnerships, may influence the results and may not be representative of all business schools. Future research should consider a more diverse sample of institutions to validate these findings and explore whether the observed relationships hold across various educational settings.

Additionally, the study's cross-sectional design presents a limitation in terms of capturing the dynamic nature of the alumni journey over time (Lariviere et al., 2014; Garepasha et al., 2020). Alumni loyalty and relationship quality are likely to evolve as alumni progress through their careers and engage with the institution at different life stages. A longitudinal study would provide a more comprehensive understanding of how these variables change over time and offer deeper insights into the long-term effects of alumni engagement strategies. Moreover, self-reported data from alumni may be subject to biases, such as social desirability or retrospective biases, which could influence the accuracy of the findings. Future research should consider triangulating data sources to enhance validity and depth of analysis. This may include incorporating objective measures such as actual alumni donations or participation in institutional events.

Future research should expand the scope of the study to include a more generalizable sample of business schools, potentially incorporating cross-cultural comparisons between institutions in different countries. This means that by cultivating the differences and varying educational contexts influence the student-to-alumni journey, the study could provide a broader understanding of how factors such as experience value, satisfaction, relationship quality, and alumni loyalty differ across cultures. Cultural norms and expectations may play a significant role in shaping alumni engagement and loyalty, as

individuals from different backgrounds may prioritize different aspects of their education and alumni relationships. Comparing institutions from various geographic locations could shed light on the nuances of alumni experiences and offer valuable insights for business schools seeking to enhance their international alumni relations and engagement strategies (Youseff et al., 2024).

Additionally, future studies could benefit from incorporating variables related to marketing, such as the branding of business schools, social media presence, and the institution's reputation and image. These factors can significantly influence alumni engagement and loyalty, as a strong brand and positive public image often enhance the overall experience for students and alumni. Social media platforms, in particular, play an increasingly crucial role in maintaining connections and fostering a sense of community among alumni. This means that by exploring how these marketing elements interact with experience value, satisfaction, and relationship quality, researchers can provide deeper insights into the factors that drive long-term alumni loyalty and engagement in the context of business schools (Huyen et al., 2024; Selby et al., 2009; Maresova et al., 2020; Stukalina and Pavlyuk, 2021; Chen, 2019; Marjanović et al., 2023; Retamosa et al., 2020).

Thus, this study includes theoretical and managerial implications as the theoretical implications, this journey from student to loyal alumni provides new insights into the interplay of HEISQUAL, experience value, satisfaction and relationship quality in shaping long-term institutional outcomes. The study demonstrates that while satisfaction alone does not guarantee loyalty, the creation of meaningful and enriching experiences fosters emotional bonds that drive alumni to remain engaged with their alma mater (Darwin, 2015). This extends existing literature by underscoring the importance of hedonic components in creating a lasting impression of the institution (Attan et al., 2024). Furthermore, the findings suggest the importance of enhancing skills and competencies, other than just the academic side of the business school, in which higher expectation for students (Abbas, 2020; Chatterjee and Poovathingal, 2020). These theoretical insights provide a nuanced understanding of how institutions can strategically focus on experiential factors to enhance alumni loyalty and, in turn, secure their position in a competitive educational landscape (Chatterjee and Poovathingal, 2020; Pedro et al., 2020a, b; Pico-Saltos et al., 2023; Snijders et al., 2019; Darwin, 2015). Besides, this study also confirms that different levels of education within the demographic profile can significantly moderate the relationship with alumni loyalty. Specifically, alumni with higher levels of education may exhibit stronger loyalty due to their greater appreciation of the experiential and professional value gained from the institution, while those with lower levels of education may prioritize more immediate and tangible benefits, leading to variations in the strength of the loyalty relationship among alumni (Luque-Martinez et al., 2023; Baumann and Halpern, 2024).

Furthermore, there are some managerial implication in this study. The journey from HEISQUAL to alumni loyalty highlights the importance of prioritizing specific service dimensions that significantly shape the student experience. In this study, the top priorities within HEISQUAL are identified as skills and competencies (that needed by students and alumni of business school), followed by the quality of administrative staff, with curriculum and lecturer profile playing supportive roles. This prioritization underscores the need for business school to focus on equipping students with industry-relevant abilities that align with market demands (Chatterjee and Poovathingal,

2020). This study finds evidence that skills and competencies must take precedence, as they form the cornerstone of students' academic and professional development. Through initiatives like hands-on learning with industry, leveraging communication skills, practicing industry relation (such as internship program), consulting projects with industry, embracing entrepreneurial programs, building networking with alumni, business schools can prepare the future graduates (alumni) with the practical expertise necessary to navigate real-world challenges. These strategies emphasize future engagement and loyalty among alumni who are believed to be the brand advocacy of HEIs, including the business school (Politis et al., 2024).

The emphasis on HEISQUAL naturally leads to the creation of experience value, which serves as the bridge between service quality and alumni outcomes such as relationship quality and loyalty (Mo and Zhu, 2022). Experience value reflects the extent to which students internalize and derive satisfaction from the services provided. Business school can amplify this value by emphasizing both utilitarian and hedonic aspects of the student experience. Utilitarian value, which relates to tangible outcomes such as career advancement, job placements, and networking opportunities, is critical in helping students perceive a measurable return on their educational investment. Concurrently, hedonic value as the top priority, derived from enjoyable and immersive experiences like global study programs, student-led activities, alumni—student events, and extracurricular engagements, fosters emotional connections with the institution. Simultaneously, these dimensions of experience value contribute to a positive and lasting impression of the business school.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving humans were approved by Komisi Etik Penelitian IPB University. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

Author contributions

LN: Methodology, Data curation, Investigation, Software, Conceptualization, Validation, Writing – original draft, Formal

analysis, Writing – review & editing, Resources, Visualization, Funding acquisition, Project administration. HH: Methodology, Supervision, Conceptualization, Writing – review & editing. US: Conceptualization, Supervision, Writing – review & editing. AW: Conceptualization, Supervision, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Generative AI statement

The authors declare that Gen AI was used in the creation of this manuscript. The authors verify and take full responsibility for the use of generative AI in the preparation of this manuscript. Grammarly, a generative AI tool, was used to assist in improving grammar, refining sentence structure, and suggesting alternative phrasing in the manuscript. All outputs from the AI were carefully reviewed and edited to ensure accuracy and academic integrity. However, the intellectual content, data interpretation, and analytical insights were fully developed by the authors.

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