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Leading to an organisation's competitive advantage: antecedents and outcomes of the industry and university collaborative relationships

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Abstract: This paper aims to explore and analyse the impact of organisational factors on the outcome of the university-industry collaboration towards competitive advantages. Based on an extensive literature review and initial qualitative research, a theoretical framework is constructed with six antecedents (commitment, trust, communication, management mechanism, reputation and understanding) of the outcome and its relationship with a competitive advantage as its consequence. A structural equation model (PLS-SEM) is then

used for an empirical analysis of 240 responses to a survey of people in business involved in university-industry relationships. Findings show that four factors had a significant positive impact on the outcome of collaborative relationships, among which the management mechanism was the most important of the results in the collaboration. Additionally, the higher the outcome of university-industry collaboration, the greater the competitive advantages. The paper concludes with recommendations and directions for future research.

Keywords: competitive advantages; structural equation model; university-industry collaboration; RBV.

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1 Introduction

One of the inevitable missions in university and business development is to enhance the multilateral cooperation and joint relationship with businesses. Evaluating the collaboration between universities and industries has become a widely researched topic, attracting high interest from scholars, particularly in developing nations, including Vietnam (e.g., Hoc and Trong, 2019; Nguyen and Nguyen, 2020). In recent years, the global education sector has undergone dramatic changes due to the impact of the economic downturn and widespread pandemics (Dwivedi et al., 2020; Zancajo et al., 2022). The new generations of graduates and university researchers, specifically in Vietnam, possess unprecedented contingent adaptability and technological know-how (Venkatesh, 2020; Neuwirth et al., 2020). The harshness of social distancing has unleashed the students' desire and boldness to discover virtual opportunities (Nguyen, 2021), including the chances to work from home for large MNCs or become full-time freelancers, which takes away their potential contributions to domestic businesses (Bakalova et al., 2021). It is widely acknowledged that human resources are the nucleus and the source of brainpower for any organisation (Fulmer and Ployhart, 2014). Universities, as middlemen, supply businesses with precious manpower as well as managerial implications from academic research activities (Ramos-Vielba and Fernández-Esquinas, 2012). Bridging the relationships between universities and spot-on industries is critical to taking advantage of this contemporary precocious generation of graduates and researchers (Lam, 2007), prohibiting the burst of ongoing brain drains (Wang and Zheng, 2021), and contributing to the development of domestic organisations (Lin and Yang, 2020). As smooth transition into the labour market after graduation is students' primary concern (Saito and Pham, 2019) and organisational willingness to provide empirical insights is academic researchers' primary concern (Lind et al., 2013), the facilitating factors of university-industry linkage are imperatively necessary to be tested to examine their joint effect on organisational competitive advantage, as previously proposed in various studies (e.g., Lindelöf and Löfsten, 2004; Marinho et al., 2020).

Many recent studies have focused on how the complexity of the modern business environment necessitates the close collaboration by multi-stakeholders; however, multilateral cooperation among different stakeholders often results in internal conflicts and misunderstandings (Bertello et al., 2022). Therefore, it is critical to pay particular focus on the quality of the B2B relationships and the use of resource base to generate

values; previous research has yet to investigate this corner deeply. In Vietnam, even after the COVID-19 pandemic, the topic of university-industry linkage received limited attention. Additionally, the antecedents of the linkage have yet to thoroughly include the organisational factors. For instance, Hoc and Trong (2019) only examined the motivators and barriers to the linkage in accordance with the national innovation system. Nguyen and Nguyen (2020) included the effect of organisation factors along with three other variables on the university-industry collaborative relationship, but have yet to closely look at the underlying factors of organisations. Most importantly, no research in Vietnam has ever examined the impact of the university-industry linkage on organisational competitive advantage, apart from technology transfer and organisational innovation. Hence, the purpose of this research paper is to fill the gaps within the existing research on the management of the inter-organisational outcomes in collaborative industry-university relationships, while at the same time, presenting authors' understandings of the strategies and techniques taken to obtain competitive advantages for businesses. This paper aims to address the following questions: "what are the organisational factors that affect industry and university collaborative relationships?" and "do the outcomes of those antecedents have an impact on organisational competitive advantage?"

2 Literature review

2.1 Competitive advantages

In the highly competitive environment, universities continuously pursue new resources to maximise their competitive advantages. The study by Zawawi and Abd Wahab (2019) states that competitive advantages put a company in a favourable or simply a better position than the rest, which enables the company to leverage their full potential of the existing opportunities while making the most of other resources to ensure the sustainability and replicability of its competitive position for the future.

In this study, the authors use the strategy of the resource-based view (RBV) to explore how the organisations' competitive advantages are boosted. This approach originated from the premise that an organisation's performance is determined by its resources and capabilities.

2.2 Resource-based view

The theory of RBV covers tangible and intangible factors (Wernerfelt, 1984) which are the required inputs for operating the business, including capital, equipment, employee expertise, finance, capacity, organisational processes, knowledge, leaders' management skills, etc. These factors are controlled through the enterprise's strategic plans to improve value and overall performance. This perspective of RBV has spotlighted how a company's resources are integrated, implemented and utilised (Priem and Butler, 2001a, 2001b). Resource possession is essential, yet this is not sufficient enough to become a condition for competitive advantages. Sufficiency is determined by how the company organises to leverage its resources to create distinctive values (Ployhart, 2021; Teece et al., 1997).

When developing a strategy to create long-lasting competitive advantages, RBV evaluates and interprets the internal resources of the organisation and places a focus on

resources and competencies (Madhani, 2010). For a university to obtain a competitive advantage, it requires a full understanding of the service behaviour as well as the characteristics of the university and its stakeholders. In this paper, from a view of university service management, the authors investigate how competitive advantages are obtained via maximising the internal resources while exploiting external resources. When an organisation competes in its external business environment, its internal competencies and resources influence its strategic decisions (Bartlett and Ghoshal, 1991). The research by Hilman and Abubakar (2019) reveals that organisational strategy, structure, and talent management significantly and positively affect university performance.

International studies on this topic, such as the research by Pertuz et al. (2021), Song et al. (2022) and Philbin (2012), measured factors that influence the outcomes of university-industry collaborations. Via the research conducted in Australia, Plewa et al. (2013) confirmed the above premise by suggesting there are four factors affecting the outcome of the university-industry collaboration, including communication, trust, mutual understanding and interaction with individuals. Communication, as stated by Plewa et al. (2013), is an incredible success factor that results from a relationship between universities and industries. Besides, domestic studies such as the research by Thanh Huyen and Thi Minh Thao (2019), which measures the level of impact between industries and universities in Vietnam, reveal findings that the relationship between universities and industries is affected by four factors: the associations between the contacts of the universities and the enterprises, the exchange of information, aspects of the enterprises and the characteristics of the universities. In this research paper, the outcome of the university-industry collaboration is determined by six factors, namely the leader's commitment, trust, communication, reputation of partners, understanding and management mechanism. Bringing these factors under the lens of RBV helps determine organisational underlying resources to facilitate collaborative relationships (Philbin, 2012), since organisational resources are essential to improving organisational performance relative to their rivals, or competitive advantage (Madhani, 2010).

2.3 The relationship between the leader's commitment and the outcomes of the industry-university collaboration

Gelaidan et al. (2018) stated in leadership styles that the leader's commitment played an important role and affected employees' working engagement. Moreover, Rybnicek and Königsgruber (2019) revealed that the tighter the collaboration between two organisations is committed by the senior leaders, the faster and smoother everything goes. From findings conducted throughout the research, the authors present how the leaders' commitment impacts the outcomes of the industry-university collaboration. As a result, the following hypothesis is proposed:

H1 The commitment of organisational leaders has a positive impact on the outcome of industry-university collaboration.

2.4 The relationship between the trust and the outcomes of the industry-university collaboration

Sharma et al. (2019) states that the mutual trust affecting the performance of a joint venture. Trust is the foundation for promoting the cooperation between enterprises and

educational institutions. Imagination might also play a role in changing the quality of the industry-university collaboration. The trust of each and every stakeholder functions as a 'glue' or a 'connection booster', whereas a lack of belief negatively impacts freelance work (Rajalo and Vadi, 2017). Therefore, the authors hypothesise that:

H2 Trust has a positive impact on the outcome of an industry-university collaboration. Organisations' trust for university units has a positive impact on the outcome of an industry-university collaboration.

2.5 The relationship between communication and the outcomes of the industry-university collaboration

In order to ensure that the collaboration runs smoothly, the information-transferring process between different stakeholders must be accurate and timely on all the concerned issues. The authors define communication as the process of exchanging information, concepts or ideas between individuals from two different organisations (Borah et al., 2021; Mora-Valentin et al., 2004; Komodromos, 2020) reveal that the interface connection has an impact on the outcome of industry-university collaborative relationships. As a result, the following hypothesis is proposed:

H3 Organisations' communication with universities has a positive impact on the outcome of industry-university collaboration.

2.6 The relationship between reputation of partners and the outcomes of the industry-university collaboration

Chew et al. (2021) approved that the reputation of each party influences the success level of the industry-university collaboration. Based on the previous studies by Rybnicek and Königsgruber (2019) and Mora-Valentin et al. (2004) the authors conclude that the partners' reputation impacts the outcome of the industry-university collaborative relationship. Therefore, the subsequent hypothesis is put forward:

H4 The reputation of the partners has a positive impact on the outcome of industry-university collaboration. Organisations' perception of universities' reputation has a positive impact on the outcome of industry-university collaboration.

2.7 The relationship between understanding and the outcomes of the industry-university collaboration

The development of understanding is established through the effective communication between two parties. Understanding plays as an essential component in shaping and developing a healthy long-term collaborative relationship (Yu and Yuizono, 2021). Both parties must increase an understanding of each other's needs, the environment in which the partnership operates, as well as their trust in the partner's ability to adapt to their culture (Plewa et al., 2013). Through the results of this research, the authors acknowledge that understanding affects the outcome of the collaborative relationship between university and enterprises. Consequently, the following hypothesis is proposed:

H5 Understanding between the two parties has a positive impact on the outcome of an industry-university collaboration.

2.8 The relationship between management mechanism and the outcomes of the industry-university collaboration

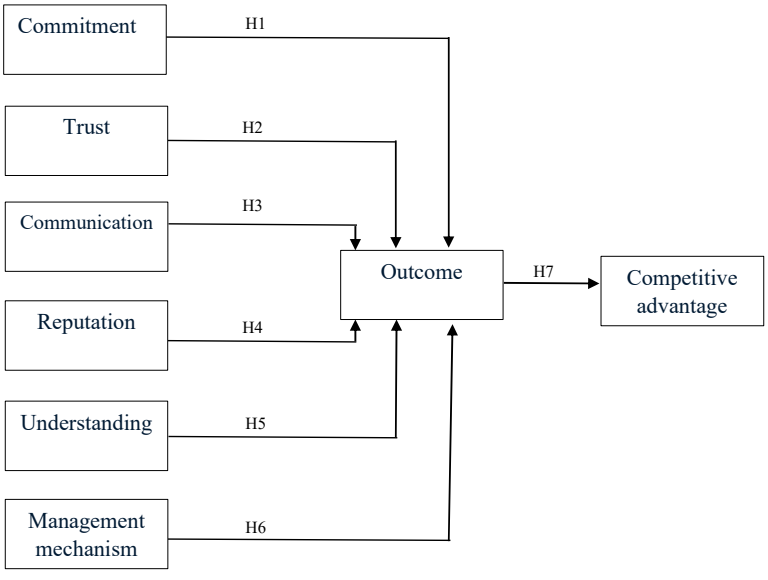
Management mechanism can be defined as a set of legal documents that clearly states the duties for which each stakeholder is in charge, and is used by both parties to ensure an effective cooperative relationship (Fernandes and O'Sullivan, 2021; Pertuz et al., 2021). This mechanism also serves as a tool to monitor the partnership's performance (Perkmann et al., 2011). As a result, the authors propose the following hypothesis:

H6 Organisational management mechanism has a positive impact on the outcome of industry-university collaboration.

2.9 The relationship between the outcomes of the industry-university collaboration and competitive advantage

The previous study shows that industry-university collaborative strategy provides university competitive advantages because it allows the deployment of rare, unique, and complex capabilities that help the universities to differentiate (Gao et al., 2021; Hart, 1995; Miles and Covin, 2000). Porter and Van der Linde (1995) state that competitive advantage is driven by performance resulting from innovations or adopting a strategic operation management model.

Figure 1 Research model



Apart from differentiation, as above-mentioned, the capabilities are also linked with cost advantages. The university's strategy of partnerships and collaborations with key stakeholders may also result in cost-driven competitive advantage (Zeithaml and Zeithaml, 1984; Leonidou et al., 2015). As such, previous literature affirms the existence of competitive advantage from the implementation of industry-universities collaborative strategic initiatives through cost reductions and innovative practices in resource

exploitation (Delmas et al., 2011; Menguc et al., 2010; Suprihono et al., 2022). Thus, we hypothesise that:

H7 The outcome of industry-university collaboration has a positive impact on the competitive advantage.

Based on the literature review in Section 2, and the results from the in-depth interviews, this research paper proposes a conceptual model as depicted below, with eight constructs and seven hypotheses included.

3 Research method

A mixed-method approach is employed to discover how an organisation's resources impact the outcome of industry-university collaborative relationships towards competitive advantage. Based on this approach, the authors design the research into two phases, based on the 'following a thread' strategy (O'Cathain et al., 2010). Using the qualitative approach, the first phase includes in-depth interviews with the purpose of identifying and reconfirming the validity of six antecedents of the industry-university linkage. Using the quantitative approach, the second phase conducts questionnaire survey to test the proposed hypotheses. The opportunities for data collection were made possible with the collaborative support of the corporate relations unit and the external relations department of the International University of VNU-HCMC (IU).

3.1 Phase 1: qualitative study

In phase 1, the qualitative method is conducted through in-depth interviews, which includes open-ended questions to explore the resources required for successful university-industry collaborations. The responses provide a thorough evaluation of the resources needed by both stakeholders to deliver better collaborations that create value for both parties successfully.

Representatives from both parties, academic and industrial, were cross-selected for the interviews. As for the university, the authors confer with ten academic faculty members from different departments at five private universities in Ho Chi Minh City; six professional service employees were selected from all relevant departments. Meanwhile, regarding the representatives from industries, 15 participants from different Vietnamese enterprises, including both technical and management employees were interviewed. All interviewees are recorded to have at least four years' experience in the industry-university collaborative relations.

Each interview lasted from 45 to 60 minutes and was conducted using in-person sessions. The semi-structured questions enable the authors to cultivate targeted, thorough and detailed information. All of the interviewees' responses were documented with an audio recording, and then later transcribed into different themes for further analysis.

Through the in-depth interview's results, the authors investigate six factors of resources that impact the outcome of industry-university collaborative relationships in the specific context of a university in Vietnam, including: the leader's commitment, trust, communication, reputation of the partners, understanding and management mechanism.

3.2 Phase 2: quantitative study

3.2.1 Sample and procedure

From March to June 2022, a survey questionnaire was developed and placed at six quarterly seminars organised by the university IU and its partner universities in Ho Chi Minh City with the attendance of enterprises. A total of 250 votes were distributed using the random sampling method to collect taking data from individuals who were involved in the collaboration between universities and enterprises in Ho Chi Minh City, which adheres to the rule of ten times in estimating sample size (Hair et al., 2011). The diversity of seminar locations and the large number of organisational representatives help reduce the response bias (Rukh and Qadeer, 2018). After screening, there were ten invalid votes, bringing the total number of votes used for research to 240 votes. Accordingly, the 96% response rate decreases the likelihood of response bias (Brick and Tourangeau, 2017). In order to examine the model, 240 qualified votes were processed and analysed using SPSS 20 and Smart PLS 3 software.

Table 1 Descriptive statistics of respondents

	Number of respondents	*Percent (%)*
Gender		
Male	138	57.5
Female	102	42.5
Income		
Over $20 million (VNĐ)	96	41.9
From 10 to less than 20 million (VNĐ)	80	32.9
From 7 to less than 10 million (VNĐ)	64	25.2
Duty		
Owner	39	15.0
Senior manager	47	19.5
Middle manager	154	65.5
Associate seniority		
Less than 1 year	84	35.0
From 1–3 years	80	33.3
From 4–6 years	30	12.7
6 years or more	46	19.0

3.2.2 Descriptions of sample

A total of 240 valid questionnaires were collected from respondents aged 25 years or older from the hospitality industry. The sample details are provided in Table 1. There were more men (57.5%) in the sample than women (42.5%). In terms of income, 41.9% of respondents had an income larger than 20 million (VND), 32.9% of respondents received an income of 10 to under 20 million; 25.2% of respondents received an income of 7 to under 10 million. As for the position, there were 39 owners (15%), 47 senior managers (19.5%), 154 middle managers (65.5%). In terms of the associate seniority, 84

respondents were working less than one year (35.0%), compared to 80 of them working 1–3 years (33.3%), 30 working 4–6 years (12.7%) and 46 working six years or more (19.0%).

3.2.3 Measurements

Quantitative methods are applied by the use of questionnaires. The measurement items are measured by a five-point Likert scale applied for all constructs and is shown in Table A1. The Likert scale ranged from 1 for 'strongly disagree' to 5 for 'strongly agree' and all constructs were measured by scales adapted from previous research which was similar to our research context.

Commitment trust was measured with three items taken from Plewa and Quester (2008): communication was measured with three items taken from Plewa et al. (2013); reputation was measured with three items taken from Mora-Valentin et al. (2004); outcome was measured with three items taken from Tseng et al. (2020); competitive advantage was measured with five items adapted from Bromiley and Rau (2016) and Chang (2011). The research on applying convenient and non-probability sampling methods includes 240 respondents in Ho Chi Minh City, Vietnam.

4 Data analysis and results

4.1 Evaluation of measurement models

The assessment of measurement models was conducted with the PLS-SEM algorithm in the SmartPLS software program, which involves examining three criteria: reliability, convergent validity and discriminant validity. As a second-generation statistical program, SmartPLS is capable of analysing complex models with smaller non-normal datasets (Ringle et al., 2015).

Confirmatory factor analysis was used to determine the scales' validity and reliability. The constructs' convergent validity and internal consistency were assessed using factor loading, average variance extracted (AVE), Cronbach's alpha and composite reliability (CR) values. All eight indicators were within the acceptable range (0.70 for Cronbach's alpha and CR; 0.50 for factor loading and AVE), as shown in Table 2 (Hair et al., 2017). Divergent validity was found by comparing the square roots of AVE for each concept to the correlational values for the other constructs (Table 2).

The Fornell-Larcker criterion is an approach to assessing discriminant validity. The indicator compares the square root of the AVE values with the latent variable correlations; specifically, the square root of each construct's AVE should be greater than its highest correlation with any other construct.

Table 3 shows the value of the square root of AVE for constructs in the research model. All AVE values are more significant than the threshold value of 0.5; specifically, the minimum value is 0.77 (on management mechanism construct), and the maximum is 0.868 (leader's commitment). The square roots of the AVEs for the constructs are higher than the correlations of these constructs with other latent variables in the path model. Therefore, discriminant validity is established.

Table 2 Outer loadings, Cronbach's alpha, CR, AVE

Construct	*Outer loadings*	*Cronbach's alpha*	*CR*	*AVE*
CK01	0.881	0.837	0.901	0.753
CK02	0.845			
CK03	0.876			
LT01	0.828	0.823	0.893	0.735
LT02	0.855			
LT03	0.889			
GT01	0.861	0.827	0.897	0.743
GT02	0.841			
GT03	0.883			
DT01	0.874	0.815	0.889	0.727
DT02	0.865			
DT03	0.818			
HB01	0.855	0.836	0.901	0.752
HB02	0.879			
HB03	0.866			
QL01	0.732	0.771	0.853	0.593
QL02	0.800			
QL03	0.771			
QL04	0.776			
KQ01	0.840	0.801	0.883	0.716
KQ02	0.857			
KQ03	0.841			
CT01	0.757	0.823	0.876	0.585
CT02	0.768			
CT03	0.770			
CT04	0.787			
CT05	0.742			

Table 3 Square root of AVE

Construct	*Square root of AVE*
Leader's commitment	0.868
Reputation of partners	0.853
Communication	0.862
Understanding	0.867
Outcome	0.846
Competitive advantage	0.765
Trust	0.857
Management mechanism	0.770

4.2 Structural model and hypotheses testing

Testing coefficients for their significance was conducted via a nonparametric bootstrap procedure. Resampling is a reasonable method for statistical testing of the research model. Bootstrapping is a technique in which bootstrap samples are drawn with replacement. It is possible to derive a bootstrap confidence interval with such a procedure. Each subsample is used to estimate the model until a large number of random subsamples – typically about 5,000 – have been created. The estimates of the coefficients form a bootstrap distribution, which can be viewed as an approximation of the sampling. By using bootstrapping, the standard error and the standard deviation of the estimated coefficients are derived from the bootstrap distribution; after this, a Student's t-test can be calculated. We can conclude that the coefficient is statistically significant at a certain significance level when an empirical t-value is larger than the critical value. Commonly used critical values for two-tailed tests are 1.65 (significance level = 10%), 1.96 (significance level = 5%) and 2.57 (significance level = 1%).

Table 4 respectively presents the results of hypothesis testing. The first column lists all seven hypotheses presented in the theoretical model. The second column presents the hypothesised relationship between the independent and dependent variables. The third column shows the path coefficient (β), showing the extent to which the independent variables are associated with the outcomes of the association between the school and the tourism business. The fourth column is the standard error of the path coefficients. The fifth and sixth columns are the results of the t-values and P-values statistics. The last column presents the decisions drawn from the hypothesis testing (whether supported or not supported).

Table 4 Results of hypotheses testing

Hypothesis	*Relationship*	*β coefficients*	*P values*	*Support*
H1	Commitment → outcome	0.039	0.634	No
H2	Trust → outcome	0.041	0.035	Yes
H3	Communication → outcome	0.191	0.013	Yes
H4	Reputation → outcome	0.22	0.026	Yes
H5	Understanding → outcome	0.040	0.56	No
H6	Management mechanism → outcome	0.224	0.032	Yes
H7	Outcome → competitive advantage	0.498	0.00	Yes

The result of assessing the significance of the path coefficients indicates that five out of seven hypothesised relationships are statistically significant (Table 4).

At a 5% significance level, the relationships hypothesised in H1, the commitment of organisational leaders has a positive impact on the outcome of industry-university collaboration) and H5 (understanding between two parties positively impacted on the outcome of industry-university collaboration) were not supported by the statistical evidence based on the t-value < 1.96.

Hypothesis H2 assumes that organisation's trust for university units has a positive impact on the outcome of the industry-university collaboration. At a significance level of 5%, the correlation coefficient (β = 0.191; t-value = 2.631 > 1.96) between an organisation's trust and the partnership's result was shown to be very strong. This research suggests that the outcome of industry-university cooperation will improve

according to the firms' trust in universities. In contrast, if there is a lack of trust between the parties, particularly on the part of the organisation, the cooperation between the university and the industry would be unsuccessful. Therefore, Hypothesis H2 is supported. To foster trust in the cooperation between companies and universities, both sides must act and speak often with integrity and mutually entrust one another with regard to collaborative projects.

Hypothesis H3 assumes that communication positively impacts the outcome of the industry-university collaboration. Results indicated that at a significance level of 5%, communication strongly correlates with the outcome of the partnership ($\beta = 0.191$; t-value = 2.473 > 1.96). This finding implies that the more effective the communication between university and enterprise goes, the better the outcome of industry-university collaboration will be. On the flip side, if the communication between two parties is poorly delivered, the partnership between the university and the enterprise will be ineffective. Thus, Hypothesis H3 is accepted. In order to enhance the effectiveness in the collaboration between industries and universities, both parties need to share and communicate frequently about related research works through seminars, conferences, etc.

Hypothesis 4 investigates the relationship between the reputation of the partners and the outcome of the industry-university collaboration. Analysis results reveal that the partners' reputation ($\beta = 0.22$; t-value = 2.224 > 1.96) has a positive relationship with the collaboration outcomes, which is statistically significant at a significance level of 0.05. When the reputation of a partner is developed, the engagement between the university and the enterprise will be strengthened. As a result, Hypothesis H4 is supported by the statistical evidence. Findings show that the partners' reputation leaves positive influence and promotes the engagement further while also strengthening coherence between the industry-university partnership. Research has shown that tightening the partnership will heavily rely on the reputation of each organisation with professional service standards, class and beneficiaries of the association.

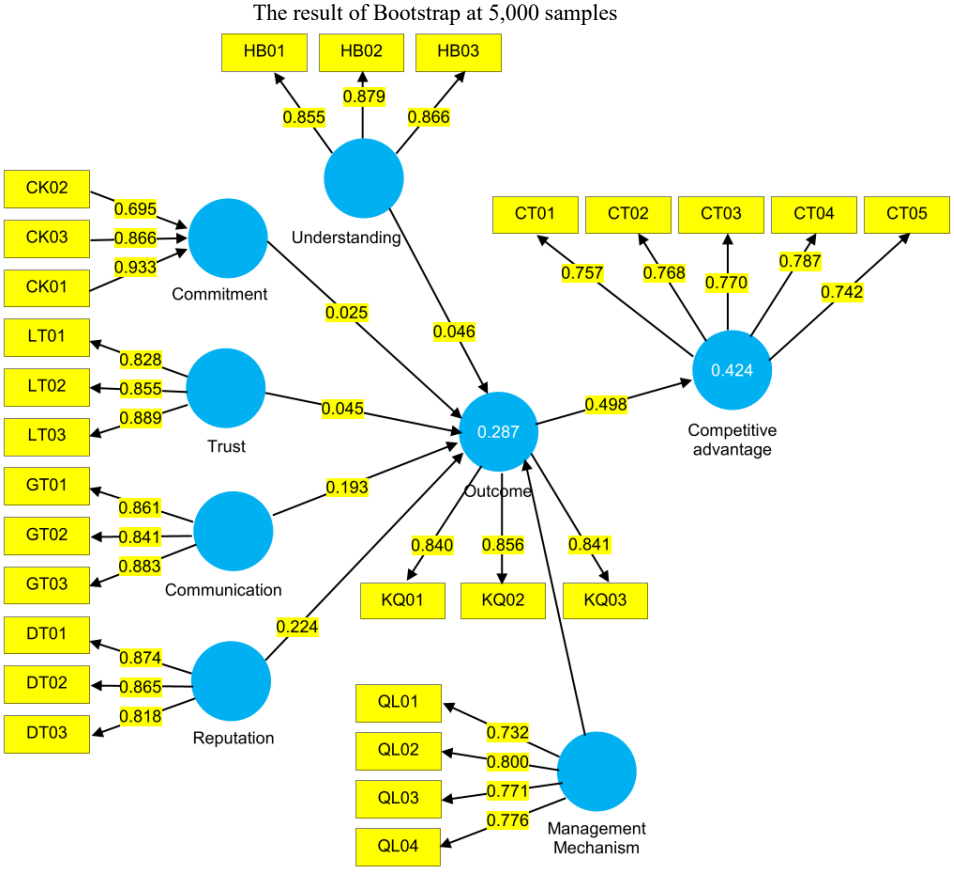
Hypothesis H6 explores the relationship between management mechanism and the outcome of the industry-university collaborative relationship. At a 5% significance level, the results of the analysis show that the management mechanism ($\beta = 0.224$; t-value = 2.142 > 1.96) had a significant influence on the outcomes of the collaboration; therefore, hypothesis H6 is supported by statistical evidence. The relationship between the university and the enterprise is reinforced when the university's management mechanism is well-managed. Management mechanisms include such components as: the organisational structure unit; personnel in charge of collaborative relationships; the content of the cooperation contract between the two parties is reflected in the rights and obligations; periodic meetings about the review and assessment of cohesion activities and directions for further activities, etc. This is the factor that has the strongest and most positive impact on the training association among the seven research factors.

Management mechanisms play an important role in forming solid partnerships between enterprises and universities. In other words, other factors will be really difficult to put into practice without receiving the consensus, the permission of senior management or the agreement about the rights and responsibilities between two parties. Typically, in the process of implementing a binding contract, when two parties cooperate to deploy issues in the cooperation content smoothly, it will leave an important step to contribute for the next decision, as well as improving the partnership between the two parties in the long run. Therefore, the assistance of the management organisation on

policies will be a driving force for the collaboration to be widely implemented and expanded.

Hypothesis H7 was supported, which implies that the stronger the level of collaboration between the university and the enterprise is, the higher the competitive advantages will be. As is mentioned in Table 4, outcomes of collaboration ($\beta = 0.498$; t-value = 6.607 > 2.58) have a significant influence on competitive advantages. The partnership between industry and the university brings such advantageous opportunities for learners, including gaining practical experience, sharpening soft skills, broadening job opportunities, etc. These relationships also lessen the gulf between theoretical and practical knowledge through the training programs with the participation of businesses, improving the reputation of the training university. As for enterprises, this collaboration improves business efficiency through reducing expenses related to training and recruiting human resources in the short- and long-term, implementing the enterprise's community service policy, increasing opportunities for employees to improve their knowledge and qualifications, etc. This increases the university's competitive advantage over the competitors in the same field.

Figure 2 The result of testing the research model (see online version for colours)



The coefficient of determination (R^2) has been used to measure the explained variance of the latent dependent variables relative to the total variance. The results indicate that the model explained 24.4% of the variance in competitive advantages. Similarly, the related antecedent constructs explained 28.7% of the variance in engagement outcomes.

Based on the analysis results (Figure 2), most of the t-values are significantly higher than 1.96; except for the constructs, commitment (t-values = 0.475) and understanding (t-values = 0.588). This result confirms that there are five out of seven latent variables which significantly affect the outcomes of the industry and university collaborative relationships and create competitive advantages for the university. By contrast, commitment and understanding did not meet the requirements for statistical significance.

5 Discussion

Previous studies have researched the collaborative relationship between universities and enterprises; however, none of them thoroughly verifies these factors across organisational boundaries. In this paper, the resources are no longer rooted within an individual university; instead, it lies in networks that encompass different types of partners, including industry, universities and government. University-Industry cooperation is therefore a crucial factor in enhancing enterprises' competitiveness. The aim of this study is to advance understanding of the benefits accrued by the University-Industry collaborative relationship. There is no empirical evidence on how a university's operation management leads to a competitive advantage. To fill this research gap, the present study proposes a model of how the resource is exploited by highlighting the relationships between the outcome of the collaboration and antecedents of its influencers on competitive advantages from the perspective of a university in the context of Vietnam. The most important factor is the relationship between management mechanisms and the outcomes of the industry-university collaboration.

This study provides both theoretical and empirical implications for UICs. Both theoretical and empirical perspectives help policymakers to understand better and to maximise the full potential of internal resources of universities as well as the partners' resources to create a competitive advantage.

5.1 Theoretical implications

The purpose of this study is to enrich the existing theory. Based on the RBV model, this paper proposes an integrated research model, leading the study to a competitive advantage versus previous studies. The RBV is used in the study to examine the unprecedented link between industry-university collaboration outcomes and competitive advantage, both of which have been previously examined in isolation under the RBV (e.g., Lindelöf and Löfsten, 2004; Madhani, 2010; Philbin, 2012). It is stated that organisations may gain from their partners' resources or pool their resources to gain a competitive edge by forming partnerships (Sanders and Wong, 2021). The study thus enriches the application of RBV for future studies relating to industry-university linkage and competitive advantage.

In addition, this study evaluates the usefulness of the RBV to the field of operations management. By analysing the essence of decision-making, the study enriches the RBV

by determining how university resources can be configured to achieve inimitable advantage and superior performance. Our findings show that collaboration, how universities can exploit interfirm resources, mediates and enhance an organisation's collaborative capability to achieve competitive advantage through the outcome of linkage between university and firms.

The RBV has long been adopted in strategic management research, but its use in operations management (OM) research is relatively new. Many empirical studies based upon RBV have investigated OM functions/capabilities and their impacts on business performance. Despite the considerable amount of research that has been conducted, there is no meta-analysis of application of RBV in the OM field. This study contributes to the literature on application RBV in OM and provides future research directions.

While earlier research investigated how the outcome of the industry-university collaboration impacts word of mouth, the authors of this paper explore how these outcomes influence universities' competitive advantages. The impact of collaboration on competitive advantage has received little attention until this research, though the antecedents of the outcomes of university-industry cooperation have been extensively discussed in the literature. In addition, this study proposed a combination of six antecedents of the outcome of industry-university collaborative relationships in a single framework, which facilitates future research paths relating to this linkage. Given the 'uncultivated soils' in the field of industry-university collaborative relationships studies in Vietnam, this study aims to be one of the first to call upon its importance and appeal.

This study also conducted detailed, in-depth interviews with experts to expand the understanding of the resources necessary for long-term, fruitful university-industry relationships. It is challenging to provide assurance of success because of how intricate the collaborative process is (Awasthy et al., 2020). The proposed collaboration framework is anticipated to increase the efficacy of cooperation since it takes a comprehensive view of collaboration and places more emphasis on the factors that encourage and allow successful collaboration than on procedures alone. As a result, this study was able to illustrate the diversity of factors involved in producing outcomes in these partnerships.

With a humble effort, the results are expected to somehow erase Filippetti and Savona's (2017) concern that previous studies have neglected to address the individual factors that influence the level of cooperation between university researchers and those working for other organisations in relevant industries. Specifically, it is demonstrated that communication and trust are crucial components of university-industry partnerships.

5.2 Practical implications

Through this research paper, the findings propose empirical implications for different stakeholders, including state management agencies, university and enterprises.

5.2.1 For state management agencies

The research results show the factors that positively affect the outcomes of the industry and university collaborative relationships. In particular, the factor of the management mechanism has the strongest impact and has brought high efficiency to the collaboration outcome. This study thereby shows that collaboration originates from the managers' point of view in enterprises, so state management agencies or departments and sectors need to

issue policies on training cooperation, provide specific guiding circulars and develop preferential policies for enterprises when engaging with the university.

In the relationship with enterprises in training institutions, the State needs to specify regulations, rights, obligations and interests of each party clearly in documents, while at the same time, setting down a policy to consider and support enterprises participating in training activities such as loan incentives, tax incentives and other preferential policies for sustainable development. This is consistent with research by Simon and Marques (2021).

5.2.2 For university

A university is an intermediary between enterprises and learners; it also has a very important responsibility for the society in training rather than just being used as a place to store, create and transmit knowledge through teaching and scientific research. To accomplish this mission, the university needs to open its doors and cooperate with outside enterprises to transfer knowledge into useful products for the community. This is consistent with research by Guerrero et al. (2019). The approach to the real environment during the study is very important in order to help students limit the difficulties when starting work.

Faced with the challenge of a competitive environment and requirements to improve the quality of training and scientific research, the university needs to have close coordination with enterprises throughout the training process to create favourable conditions for learners. The programs of interns will assist them to pre-experience real-life situations in order for them to minimise the problem of training that has not met the needs of enterprises and has not been close to the reality of work. The next important thing is that, through cooperation, the university organises for teachers to practice at enterprises and invites technical ministries and experts from enterprises to teach and participate in professional councils of the university. Therefore, linking with enterprises and creating close links with enterprises is one of the optimal and highly practicable options to benefit the university in solving difficulties and requirements. Universities need to have mechanisms and policies for consolidating key departments to cooperate with enterprises to search and select partners, measure capability and assess the level of association suitable for the enterprises. They are also exploiting and processing information to grasp the human resource needs of the enterprise quickly.

5.2.3 For enterprises

In this era of globalisation, every enterprise that wants to survive and develop needs to create new products with high-knowledge content and breakthroughs in customer experience research. Enterprises start by implementing measures to order, sponsor and cooperate with universities to improve the quality of human resources by recruiting high-quality students or directly participating in the training process, as well as jointly developing training programs, program learning objectives, learning outcomes, participating in teaching, creating conditions for students to practice, learning-by-doing business, support in skills, to improve professional quality and seek talent training. Enterprises gradually become more aware of their role in the new context, both for economic profit and also for 'social responsibility', so they should connect with the

university through funding, grant scholarships and creating opportunities for interns are practical measures to demonstrate corporate social responsibility.

Enterprises also need to setup a department in charge of connecting and cooperating with educational and training institutions so that they can proactively provide information on labour needs; coordinate with the university in developing training programs; opening new industries; compiling curricula; content and teaching methods; guiding graduation internships at enterprises, etc. in order to improve the quality of training, and help the training program to meet the needs of enterprises and society.

Enterprises need to send qualified experts directly to teach or guide practice at universities while, simultaneously, creating favourable conditions to receive teachers and administrators from universities to enterprises to learn and share experiences. On the other hand, enterprises need to have mechanisms and policies to encourage high-quality lecturers to participate in sharing and internal training for businesses.

6 Conclusions

This research paper shows how a strategy of RBV can be used as a framework for considering how an industry-university collaboration can be successfully developed and managed. The outcomes of the collaborative relationship between a university and an enterprise reveals the factors that positively influence the competitive advantages of the university, specifically in regard to human resource training which help the university to strengthen its development strategies, turning the university into one of the national training institutions for high-quality human resources. In this paper, the authors put forward appropriate solutions in order for a university to turn into a prestigious human resource training institution, nationally as well as globally, in general.

Based on the actual outcomes of the industry-university collaboration, solutions should be highlighted to improve the supported factors, while special attention should be targeted to the unsupported factors, namely understanding and leader's commitment.

The partnership between industry and university in terms of expertise will generate positive advantages for professional associations, businesses, clubs, etc. to share, learn and exchange experiences. In the long run, both parties need to replicate effective collaborative models to enhance the human resources quality for industries, as a methodical user of training products.

7 Limitations and avenues for future research

This paper recognises that this research has several limitations needed on which more attention should be paid:

Firstly, this study takes into account the research data primarily from five private universities in Ho Chi Minh City; consequently, this prevents the present research from exploring the existing issues further on a wider research scope. Thus, future studies need to expand the study scope via broadening their research subjects, instead of putting all focus on the research topics through the perspectives of universities only.

Secondly, this paper was conducted in the context of Vietnam, which is a developing country with an emerging economy; as a result, this hinders the study to dive further into the generalisability of the global context. Therefore, future studies should broaden their

research scope to investigate this topic from the angles of other countries, specifically in the context of developed nations.

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Appendix

Table A1 Measurement scales and items

Constructs		*Original scales*	*Source*
Leadership commitment	CK01	We have a strong sense of loyalty towards research group/business unit	Plewa and Quester (2008)
	CK02	We are quite willing to make long-term (>=5 years) investment in our relationship to this research group/business unit	
	CK03	The relationship with this research group/business unit deserves our business unit's/research group's effort to maintain	
Trust	LT1	We feel that we can trust this research group/business unit completely	Plewa and Quester (2008)
	LT2	This research group/business unit can be counted on to act with integrity	
	LT3	We feel this research group/business unit has been on our side	
Communication	GT01	We had great dialogues	Plewa et al. (2013)
	GT02	We had great professional exchange	
	GT03	There was a lot of two-way communication between the partner and us	
Partner's reputation	DT01	My partner is a very prestigious firm/research organisation	Mora-Valentin et al. (2004)
	DT02	My partner is good in the specialised subject of the project	
	DT03	My partner's team is made up of prestigious researchers and specialists	
Outcome	KQ01	We were satisfied in general with the project	Plewa et al. (2013)
	KQ02	Project results covered the initial expectations	
	KQ03	The project results provided balanced results for partners	
Understanding	HB01	We understood the partner's needs	Plewa et al. (2013)
	HB02	We understood the environment in which the partner operates	
	HB03	The partner could count on our ability to adapt to their culture	
Management mechanism	QL01	The number of employee in charge with UIC affairs in the university	Tseng et al. (2020)
	QL02	The number of staff whose business is to establish links between universities and industries	

Table A1 Measurement scales and items (continued)

Constructs		*Original scales*	*Source*
Management mechanism	QL03	The content of the cooperation contract of the two parties expresses the interests and obligations of each party (school and enterprise)	Group discussions with experts
	QL04	Each year, the school holds regular meetings to review and evaluate the past year's activities and the school and business activities plan for the coming year	Group discussions with experts
Competitive advantage	CT01	Firms show a wide variation in performance within an industry	Bromiley and Rau (2016)
	CT02	The output quality of students is better than other schools	Group discussions with experts
	CT03	The competitors are difficult to take the place of the school's the competitive advantage	Chang (2011)
	CT04	The company is more capable of R&D than the others	
	CT05	The corporate image of the company is better than that of the competitors	