

Strengthening the Industrial University Collaboration with Relational Model Theory

Norfadzilah Abdul Razak*, Wan Edura Wan Rashid

Faculty Business and Management, Universiti Teknologi MARA, Puncak Alam, Selangor
Institute of Business Excellence, Universiti Teknologi MARA, Puncak Alam, Selangor

* Corresponding Author's Email: norfadzilah0438@gmail.com

Abstract

Academic-industry collaboration is considered a crucial component of the effective innovation ecosystem. Through such collaborations, the experiences of industrialized countries can be assessed to better understand the many types of university-industry collaboration (UIC), incentives to form such partnerships, impediments to collaboration, and the role of public policy in supporting such ties. Since developing countries face obstacles in such coalitions, a unique approach to promoting UIC is pivotal. In the Malaysian context, the policies and guidelines in place could assist academia in developing stronger links with industries and vice versa in conducive areas to establish and maintain an industrial partnership. Hence, a strong partnership and collaboration between industry and academia may lead to a more significant contribution to innovation and the development of inventive human capital. This study examines the four dimensions of communal sharing, authority ranking, equality matching, and the Relational Model Theory (RMT) market pricing. The survey involved 100 industry and academia respondents with extensive collaboration experience. Based on the structural equation model analysis using Partial Least Square, a favourable association between the predictors of RMT and the collaboration revealed. The findings implied that the practices associated with the dimensions of RMT might facilitate collaborations between industry and academia. This study is expected to offer a new strategy for the industry and academia to strengthen their collaboration to ensure success.

Keywords: Industry-University Collaboration, Relational Model Theory, Innovation, Industrial

Introduction

The most well-documented benefit of university-industry collaboration (UIC) on innovation includes income streams through new or enhanced products or the possibility of leveraging innovations (Hewitt-Dundas et al., 2019). Despite the potential benefits for businesses, the collaboration between universities and businesses is not always seamless and successful. Apart from universities perceived as excessively formal, the success of collaborations can also be costly (Ostergaard & Drejer, 2020). Meanwhile, inadequate absorptive capacity in companies (Rajalo & Vadi, 2017) may also obstruct collaboration. Such impediments could prevent collaborations or make it difficult to continue if expectations are not realized. However, according to a recent study (Hewitt-Dundas et al., 2019), the learning effects could increase the possibility of businesses collaborating with universities. Yet, little is known about businesses' characteristics, particularly during their interactions with universities in making clear strategic choices.

Additionally, it is unknown whether a firm's decision to collaborate with a university on a long-term basis represents the university industry as a whole or of a particular university. Since collaborations usually occur due to human relationships within cooperating institutions, it is natural to assume that industry players prefer to collaborate with the same university partner.

The UIC is crucial to Malaysia's transformation into a knowledge- and innovation-based economy. Therefore, universities and industries are expected to collaborate, design, and implement effective curricula through partnerships that include apprenticeships, hands-on training, realistic simulations, and specialized employer training programs as part of the Malaysian Education Blueprint 2015-2025 (Higher Education). Most academicians and business executives concur that numerous benefits exist, including enhanced teaching and learning, increased student knowledge and employability, and new revenue streams for academic institutions. In Malaysia, a majority of the universities are in an organized collaboration with industries in terms of curriculum development, teaching and learning, research and development, consultancy, and placement of students in appropriate industrial settings.

On the other hand, the Global Innovation Index (GII) assigns value to an economy's capacity to innovate. The GII collects about 80 indicators categorising innovation into inputs and outcomes. Moreover, the GII rankings are compared annually based on data availability and changes to the GII model framework. According to GII 2020, Malaysia statistically ranked between 32 and 35. It was the most significant accomplishment in the past five years (Landau, 2020). Generally, universities provide a platform for industries and governments to collaborate and share expertise and technology. The partnership establish through legal agreements like memorandums of understanding, memorandums of agreement, and other documents. Despite such efforts, a majority of programs were unsuccessful. Researchers in local universities conduct studies and have their findings published to establish a local and global reputation. However, without proper collaboration, their products are usually shelved in their offices (Mustapa, 2019). Hence, they should commercialize their products to gain market visibility. Collaborating with strangers may cause suppliers and users on peer-to-peer sharing platforms to be significantly more cautious when sharing. They would be if the other party were a firm, as they feel significantly more exposed to being used by the other party (Schor & Fitzmaurice, 2015). Therefore, this study employs the basics of Relational Model Theory (RMT) to determine the efficacy of community sharing, authority ranking, market pricing, and equality matching in fostering UIC. The resulting model was used to aid in comprehending, motivating, and evaluating social ties and institutions. The simplest models are intuitively commonsensical and straightforward. According to RMT, humans are fundamentally social beings who shape and understand social connections through relational models. The application of these concepts is valuable on an inherent level. RMT also classified social interactions into four fundamental categories, namely community sharing, authority ranking, equality matching, and market pricing.

Literature Review

According to the theory, the relationship by communal sharing refers to the existence of a limited group whose members are similar. In a social environment, individual identities are irrelevant (Fiske, 1991). Due to this shared identity, the generosity within communal sharing is not typically considered altruism, although behaviours resembling strong altruism are frequently detected. Moreover, the members in a communal sharing relationship often have something in common, such as blood, great desire, national connection, a history of pain, or a love of food (Fiske, 1992).

A hierarchy in which individuals or organizations ranked according to their relative superiority or inferiority referred to as an authority ranking relationship. Those in positions of authority enjoy prestige and perks compared to those in lower positions. Individuals holding top ranks often wield considerable influence over those of lower ranks. Similarly, superiors hold protective and pastoral responsibilities over their subordinates.

Equality matching seeks to develop and maintain an equitable balance among individuals or groups and in one-to-one correspondence. In short, when the balance is not optimal, individuals attempt to quantify the degree of imbalance to determine the number of adjustments required (Fiske, 2002). In other words, equivalent matching is similar to using a pan balance where individuals understand how to equate mixed actions to the weight of any given object.

On the other hand, market pricing is a technique of relating social interactions to ratios. Profit maximization or loss minimization is also included in equality matching. For instance, it may also imply arriving at an intuitively equitable proportion when a court chooses a proper sentence for a crime. Market pricing simplifies all socially significant features of a relationship to a single unit of value, such as money or pleasure (Fiske, 2004). Hence, this study applied the fundamental of RMT to examine the collaboration between the industry and university. Therefore, the following hypotheses drafted:

Hypothesis 1: Authority ranking positively and significantly influences the UIC.

Hypothesis 2: Communal sharing positively and significantly influences the UIC.

Hypothesis 3: Equality matching positively and significantly influences the UIC.

Hypothesis 4: Market pricing positively and significantly influences the UIC. It's the foremost preliminary step for proceeding with any research. While doing this, go through a complete thought process of your Journal subject and research for its viability by the following means:

Methodology

A quantitative survey conducted to determine the significance of the four dimensions of RMT on UIC (communal sharing, authority ranking, market pricing, and equality matching). Purposive sampling utilized to select 100 respondents from industry and academia with extensive experience in collaboration. In PLS-SEM, the 10-times rule method is the most common calculation for estimating the required minimum size of the sample (Hair et al., 2011). A structural equation model using the Partial Least Squares (PLS) algorithm demonstrated a positive relationship between RMT predictors and collaboration. PLS uses two methods to assess, namely the measurement and structural model. This study used the convergent measurement model to examine the loading variables, composite reliability (CR), and Average Variance Extracted (AVE). According to Chin (2010), standardized loadings greater than 0.70 is a desirable value for any study. Meanwhile, composite reliability greater than 0.70 but less than 0.95 ensures the reliability of the internal consistency (Hair, Hult, Ringle & Sarstedt, 2017).

The following analysis used the AVE to determine whether the constructs met the appropriate criteria. AVE values of more than 0.50 indicate that the model explains at least 50% of the variance in its elements (Chin, 1998). Once the convergence is validated, the discriminant validity was determined using the Fornell Lacker approach. According to Table 2, the validity of the measurement model exceeded the recommended values, indicating that the convergence validity of the model was excellent. Next, the data further assessed to ascertain the structural model where all constructs were tested for their R Square (R^2) values. R^2 values of 0.25, 0.50, and 0.75 categorized as weak, moderate, and strong, respectively (Hair, Ringle & Sarstedt, 2011). Finally, the path coefficient and t-statistic were also estimated to test the hypotheses using a 500-resample bootstrapping technique.

Results and discussion

In the study, 48% were from the industry, and 52% were from the university where the sample of this study. Of the total, 46.4% were male, and 53.6% were female. Based on the analysis, 56.4% of respondents have long-term partnerships with industries and universities, while 43.6% hold short-term partnerships. The factor loadings of the 22 items in Table 1 for authority ranking,

communal sharing, equality matching, market pricing, and collaboration were greater than 0.5, demonstrating that all the items were relevant to each construct. The acceptance composite reliability in PLS must be greater than 0.5 indicates that the reliability of the items and construct are acceptable. The result in Table 1 shows the result of composite reliability for authority ranking (CR = 0.749), communal sharing (CR = 0.814), equality matching (CR = 0.835), market pricing (CR = 0.801), and collaboration (CR = 0.781) was greater than 0.7, indicating that the constructs were highly reliable to represent the samples of this study. Meanwhile, the AVE for authority ranking (AVE = 0.610), communal sharing (AVE = 0.526), equality matching (CR = 0.562), market pricing (CR = 0.575), and collaboration (CR = 0.554) was greater than 0.5 indicating that the constructs represent an average of at least 50% of the item variances.

On the other hand, Table 2 shows the discriminant validity evaluated by comparing the items in cross-loading with the Fornell and Lacker criterion. The traditional Fornell and Lacker criterion assessment used to calculate the cross-loadings between other constructs (Fornell & Larcker, 1981). The assumption underlying discriminant validity, if the single loading of the indicator is more significant for their latent variable than for the other latent variable in the model, the result interpreted in the model is well-differentiated concerning the other constructs. As shown in Figure 1, the factor loading of the items of the assigned constructs must be higher than the factor loading score of the different constructs while maintaining the threshold value of 0.60 or above (Hair, Black, Babin & Anderson, 2010).

Table 1: Convergent Validity

Variables	Cronbach's Alpha	Rho A	Composite Reliability	AVE
Authority Ranking	0.416	0.598	0.749	0.61
Collaboration	0.603	0.723	0.781	0.554
Communal Sharing	0.693	0.719	0.814	0.526
Equality Matching	0.757	0.812	0.835	0.562
Market Pricing	0.628	0.642	0.801	0.575

Table 2: Discriminant Validity

Variables	1	2	3	4	5
Authority Ranking	0.781				
Collaboration	0.423	0.744			
Communal Sharing	0.290	0.509	0.725		
Equality Matching	0.269	0.402	0.540	0.750	
Market Pricing	0.536	0.421	0.420	0.561	0.758

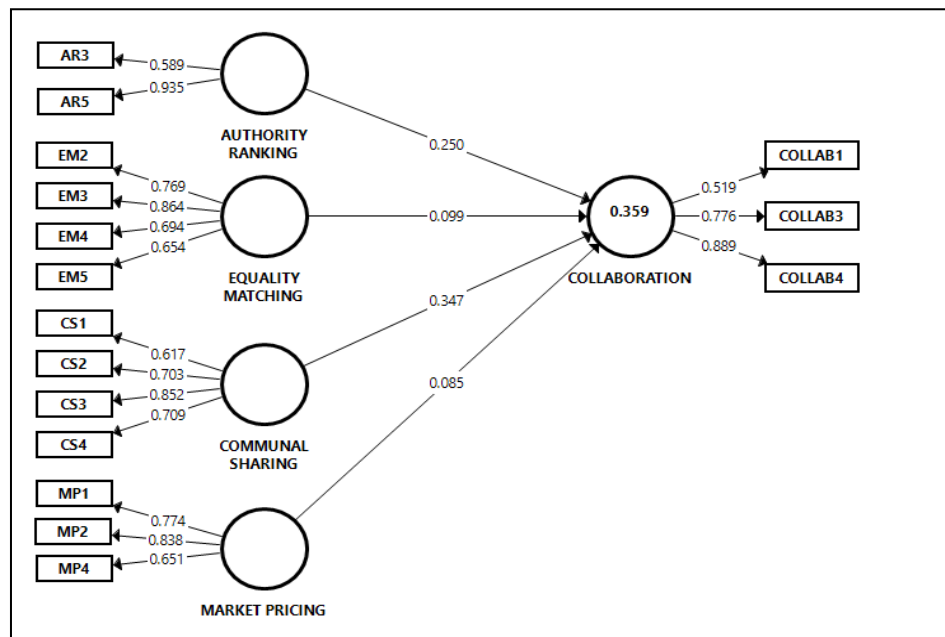


Figure 1: Measurement Model

Path coefficients for the structural model should be greater than or equal to 0.2 to be considered significant (Jones & Smith, 2013). The coefficient of determination R^2 is defined as an in-sample predictive power (Rigdon, 2012) and illustrates the explained variance for each endogenous construct of the exogenous construct. According to Hair et al. (2011), the values of R^2 , namely 0.75, 0.5, and 0.25, are denoted as substantial, moderate, and weak, respectively. Table 3 presents the path coefficient of the RMT dimensions and collaboration. Based on the analysis, the beta values of authority ranking ($\beta = 0.250$), communal sharing ($\beta = 0.347$), equality matching ($\beta = 0.099$), and market pricing ($\beta = 0.085$) were greater than 0.2. Hence, the path coefficients were significant. The R^2 value of 0.302 explained that the collaboration caused 30.2% variance, whereas 69.8% was due to other factors. After bootstrapping, the T-values of authority ranking (T-values = 4.275, $p < 0.05$) and communal sharing (T-values = 3.520, $p < 0.05$) were denoted as significant collaboration. Contrarily, equality matching (T-values = 0.924, $p > 0.05$) and market pricing (T-values = 0.609, $p > 0.05$) demonstrated no significant influence towards collaboration. Thus, hypothesis 1 and hypothesis 2 were supported, while support hypotheses 3 and 4 not supported.

Table 3: Structural Analysis

Path Coefficient	Beta Value	SE Value	T-Values	P Values	LL	UL	Result
Authority Ranking -> Collaboration	0.274	0.064	4.275	< 0.05	-0.07	0.627	H1: Supported
Communal Sharing -> Collaboration	0.387	0.110	3.520	< 0.05	-0.119	0.723	H2: Supported
Equality Matching -> Collaboration	0.078	0.084	0.924	> 0.05	-0.325	0.418	H3: Not Supported
Market Pricing -> Collaboration	0.068	0.111	0.609	> 0.05	-0.372	0.439	H4: Not Supported

The UIC deemed essential for the industries to boost creativity and innovation. Hence, most industries aim to nurture long-term collaborations to sustain and maintain relevance in a highly competitive market. Similarly, Stofberga et al. (2021) also revealed that communal sharing positively affected the behavioural outcomes of providers and users, reflected in a

heightened sense of responsibility towards the other sharing participant and their willingness to continue sharing in any collaboration. While Bridoux and Stoelhorst's (2016) claimed that communal sharing positively influenced sharing citizenship behaviour, equality matching and market pricing demonstrated contradicting findings. According to Stofberg Bridoux, Ciulli, Pisani, Kolk, & Vock (2021), a higher market pricing framing can negatively affect the willingness to continue participating, but not the two aspects of sharing citizenship behaviour. Consequently, the more individuals view their interactions with other participants as communal sharing, the more likely they will engage with little consideration for the personal costs associated with meeting the demands of other participants. Fiske's relational models have illustrated the other forms of prosocial behaviour in management, such as assisting coworkers' knowledge sharing (Boer et al., 2011) and cooperation among stakeholders (Bridoux & Stoelhorst, 2016).

Furthermore, individuals who seek non-monetary value from their participation on collaboration project sharing platforms are those who accept relationships to fulfil different relational needs and therefore deliver more or less relational values (Fiske, 2002). Regarding authority ranking, collaboration does not generally encompass transferring the ownership of a good (Jiang & Tian, 2018) permanently. Instead grants temporary access to under-utilized physical assets (Frenken & Schor, 2017). While buyer-seller interactions usually begin and end with the supply of the product in exchange for money, collaboration initiated when the provider gives the user access to his/her possession. In contrast, access terminated when the good returned to the business partner.

Conclusion

This study examined the significant relationships between the four dimensions of RMT towards UIC. Based on the survey, authority ranking and communal sharing indicated significant relationships, while market pricing and equality matching were insignificant to collaboration. This study implied that the industries and universities use these relational models (consciously or unconsciously) to plan and generate their action; to understand, remember and anticipate the reactions of others; to coordinate the joint production of collective action and institutions; to evaluate their actions and of the others (Fiske, 2004). The relational models are not exclusively cognitive but instead comprised of needs, motives, evaluative attitudes and judgments, and emotions (Fiske, 1991). The relational models trigger different behaviours in social interactions. Since collaboration is associated with different motives, it leads to appropriate behavioural rules for oneself and the partner (Bridoux & Stoelhorst, 2016). Thus, both parties must be aware of the current status and long-term trends in collaboration policies, market trends, financial management, human capital development, and day-to-day administration to effectively manage the collaborative outcomes. In conclusion, this study demonstrated the need to actively control collaboration.

Acknowledgement

This research supported by the Fundamental of Research Scheme (FRGS-149/2019) under Universiti Teknologi MARA.

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