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Higher Education Institutions Resilience During Covid-19 Post-Pandemic: A Quantitative Approach

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Abstract

The pandemic of COVID-19 has had a significant impact on higher education institutions (HEI). The question is whether HEI have been able to adapt to the pandemic's new normal. There is a need for quantifying the impact of Covid-19 pandemic on HEI in a formal manner. This paper aims to presents a structural quantitative approach to operationalizing a proposed conceptual framework that addresses the resilience of HEI in response to the Covid-19 pandemic. So far, there has been little quantitatively based empirical research on HEI resilience. Even though several authors proposed formidable frameworks for conceptualizing organizational resilience, none of these studies presented quantitative evidence of the COVID-19 pandemic of HEI resilience. The current study aims to quantify the HEI resilience framework by measuring the inter-relationships between the components of the framework using Structural Equation Modeling with Partial Least Squares (SEM-PLS) method. The data from 121 public and private universities in Malaysia were collected and used as a basis for determining the significant relationships in the HEI resilience framework. The empirical findings demonstrated that the (higher order) three stages of HEI resilience, namely anticipation, coping, and adaptation, which were precedingly linked to four HEI capability (lower-order) constructs, namely knowledge-based, resources availability, social resources, and power-based, positively influence HEI Resilience. In the meantime, the knowledge-based and power-based capabilities of the HEI appeared to have significant indirect effects on their resilience via their adaptation stage. Recommendations for practice and research were also discussed.

Keywords: *Higher Education Resilience, Anticipation, Coping, Adaptation*

INTRODUCTION

The COVID-19 pandemic was one of the most catastrophic events to ever occur. On 30 January 2020, the World Health Organization (WHO) declared the outbreak a Public Health Emergency of International Concern, and on 11 March 2020, a pandemic [Jasarevic et al., 2020; WHO,2020]. Due to the global COVID-19 pandemic, the educational landscape has undergone a sudden transformation. Traditional face-to-face instruction, for instance, is now conducted online. Virtual coaching and mentoring have replaced traditional internship mentoring. Since the launch of online classes, teaching interns have provided feedback on their experiences with blended teaching (i.e. synchronous and asynchronous classes) (Iradel et al., 2021). Due to poor internet connectivity, a lack of appropriate electronic devices, difficulty concentrating, and other issues, students face significant obstacles (Ag Ahmad, 2020). During the COVID-19 pandemic, students and instructors continue their education via online learning. Interaction and social relationships are integral to online learning. Internet connectivity issues are a constant source of frustration for students and teachers, hindering their interactions and relationships (Mohd Ghani et al., 2022). When instructors and students collaborate effectively, online education can be more enjoyable (Richardson et al., 2017). Indeed, students now face obstacles such as a lack of social interaction and an inability to form study groups, which they once enjoyed (Chung et al., 2020). Consequently, as pointed out by various scholars that during the COVID-19 outbreak, many university students were unable to continue their studies at home. Due to these obstacles during the learning process, the motivation of a great number of students was negatively impacted and weakened (Gustiani & Sriwijaya, 2020; Sakkir et al., 2021).

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In response to the COVID-19 pandemic, the government of Malaysia and Ministry of Health (MOH) implemented a movement control order (MCO) on 18 March 2020 to manage disease spread and reduce mortality (Maung et al., 2022). The Director-General of the Ministry of Health emphasized that the order being enforced was in accordance with the Prevention and Control of Infectious Diseases Act of 1988 and the Police Act of 1967, and that it would assist in preventing the spread of the virus. Due to COVID-19, public institutions, including educational institutions, schools, and universities, were required to close (Shah et al., 2020).

COVID-19 has become a new pandemic around the world, with many countries facing critical situations in managing and controlling the virus's rampant spread. The pandemic is extremely "complex" in that it not only affects the health sector but also causes devastating socioeconomic and political crises in countries with high infection rates. The pandemic is not only posing significant challenges to health-care systems and economic sectors, but it is also constantly putting pressure on governments to develop sensible and effective virus-control strategies (Muhamad Khair et al., 2021). Due to the lockdown, the manufacturing, tourism, and transportation industries suffered massive losses as a result of extended lockdown periods (Chakraborty and Maity, 2020). The low production rates of such industries had a direct impact on GDP and put countries at risk of high inflation, an unemployment crisis, and reduced working hours (Béland et al., 2020; Kawohl and Nordt, 2020).

This study advances understanding of organisational resilience with a focus on higher education institutions (HEI), in particular. This is an effort to more precisely quantify or operationalize the connections between a number of enablers and the resilience of HEI. The quantitative approach used in this study is an addition to or a continuation of the earlier research by the authors (Abdullah et al., 2020), who conceptualised the ideas raised by Ducheck (2020) regarding the organisational resilience. This paper presents a Higher Order Construct (HOC) framework that uses predictive modelling to take a more organised approach to examining the connections between the enablers and the HEI resilience. First, we adopt partial least squares structural equation modelling (PLS-SEM), which consists of two layers: lower-order constructs (LOC) that together constitute higher-order constructs (HOC). This reflects the diversity, complexity, and interdependence of the various LOC that make up HOC (Hair et al., 2022; Sarstedt et al., 2019; Wetzels et al., 2009). Using this higher order concept of relationship, we employ a complex model using PLS-SEM to understand how the LOC consisting of *knowledge-based, resource availability, social resources*, and *power-based* capabilities of HEI are linked to the HOC comprising of HEI's stages of Resilience (i.e., *anticipation, coping*, and *adaptation*) to affect the resilience of the HEI.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

HEI Resilience

In the context of organizations, the word resilience was first used by Meyer (1982). He used it to describe an organization's capability to absorb a shock and return to its original state. Recently, Koronis and Ponis (2018) referred to resilience as the maintenance of positive orientation under disruptive conditions such that the organization becomes more resourceful and strengthens itself. Organizational resilience is complicated because it affects the community and societal security, effective rural and urban responses, and consequences. Its effectiveness is also significantly influenced by people, organizations, infrastructure, logistics, capability, and preparedness elements (Almufarji & Husin, 2022). An organization's ability to cope with unexpected events, such as internal and external threats, is critical for the organization's stability and even survival (Burnard & Bhamra, 2019). The COVID-19 pandemic is previously testing the resilience of organizations, including HEI, worldwide. Through cultivating elements of resilience within organizational systems, several authors have suggested that an organization may be better placed to maintain or restore efficacy during challenging conditions (Burnard et al., 2018; Young et al., 2022).

However, while the concept of resilience is receiving duly increased attention, resilience still presents several challenges for organizations. Further work is still required to understand the features of resilience and the effective development of organizational-level resilience. One of the central challenges of resilience is that the resilience of an organization element is not directly observed but is often the result of multiple interactions and

linkages between variables. These interactions foster the complex ability to address discontinuities and adversity (Burnard et al., 2018). For the HEI to navigate through the ongoing pandemic smoothly, the development of resilience capabilities is imperative.

The Influence of HEI's Knowledge-based Capability on Its Anticipation Stage

Anticipation in the context of a resilient organization is not limited to forecasting events, which may be impossible, but includes the critical concept of preparation (Bartusevičienė et al., 2021). Regardless of the strategies of anticipation, Fachrunnisa et al. (2020) argued that the key to the success of anticipation capability lies in the organization's 'future-oriented knowledge base capability. According to Gressgård and Hansen (2015), a diverse knowledge base may reduce the tendency to focus on the surface and promote the organizational future function logic instead of individual blame when explaining failures. The knowledge base, such as human capital's know-how, is a valuable source and important approach to organizational learning. Post-event learning increases the organization's knowledge and becomes the primary source informing anticipation of and preparation for future events (Zahra et al., 2018). Based on this discussion, this study conjectures the following hypothesis.

H_1: There is a significant influence of HEI's Knowledge-Based Capability on HEI's Anticipation Stage

The Influence of HEI's Knowledge-based Capability on Its Coping Stage

HEI's Coping stage is related to short-term actions to deal with unexpected events to avoid the worst-case scenario and ensure survival (Bartusevičienė et al., 2021). Effective handling of the disruptive event requires (a) accepting the reality as it is and (b) developing and implementing solutions through immediate or short-term action (Duchek, 2020). Previous studies found that strong internal knowledge bases, by enabling internal capabilities, yield strong coping capacity and lead to higher innovation performance during the financial downturn (Zouaghi et al., 2018). In the HEI context, Bartusevičienė et al. (2021) suggested that going through the coping stage required faculty members to develop and implement creative solutions to pedagogical issues. Both effective formal and informal communication during the anticipation stage can promote access to a wider range of coping options and contribute to the smooth implementation of coping strategies by promoting the best practices for strengthening organizational capabilities for academic resilience. Based on the discussions, this study predicts the following hypothesis.

H_2: There is a significant influence of HEI's Knowledge-Based Capability on HEI's Coping Stage

The Influence of *HEI's* Knowledge-based Capability on *Its* Adaptation Stage

Adaptation stage shown by an organisation implies that the organization's ability to quickly coordinate and reconfigure resources to respond to sudden environmental changes while sustaining performance (Corrales-Estrada et al., 2021). It has been argued that organizations that invest in internal knowledge base capabilities benefit more when adapting to environmental conditions post-COVID-19 (Krammer, 2022). Organizations possessing internal investments in knowledge generation can improve their knowledge base capabilities and their adaptive capacity (Martínez-Sánchez et al., 2020). In turn, strong adaptive capabilities in these areas will provide these firms with internal resources they can employ to deal with an unexpected crisis (Zouaghi et al., 2018). Similarly, Stieglitz et al. (2016) revealed that organizations possessing adaptive capability learn faster by integrating external information into the knowledge base of the organization. Based on the preceding discussion, the following hypothesis is proposed:

H_3: There is a significant influence of HEI's Knowledge-Based Capability on Its Adaptation Stage

The Influence of HEI's Resource Availability on Its Anticipation Stage

Ensuring the availability of resources is an essential step in preparation for unexpected events. Findings related to organizational resilience capabilities pointed out anticipation as a capability related to preparation based on resource availability (Duchek, 2020). Making resources (such as material, financial, and human talent) available may seem counterintuitive in uncertain times. However, organizations striving for resilience must expend resources on not only "what is" but also on "what may be" (Cyfert et al., 2021). In order to develop the ability

to withstand disruption, organizations must recognize available resources and identify the limitations within current operations, planning, and the organization's capacity to respond in the future (Burnard & Bhamra, 2019). Based on this discussion, this study assumes the following hypothesis.

H_4: There is a significant influence of HEI's Resource Availability on Its Anticipation Stage

The Influence of HEI's Resource Availability on Its Coping Stage

According to Bergami et al. (2022), organizations must ensure that they have resources available that allow them to 'be ready to adjust and cope with disturbance, as well as the actual capabilities deployed by the organization in response to adversity. For instance, the health care workers' coping strategies during disasters included their sense of duty, religion, family and peer support, as well as resource availability (Ali et al., 2022). In the HEI context, Shaya et al. (2022) found that solid resource availability allowed for effective coping capability in terms of coordinating with regulators while accelerating the institutions' digital transformation. Reams et al. (2017) found that the capacity to overcome difficult and stressful situations using any available resources must be acknowledged as a complex process involving the dynamic interactions between the organization and the environment. The following hypothesis is predicted based on this discussion.

H_5: There is a significant influence of HEI's Resource Availability on Its Coping Stage

The Influence of HEI's Resource Availability on Its Adaptation Stage

Resource availability played a significant role in advancing adaptation capability (Shaya et al., 2022). Through utilizing available resources and recognizing contextual or situational demands, Bergami et al. (2022) found that the firms mobilized their resources and capabilities to expand their ability to adapt and cope with adversity at the organizational level. Similarly, Krammer (2021) found that organizations with more resources, more agile, and more open to change appear to be better equipped to adapt their production to these new challenges. Sarwadhamana et al. (2022) revealed that sensitivity and adaptability to a disaster are determined by a number of human, technological, physical, funding, political, and resources that can be used to deal with disturbances. Based on the discussions, this study predicts the following hypothesis.

H_6: There is a significant influence of HEI's Resource Availability on Its Adaptation Stage

The Influence of HEI's Social Resource Capability on Coping

According to Ho et al. (2022), social resources, such as shared goals, mutual respect, and a trusting organizational culture, are necessary for coping capabilities. Similarly, Andersson (2018) and Ojo et al. (2021) agreed that social resources in terms of enhanced information sharing, resource interchange, shared objectives and vision, and high levels of support and coordination among employees could serve as critical components to coping capabilities. In addition, Ojo et al. (2021) exposed that social support positively impacts organizational resilience by improving employee resilience and increasing job engagement. Further, Kuščer et al. (2022) revealed that social resources are significant antecedents to coping capability for achieving organizational resilience in the tourism industry due to the pandemic. Based on this discussion, this study conjectures the following hypothesis.

H_7: There is a significant influence of HEI's Social Resources Capability on Its Coping Stage

The Influence of HEI's Power-based Capability on Its Adaptation Stage

After a crisis, powerful actors can either inhibit or hinder the process of turning lessons learned into overall positive change, affecting organizational performance directly. This reflects how power-based capabilities could be used through shared decision-making, which allows for empowering technical expertise to build organizational strategies, reconfigure, and adapt to ever-changing conditions (Onwughalu & Amah, 2017). The power-based capability involves decentralization, self-organization, shared decision-making, organic structures, as well as employee involvement and empowerment, which are largely related to adaptation capabilities (Duchek, 2020). Previous studies suggest that power-based relationships emerged as a valuable antecedent to the adaptation stage (Abdullah et al., 2020; Kuščer et al., 2022), demonstrated through empowering employees

as a long-term priority designed to keep the organization as resilient as possible post-pandemic (Abdullah et al., 2020). Similarly, Shaya et al. (2022) also found that power-based relationships emerged as a valuable antecedent to the adaptation stage, which was demonstrated through resetting priorities. The following hypothesis is expected based on this discussion.

H_8 There is a significant influence of HEI's Power-Based Capability on Its Adaptation Stage

The Influence of HEI's Anticipation Stage on HEI Resilience

Anticipation stage is related to preventive actions in case of disturbance and minimizing adverse consequences (Duchek, 2020). The main characteristics at this stage are the ability to (a) observe the evolution of potential events inside and outside the organization, (b) identify critical issues and potential threats, and (c) be prepared to continue activities in a risky environment. Brülhart et al. (2020) revealed that anticipation and measured responses are able to increase organizational resilience to such disruptive environments caused by the pandemic crisis in Switzerland. In building a resilient university, Bartusevičienė et al. (2021) found that high-level anticipation capabilities have at their disposal to draw on in the face of disruptive events that threaten academic continuity. Hence, the following hypothesis can be conjectured.

H_9: There is a significant influence of Anticipation Stage on HEI Resilience

The Influence of Coping Stage on HEI Resilience

Coping stage is related to short-term actions taken to deal with unexpected events in order to avoid the worst-case scenario and ensure survival. Effective handling of the disruptive event requires (a) accepting the reality as it is and (b) developing and implementing solutions through immediate or short-term action (Duchek, 2020). The findings of Bartusevičienė et al. (2021) revealed that to ensure academic continuity and build resilience, the university must develop coping capability and act on lessons learned. They found that faculty members engaged in ad-hoc problem solving, using available resources and existing capabilities to make an uninterrupted transition from face-to-face to online learning. To cope with the unexpected COVID-19 pandemic, Lombardi et al. (2021) suggested that leaders should respond accordingly and opt for solutions that are consistent with the environment where they are embedded so that organizational resilient could be achieved (Lombardi et al., 2021). Based on this discussion, this study predicts the following hypothesis.

H_{10}: There is a significant influence of HEI's Coping Stage on HEI Resilience

The Influence of Adaptation Stage on HEI Resilience

Adaptation stage is related to the abilities of the organization to (a) reflect and learn from success and failures and (b) implement organizational change (Duchek, 2020). This stage is crucial for the successful development of organizational resilience because it is related to reflecting on lessons learned from successes and failures and the use of those lessons in feeding back to the coping stage and ultimately building the knowledge base and strengthening resilience capabilities stages. Bartusevičienė et al. (2021) suggested that resuming the same pre-pandemic teaching and learning models once the crisis has ended would be a lost opportunity. Instead, HEI should consider how newly developed solutions can become opportunities for new learning models, such as blended learning or expanded online offerings which make use of newly developed digital skills and pedagogical capabilities. According to Ho et al. (2022), actions such as systematic measurement, evaluation, and learning are necessary for the adaptation stage. At the adaptation stage, organizational leaders can consider what else they could do to rethink, recover, rebuild, and develop stronger organizational resilience for the future. Therefore, the following hypothesis is suggested.

H_{11}: There is a significant influence of Adaptation Stage on HEI Resilience

Based on the arguments presented above, the conceptual model in Fig. 1 illustrates the drivers or enablers of Higher Education Resilience, e.g., Meta-Capability *(Knowledge-based, Resource Availability, Social Resources*, and *Power-based*) of Higher Education Institutions (HEI) and Stages of Resilience (*Anticipation, Coping*, and *Adaptation*) lead to the Higher Education Institutions Resilience (HEIR). This conceptual model was developed by Abdullah et al. (2020) based on Dudek's (2020) proposition.

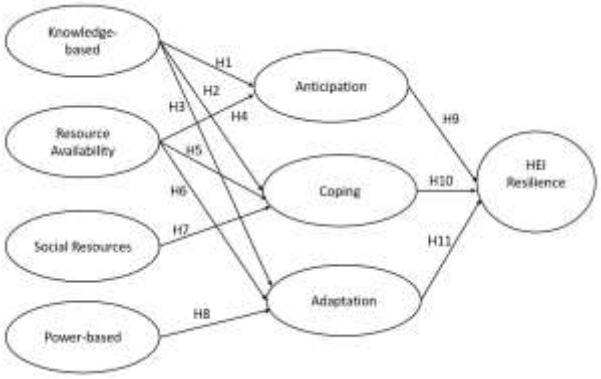


Fig. 1: Higher Education Institutions (HEI) Resilience Framework

METHODOLOGY

In this study, the cross-sectional, quantitative exploratory and causal research design was adopted to operationalize the suggested conceptual model. The study was conducted from 1 August 2021 to 31 October 2021, using an online semi-structured questionnaire and purposive sampling scheme. A group of professionals at the managerial level from Malaysian public and private universities were chosen as respondents to examine HEI resilience at their institutions as a result of Covid-19 pandemic. They are the ones who can evaluate the influence of the pandemic on various academic and organizational resilience by utilizing professional knowledge and experience. The respondent

s were chosen from an email database of individuals in upper management. The link to the questionnaire was emailed to the respondents through email. An invitation email was sent prior to engaging with the selected respondents to describe the aims of the study, the voluntary nature of participation, confidentiality, anonymity, and the possibility to withdraw from the survey at any time. The completed questionnaires were returned by 121 out of 200 (60.5%) respondents, and the information acquired was used for the subsequent steps of analysis.

Data Analysis

Apart from performing basic statistical analyses (frequency analysis and descriptive statistics), this study utilised the Structural Equation Modelling with Partial Least Squares (PLS-SEM) method to examine if HEI Resilience (HEIR) is directly influenced by the Stages of Resilience (SOR) (*Anticipation, Coping*, and *Adaptation*) and indirectly by the HEI Capabilities (HEIC) (*Knowledge-base, Resource Availability, Social Resources*, and *Power-based*). PLS-SEM was known to be the optimal method, according to Nitzl et al. (2016).

In certain research issues, researchers were required to work with a research model containing higher order constructs (HOC). Typically, HOC models are identified by the number of levels in the model (typically restricted to second-order models) and the distinct relationships between the HOCs and the Lower Order Constructs (LOCs) (reflective and formative relationships) (Becker et al., 2012). A higher- (or second) order construct is a general idea that is either represented (reflective) or formed (formative) via its dimensions (lower or first-order constructs) (Becker et al., 2012). Four types of HOC models discussed in the literature (Wetzels et al., 2009). These models are based on the relationship between the first-order latent variables and their manifest variables, as well as the relationship between the second-order latent variables and the first-order latent variables (Becker et al., 2012).

The HOC model is taking into account the association between SOR and HEIC, as well as the role of HEIC as a set of predictors variable in the HOC relation (Type II, Reflective-Formative) between HEIC, SOR and HEIR. When higher-order constructs are included in the model, PLS-SEM is the preferable statistical method (Hair et al., 2022; Hair et al., 2019b; Sarstedt et al., 2019). SOR is a higher-order construct, while HEIC is a lower-order construct, respectively, which further support the use of PLS-SEM in the current study.

RESULTS AND DISCUSSION

Respondents come from both public and private universities, according to the respondent profile. 43.8 percent of the selected institutions or universities in Malaysia were public universities, while 56.2 percent were private universities. 20.7% of the institutions have fewer than 100 employees, 31.4% have between 100 and 500 employees, 16.5% have between 501 and 1000 employees, and 31.0% have more than 1000 employees. In terms of student population, 21.5% of the institutions have fewer than 1,000 students, 27.3% have between 1,000 and 5,000 students, 21.5% have between 5001 and 10,000 students, and 29.8% have more than 10,000 students.

15.7% of the total number of respondents were at the highest level of management (vice chancellor and deputy vice chancellor), 9.1% were senior lecturers, among others. There were only 6.6% deans, their deputies and department heads and 6.6% registrars and their assistants. The majority (54.5%) of the total of the respondents were lecturers, while the remaining 7.4% were university administrators.

Table 1 Demographic characteristics of the respondents

Characteristic		Frequency (%)
Type of Institution	Public	53 (43.8%)
	Private	68 (56.2%)
Number of Staff	< 100	25 (20.7%)
	100 - 500	38 (31.4%)
	- 1000	20 (16.5%)
	>1000	38 (31.4%)
Number of Students	<1000	26 (21.5%)
	1000 - 5000	33 (27.3%)
	5001 - 10000	26 (21.5%)
	>10000	36 (29.8%)
Staff Designation	Top Management (VC, DVC, etc.)	19 (15.7%)
	Senior Lecturer	11 (9.1%)
	Dean, Head of Depart. & Head of Prog.	8 (6.6%)
	Registrar & Deputy Registrar	8 (6.6%)
	Lecturer	66 (54.5%)
	Admin Staff	9 (7.4%)

Results of PLS-SEM Analysis

Assessing Measurement Model

SmartPLS 4, a PLS structural equation modelling software, was used to examine the research model (Fig. 3). PLS evaluates the measurement model in terms of item loadings and reliability coefficients (composite reliability), as well as convergent and discriminant validity. Individual item loadings larger than 0.7 are deemed sufficient (Fornell & Larcker, 1981). To justify using a construct, the average variance extracted (AVE) should be more than 0.50. (Barclay et al., 1995). Table 2 displays the reflective measurement model assessment results associated with HEI Resilience, including indicator loadings, composite reliability, Cronbach's alpha, and AVE. These goodness-of-fit criteria are not relevant for the formative constructs, i.e., the HEI capabilities (Knowledge-based, Resource Availability, Social Resources, and Power-based) and the Stages of Resilience (Anticipation, Coping, and Adaptation). For these formative constructs, a different set of assessment criteria will be used.

Table 2: Reliability and Discriminant Validity of the Construct

Construct and Items	**Loadings**	**CA**	**CR**	**AVE**	**Discriminant Validity?**
HEI Resilience		0.943	0.94	0.625	Yes
HEI1	0.839				
HEI2	0.738				
HEI3	0.763				
HEI4	0.789				
HEI5	0.796				

HEI6	0.798	
HEI7	0.789	
HEI8	0.676	
HEI9	0.869	
HEI10	0.850	

As demonstrated in Table 2, the construct HEI Resilience has Cronbach Alpha (CA) value of 0.944, which is greater than 0.7, as indicated by Hair et al (2013). The Composite Reliability (CR) value range is also greater than 0.7 and this indicates adequate internal consistency (Gefen et al., 2000). As a result, the reliability of the reflective construct, HEI Resilience, was established.

The average variance extracted (AVE) for all items on a reflective construct is the metric used to assess the construct's convergent validity. The minimum acceptable AVE is 0.50 or higher; an AVE of 0.50 or higher shows that the construct explains 50% or more of the variance of the construct's items. The AVE value for HEI Resilience is 0.625, confirming the construct's convergent validity.

Assessment of Formative Measurement Models

The weights associated with indicators of a formative construct measures the importance of each indicator to the associated formative construct. Bootstrapping procedure was used to determine the significance of the weights (Henseler et al., 2009). The analysis reveals that for each formative construct, the following indicators can be regarded as of the highest importance:

(i) *Indicator*: Knowledge-based capability for coping and adaptation stages

Description: Our top management utilised available information to prepare them to make the best decisions in 'coping' (weight = 0.325, sig. at 0.05) and 'adaptation' (weight = 0.280, sig. at 0.05) with the potential occurrence of a disaster or catastrophe.

(ii) *Indicator:* Power-based capability for adaptation stage

Description: Our top management has the authority to make risky decisions in 'adaptation' (weight = 0.303, sig. at 0.05) in the event of a disaster or catastrophe.

(iii) *Indicator:* Power-based capability for adaptation stage

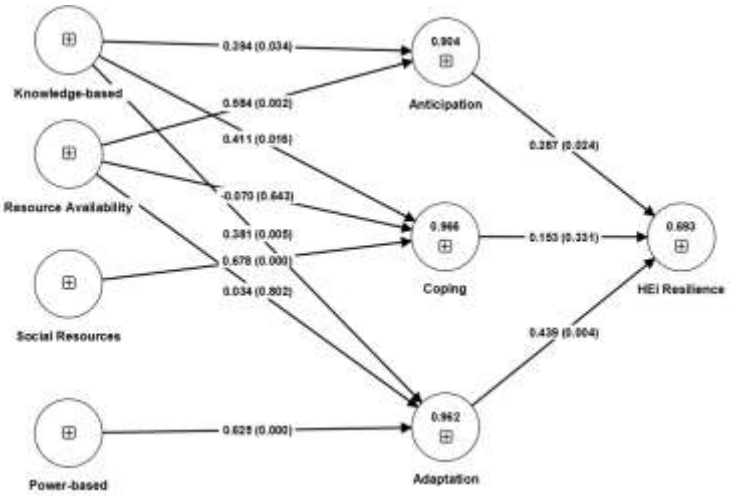
Description: Everyone in the organisation fully supports top management in exercising their authority in 'adaptation' (weight = 0.258, sig. at 0.05) with the event of a disaster or catastrophe.

(iv) *Indicator*: Social Resources for coping stage

Description: Our leadership can anticipate and manage undesired situations in 'coping' (weight = 0.563, sig. at 0.01) with the event of a disaster or catastrophe.

The indicators in (i)-(iii) above with the corresponding significant weights are regarded as of major importance. By contrast, the other indicators associated with the stages (anticipation, coping, and adaptation) with most of their weights being less than 0.200, are barely important. The other formatively measured indicators associated with the HEI capabilities (Knowledge-based, Resource Availability, Social Resources, and Power-based) were assessed in a similar manner.

Collinearity (as measured by Variance Inflation Factor, VIF) is a crucial metric for the Higher Order formative constructs, i.e., anticipating, coping, and adaptability (Sarstedt et al., 2019). With the exception of four indicators, the majority of VIF values were below the maximum level of 5.0, as demonstrated by the results. Eliminating these four from the LOC constructs Resource Availability, Social Resources, and HEI Resilience, respectively, did not significantly alter the relevance or strength of the correlations between anticipation, coping, and adaptability and HEI Resilience (see Fig. 2). The formative signs associated with VIF values just over 5.0 were therefore preserved.



(Note: The value in the bracket denotes the significance level, either at .01 or 0.05 level)

Fig. 2: The Estimated Structural Model

The results depicted in Fig. 2 and Table 3 indicate that Knowledge-based capability significantly impacted the three phases of HEI Resilience, namely Anticipation, Coping, and Adaptation. While Resource Availability appeared to have a substantial impact on the Anticipation stage, it had no discernible impact on the Coping and Adaptation stages. In the meantime, Social Resources had a tremendous (very substantial) impact on Coping. Similarly, power-based capabilities can have a significant impact on HEI adaptation.

The results offered considerable evidence that the Anticipation and Adaptation stages of the HEI significantly influenced the HEI' resilience, whereas the Coping stage did not seem to have a discernible effect.

Table 3: The Structural Model Path Coefficients

Relationships	Path Coefficients	t-values	p-value	Supported?
Anticipation -> HEI Resilience	0.287	2.251	0.024**	Yes
Coping -> HEI Resilience	0.153	0.973	0.331^{ns}	No
Adaptation -> HEI Resilience	0.439	2.860	0.004***	Yes
Knowledge based -> Anticipation	0.394	2.117	0.034**	Yes
Knowledge based -> Coping	0.411	2.412	0.016**	Yes
Knowledge based -> Adaptation	0.381	2.832	0.005***	Yes
Resource Availability -> Anticipation	0.584	3.163	0.002***	Yes
Resource Availability -> Coping	-0.070	0.464	0.643^{ns}	No
Resource Availability -> Adaptation	0.034	0.251	0.802^{ns}	No
Social Resources -> Coping	0.678	4.268	0.000***	Yes
Power based -> Adaptation	0.625	5.749	0.000***	Yes

(Note: *** denotes significance at .01 level; ** denotes significance at .05 level; ^{ns} denotes not significant)

Table 4a: Total Indirect Effects of HEIC on HEIR

Relationships	Total Indirect Effect	t-values	p-value	Supported?
Knowledge-based -> HEI Resilience	0.343	3.151	0.002***	Yes
Power-based -> HEI Resilience	0.275	2.775	0.006***	Yes
Resource Availability -> HEI Resilience	0.172	1.409	0.159^{ns}	No
Social Resources -> HEI Resilience	0.104	0.998	0.318^{ns}	No

(Note: *** denotes significance at .001 level; ** denotes significance at .05 level; ns denotes not significant)

Table 4b: Total Specific Indirect Effects of HEIC on HEIR

Relationships	Indirect Specific Effect	t-values	p-value	Supported?
Knowledge-based -> Adaptation -> HEIR	0.168	2.006	0.045**	Yes
Power-based -> Adaptation -> HEIR	0.275	2.775	0.006***	Yes
Knowledge-based -> Coping -> HEIR	0.063	0.882	0.378ns	No
Knowledge-based -> Anticipation -> HEIR	0.113	1.479	0.139ns	No
Resource Availability -> Anticipation -> HEIR	0.167	1.861	0.063ns	No
Resource Availability -> Coping -> HEIR	-0.011	0.329	0.742ns	No
Resource Availability -> Adaptation -> HEIR	0.015	0.213	0.831ns	No
Social Resources -> Coping -> HEIR	0.104	0.998	0.318ns	No

(Note: *** denotes significance at .001 level; ** denotes significance at .05 level; ns denotes not significant)

Tables 4a and 4b demonstrate the indirect effects of each HEI's capability, i.e., Knowledge-based, Resource Availability, Social Resources, and Power-based, on HEI's Resilience. According to Table 4a, the overall indirect effects on HEI's Resilience are attributable to Knowledge-based and Power-based capabilities. Further results presented in Table 4b demonstrated that only knowledge-based and power-based capabilities improved the adaptation of HEI, which consequently had a substantial impact on their resilience.

The R^2 value for HEIR is 0.693, and the adjusted R^2 is 0.685, which is greater than the 0.26 value recommended by Cohen (1988), indicating a 'significant' model. This implies that the SOR variables in the model could explain about 69.3% of the variance explained toward the HEIR. Hair et al. (2014) suggested examining the change in the R^2 value via the f^2 value as an additional step. Observe the change in R^2 after eliminating a specific exogenous or independent construct from the model. It can be used to determine if the absent construct has a substantial impact on the endogenous construct. The predictive ability of HEI's Anticipation on their Resilience is 0.091, Coping on HEIR is 0.023, and HEI's Adaptation on their Resilience is 0.153, as shown in Table 5. On the basis of Cohen's (1988) guideline, with effect sizes of 0.02 (small), 0.15 (medium), and 0.35 (large) reflecting small, medium, and large effects, respectively, we can conclude that HEI's Anticipation, Coping, and Coping capabilities have small effects on their Resilience.

Table 5: Effect Size (f^2)

Phase	HEIR
Anticipation	0.075
Coping	0.019
Adaptation	0.130

CONCLUSIONS AND LIMITATIONS

This study attempts to give empirical analysis on a significant issue recently confronted by organisations around the world as a result of the Covid19 pandemic, with a particular emphasis on its impact on Higher Education in Malaysia. The study operationalizes the proposed framework that was derived by Abdullah et al. (2020) by conceptualizing Duchek's assertions (2020). While previous research (Shaya et al., 2022) investigated the operationalization of the research framework using a qualitative technique, this study provides the findings using a quantitative approach, especially a predictive modelling approach, i.e., PLS-SEM. The findings revealed several intriguing conclusions that confirmed the existence of Duchek's claims (2020). The findings revealed that only Knowledge-based and Power-based anticipations are the capabilities that had significant impacts on HEI Resilience.

This study has some limitations, in addition to its implications. The research scope imposes various limitations on the applicability of this study's findings. These limitations must be acknowledged in order to offer proper

context for the study's conclusions. Future research may look into the following points, based on the findings of this study and the constraints noted above. The findings of this study are exclusively applicable to Malaysian HEI. Because of disparities in financial strength, the same conclusions may not apply to HEI in different countries. Further study could use the findings of this paper as a model for gauging HEI resilience in other countries. Furthermore, additional investigation may look into other elements such as the impact of geographical locations of HEI across countries to acquire a clear image and better understanding of HEI resilience. Future research could look into the effects of several major moderating variables on HEI resilience.

Declarations

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