*Research Article*

# Determinants of Open and Distance Learning (ODL) Performance in Higher Education Institutions (HEIs): Evidence from Malaysia

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**Abstract**

The advent of technology and the COVID-19 pandemic has altered the higher education landscape by highlighting online education platforms, thus bringing transformation to the teaching and learning process. Drawing from the dynamic capability theory, this study examines whether institutional, technology and human resources are determinants for the performance of Open and Distance Learning (ODL) in Higher Education Institutions (HEIs) in Malaysia. A quantitative approach was employed in this study, specifically utilising a structured questionnaire to collect data from a sample of 217 educators in Malaysian public and private HEIs. Data were analysed using the SmartPLS software. The empirical results reveal that institutional and technology resources significantly influence the performance of ODL in the HEIs. These results suggest that the ODL practices could be improved with dynamic resources supported by the HEIs. A sustainable ODL implementation would increase access to academic advancement for educators and students. The study's findings underscore the importance of sustainable education for HEIs, emphasising the need for robust policies and standards, efficient procedures, modern infrastructure, advanced information systems, and strong management support to ensure the long-term success of ODL.

**Keywords:** Institutional, technology, human resources, Open and Distance Learning (ODL), Higher Education Institutions (HEIs).

## INTRODUCTION

The challenges faced by higher educational institutions (HEIs) have evolved significantly over the past few years, notably the accelerated digital shift that has shaped the modern education experience (Aldhafeeri & Alotaibi, 2023; Ugur, 2020). To keep abreast with the rapidly evolving landscape of digital education delivery, HEIs must act swiftly and strategically as failure to effectively respond to this change puts the HEIs' sustainability at risk. The two most notable challenges for HEIs in sustaining their operations are in terms of adapting economically and socially to embrace the digital shift (Baturina, 2022). Economically, the HEIs are pushed to invest substantially in their digital infrastructure as well as repurpose and adapt their existing digital tools and technologies (Ershova et al., 2019). This has exerted a financial burden not only on the HEIs themselves, but the government is also obliged to allocate a substantial budget especially for the public universities to upgrade their digital infrastructure (Marin et al., 2020). The HEIs have limited financial capacity to invest in digital infrastructure (Rafiq et al., 2021),

while the government often has other significant priorities in terms of the public budget. Socially, the shift towards digital education delivery has likewise visibly impacted the HEIs in managing the acceptance of the students and lecturers in delivering teaching and learning (T&L) activities digitally. Some students and lecturers have involuntarily been forced to change to digital T&L, with the majority not fully ready for the shift.

When the COVID-19 pandemic hit the world in 2020, the HEIs were left with no choice but to be further pushed to digitally change their T&L delivery. Similarly, students and lecturers also have no other option but to abide by the directives from the HEIs. Before the COVID-19 pandemic, the shift towards digital T&L delivery had been taken on a slower mode. In that case, the COVID-19 pandemic has somehow been a blessing in disguise as ODL during the COVID-19 pandemic has been seen as the stimulus that further soars the digital shift in education. Following rapid digital developments at the onset of the COVID-19 pandemic, the model of T&L delivery has been largely shifted towards an open and distance learning (ODL) method (Murphy, 2020). During the COVID-19 pandemic, ODL has been seen as the most realistic method of increasing access to education while enhancing educational quality, encouraging peer-to-peer cooperation, and providing learners with a greater feeling of responsibility and autonomy for their learning (Cañabate et al., 2019). The HEIs have to adapt their education policy in supporting ODL implementation given that face-to-face class interactions were way too risky during the height of the COVID-19 pandemic. With the COVID-19 pandemic, the HEIs are still economically and socially challenged despite the digital shift for T&L delivery having been noticeably justified.

Being the restricted option for T&L delivery during the COVID-19 pandemic, ODL was viewed as an expedient and effective measure to cope with this crisis since online teaching is not entirely alien in the tertiary education setting. Nevertheless, a recent study suggests that HEIs were unprepared for such sudden changes in teaching and learning modes (Schuck & Lambert, 2020). This has resulted in some of them being lacking in managing their resources optimally to support ODL execution. For example, learner support, administration, clear design of pedagogical, flexibility process and collaborative support are not aligned with the requirements of ODL implementation. This is because the shift from conventional to ODL platform was done in a rush.

For many HEIs, managing technological resources is a great challenge given that some of their technological infrastructures are outdated and require significant investment for an upgrade (Stephenson & Torn, 2023). With obsolete technology, the HEIs would not be able to cope with the extent of demand that ODL would have in utilising these technological resources for T&L digital delivery. Accordingly, lecturers were compelled to utilise ODL platforms as either their sole delivery channel or as a supplement to in-person instruction (Lim, 2020). Most of these lecturers, unfortunately, possess insufficient first-hand experience with the ODL method before COVID-19, causing them to experience significant interruptions in teaching and evaluating students. Given this situation, the HEIs need to enhance the human resource capacity, particularly the lecturers' digital competency. Lack of this support would leave human resources to be the missing link in sustaining the ability of HEIs to operate. It is also acknowledged that a comprehensive digital infrastructure to support ODL implementation is impossible to be developed overnight and HEIs' capability to administer the ODL system effectively remains questionable. Nevertheless, in ensuring that HEIs can sustain their operations in providing seamless education in the digital era, considerations for HEIs in allocating their institutional, technological and human resources in supporting ODL implementation is crucial.

A lack of support for ODL practices could jeopardise the HEIs' ability to continue operating as demand for digital education delivery has greatly evolved during and after the post-COVID-19 pandemic (Maity et al., 2021; Romero-Hall & Jaramillo Cherrez, 2023). Overall, it is suggested that HEIs are required to

provide dynamic resource support to achieve successful ODL implementation, especially in the long run. Thus, this study's objectives are threefold. First, to investigate if institutional resources are a determinant of the performance of ODL in the HEIs. Second, to investigate if technological resources are a determinant of the performance of ODL in the HEIs. Third, to investigate if human resources are a determinant of the performance of ODL in the HEIs.

By drawing on the dynamic capability theory (Teece et al., 1997), this study provides empirical evidence regarding the role of institutional and technological resources in the context of ODL performance in HEIs. The findings highlight the importance for HEIs to provide an institutional environment where there are policies and standards, procedures, and planning, as well as management systems that acknowledge and support world-class ODL implementation. Additionally, this study also confirms the importance of modern infrastructure equipped with up-to-date information technology systems to meet the requirements of quality ODL education.

Universities worldwide may want to focus on investments related to institutional and technological support to sustain their ODL practices. Although human resources have always been claimed as the backbone for the implementation of any new practices in the organisation, this study acknowledges the importance of a support system via institutional and technological resources as the driver for good ODL performance in the long run. The remainder of this paper outlines reviews of previous literature, hypotheses development, research methodology, results and discussions, and conclusion.

## LITERATURE REVIEW

### Theoretical Background

Dynamic capability theory (Teece et al., 1997), as the foundation of this study, explores how organisations, particularly the HEIs, adapt their resources to achieve goals in changing environments. Resources, defined as tangible assets, are effectively utilised by firms to meet evolving demands. Dynamic capabilities, highlighted by Helfat et al. (2007), represent an organisation's persistent capacity to create, extend, or alter resources, address challenges, and make decisions. The HEIs, equipped with dynamic capabilities in institutional, technology, and human resources, exhibit a high level of adaptability in uncertain environments. This adaptability is crucial for navigating unforeseen changes, such as those brought about by the COVID-19 pandemic, ensuring the sustained success of ODL implementation in the present and future education landscape.

The HEIs navigate a complex and uncertain environment due to global pressures. The ODL has emerged as a pivotal force in reshaping higher education, especially during the pandemic. The ODL serves as a viable alternative to traditional teaching and learning methods, aiming to bridge gaps in time, geography, economics, and communication. Using information and communication technologies, The ODL facilitates learning across formal, informal, and non-formal domains, fostering interactivity and communication among learners. During the pandemic, ODL has proven to be a crucial means of expanding educational access, enhancing quality, promoting collaboration, and empowering learners. This educational revolution, accelerated by the COVID-19 pandemic, underscores the potential for widespread development and increased freedoms for humanity. To leverage these opportunities, HEIs must establish a comprehensive digital infrastructure to support accessible and high-quality ODL systems at minimal operating costs. A dynamic ODL system, managed by key resources and institutional support, ensures adaptability to environmental changes, sustaining HEIs in the long run (Por & Muniandy, 2023).

The success of the ODL implementation can be measured by students' performance, HEIs' competitive

position, education outreach, widened access opportunity (opportunity since students/lecturers can access external resources), quality of ODL platform, multicultural communities, innovative and attractive learning process, and life-long learning skills. The HEIs need to strengthen the ODL system through the digital infrastructure, institutional resources and skillful human resources to meet the current changes as HEIs no longer relevant to depend solely on face-to-face T&L platforms. Technology changes provide wider access for T&L, the latest Sustainable Development Goal (SDG) direction in education. With the technological, human and institutional resource support, it could enhance the current ODL system which will lead to HEI sustainability.

Effective management of dynamic capabilities is crucial for HEIs to thrive. This involves efficiently utilising resources and adapting to environmental changes. The integration of resource viability and management capabilities is key for successful ODL implementation. It's essential for HEIs to ensure that resources are of acceptable quality, relevant, and sufficient, (Badiozaman et al., 2020), especially during sudden disruptions like the COVID-19 pandemic. In maintaining and improving ODL systems, institutions need three main capabilities: institutional resources, technology support, and human resources.

**Hypotheses Development**

*Institutional Resources and ODL Performance*

The HEIs are responsible for providing sufficient resources and support to educators and students. The quality and quantity of these resources, encompassing administrative, personnel, pedagogical, and technology support, are critical for effective management (Badiozaman et al., 2020; Martin et al., 2019). Academic and student support services, whether initiated by management or grassroots efforts, potentially play a significant role in ODL implementation (Sales de Aguiar & Paterson, 2018). In ODL situations with minimal face-to-face interaction, academic assistance and feedback become essential substitutes, necessitating exploration and provision of more effective academic support. However, such exploration may incur higher costs for HEIs, involving additional academic appointments, investment in better technology, and additional technological training for educators (Badiozaman et al., 2020).

Learner assistance is crucial for online course delivery and should be consistently provided by HEIs. Studies reveal that instructors often lack essential resources, such as properly functioning computers, internet connections, and microphones, hindering effective student education during a pandemic (Badiozaman et al., 2020; Kaup et al., 2020; Joshi et al., 2021). Technical difficulties, including network problems and system failures, commonly occur during online sessions without adequate support. Distance learning students often experience loneliness, dissatisfaction, lack of self-direction, time management difficulties, and decreased motivation, leading to higher withdrawal rates in ODL institutions compared to traditional counterparts (Puspitasari & Oetoyo, 2018). To address these challenges, ODL students require additional support services, such as online social support groups with access to the institution's mental health staff, providing supportive therapy (Dhahri et al., 2020).

To ensure the long-term viability of ODL, fostering creative learning and knowledge-creating communities is essential. These communities should recognise collaboration, learning, and innovation as complementary forces, securing the long-term sustainability of institutional efforts. Self-organising systems, represented by communities, facilitate learning through edge interactions and centralise knowledge. Collaborative learning, encompassing lifelong learning through work, learning by doing, and experiential learning, contributes to expansion manifested as learning, growth, and development. In this social ODL entity, continuous learning about its capabilities and evolving potentials occurs.
Therefore, the success of ODL is contingent on institutional resources, emphasising the provision of

adequate academic and other support services. Institutional support during and after a pandemic is critical for the long-term viability of ODL. Therefore, the following is hypothesised:

*Hypothesis 1: There is a significant positive relationship between institutional resources and ODL performance in HEIs.*

### Technology Resources and ODL Performance

Digital technologies offer opportunities in various educational formats, including distance education, e-learning, and blended learning, as well as face-to-face education (Barnová et al., 2020). Their potential for higher efficiency in T&L activities is evident, especially in ODL, where success relies on advanced technological support and a robust logistical and administrative infrastructure (Mayanja, 2019). This infrastructure encompasses software, hardware, distance delivery technologies, technical personnel, and academic support for staff, determining the effectiveness of the learning management system essential technological component for the long-term success of ODL (Martin et al., 2019; Badiozaman et al., 2020). Nevertheless, the impact of digital technologies on education, particularly during the pandemic, faced challenges due to weak digital infrastructure, including a shortage of devices and limited accessibility with poor technological capabilities (Aisha & Ratra, 2022). The availability of digital skills, infrastructure, and support systems for educators and students is crucial, especially in uncertain situations like a pandemic; a lack of technology can disrupt online education systems (Barnova et al., 2020; Alonso-Gracia et al., 2021; Martin et al., 2019). Ensuring the quality of online education is crucial, especially during crises where ODL is a preferred option (Barnova et al., 2020). The pandemic highlighted the significance of digital technologies in education, showcasing online education as an efficient alternative when traditional forms are unavailable. Educators seek just-in-time technology support, such as 24-hour help desk access for technical issues on Learning Management Systems (LMS), but many organisations lack such support during course design (Martin et al., 2019).

Transitioning to online teaching faces challenges like inadequate facilities for high-tech integration, hindering the bridging of the digital divide. Challenges include aligning pedagogies with technologies, designing interactive activities, and improving formal learning for enhanced student engagement (Hartshorne et al., 2020). Student assessment in ODL settings is challenging due to the unpredictable nature of administering assignments and projects, and the current system lacks a secure platform, posing risks like security breaches and data issues (Raaheim et al., 2019). The current ODL system is yet to have a secured platform which does not compromise on security, data issues, viruses and phishing attacks. Since student assessment and evaluation are crucial components of the higher education system, both aspects deserve significant investment by the HEIs operating an ODL environment. HEIs investing in secure and innovative technologies can enhance the teaching and learning process, contributing to the sustainability of ODL (Joshi et al., 2021; Zen, 2017). Thus, HEIs ensuring relevant technology resources and infrastructure for ODL contribute to long-term sustainability. The following hypothesis is proposed:

*Hypothesis 2: There is a significant positive relationship between technology resources and ODL performance in HEIs.*

### Human Resources and ODL Performance

Human resources, particularly educators, play a pivotal role in establishing a sustainable ODL system. The success of ODL relies heavily on educators as leaders in the teaching field, emphasising innovative curriculum delivery. However, variations exist in educators' abilities to demonstrate professionalism and competence in teaching, particularly in adapting to technology for online teaching during the pandemic

(Joshi et al., 2021; Gratz & Looney 2020; Arora & Srinivasan 2020; Rafiq et al., 2021). Many educators lack technology skills, especially when transitioning to ODL, as they may be unfamiliar with various platforms.

Most educators originate from non-ODL-based institutions, making it challenging for them to develop and deliver courses with ODL philosophies in an ODL environment. Adapting technology for online teaching in a short span is challenging for all educators (Joshi et al., 2021; Martin et al., 2019). To address this, relevant resources should be created to prepare teachers for online teaching. Pedagogical aspects of ODL need a clear online course design, effective delivery method, and support through rubrics and quality standards (Martin et al., 2019; Badiozaman et al., 2020). Proper training is essential to enhance educators' skills, especially in the unique ODL environment (Hamouche, 2023). Enrichment programs for educators increase their ability to deal effectively with learners in the ODL setting, contributing to the sustained success of ODL programs. Comprehensive support services are crucial for intellectually stimulating and sustainable ODL implementation.

In the education system, the effective implementation of ODL relies significantly on academic and non-academic staff. Literature highlights the importance of instructional development for support staff, staff training, effective leadership, and governance in achieving successful ODL outcomes (Martin et al., 2019). To sustain ODL, top leaders must demonstrate commitment, leverage administrative and human resource powers, communicate effectively, celebrate milestones, and integrate sustainability into the curriculum. Governance plays a crucial role in creating an enabling environment for institutions to achieve their purpose, particularly in the challenging administration of ODL (Nyangarika & Bundala, 2020). Clear human resource policies related to compensation, evaluation, intellectual freedom promotion, and performance management are essential for HEIs engaged in ODL. Institutions with excellent human resources are more likely to sustain successful ODL delivery. Therefore, the following is hypothesised:

*Hypothesis 3: There is a significant positive relationship between human resources and ODL performance in HEIs.*

**RESEARCH METHODOLOGY**

**Sampling Population and Size**

This study employs a quantitative approach. Data were collected by administering online questionnaires using Google Forms. The online platform was used as it offers the fastest and most convenient way to connect with respondents (Sekaran & Bougie, 2016). The targeted respondents were educators in Malaysian public and private HEIs, with a total population of 57,755 (Quick Facts Malaysia Educational Statistics, 2020), using a simple random sampling technique. Using the G*Power software program, a minimum sample of 108 respondents was suggested to achieve a 90% statistical power, an R2 value of 0.15, and a 5% chance of error probability. Therefore, questionnaires were distributed to 600 educators in Malaysian public and private HEIs through their work emails, with an estimated 5% to 33% returned response rate (Sekaran & Bougie, 2016). At the end of the data collection phase, 217 usable responses were gathered which represents 36% of responses and sufficient for data analysis.

**Questionnaire Development and Instrument**

The self-administered questionnaire contained three sections: respondents' demographic profiles, perception of management capabilities (institutional, technological and human resources) and ODL performance. There are five items on the demographic profile, while the independent variables were measured by six items for institutional resources, four items for technological resources, and five items

for human resources, which were adapted from Powell and Dent-Micallef (1997). To measure the dependent variable, ODL performance, nine items were used, adapted from Wagner and Schaltegger (2004). A five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) requires the respondents to rate the statement based on their perspective of management capabilities towards ODL implementation which could contribute to sustaining HEIs.

**Data Analysis**

The Statistical Package for the Social Sciences (SPSS version 28) software was used for preliminary data analysis including data screening and cleaning. The developed hypotheses were tested using the partial least squares of structural equation modelling (PLS-SEM). SmartPLS 3 was employed to perform this latter analysis from the model measurement validation to the structural model evaluation, including path analysis and bootstrapping (Hair et al., 2021).

**RESULTS**

**Respondents' Demographic Analysis**

Table 1 indicates the respondents' demographic data. The demographic analysis reveals that 77.9% of the respondents were female and 22.1% were male. The ratio is representative of the gender ratio typically found among educators in Malaysian HEIs (Alzahrani et al., 2017).

Most of the respondents are at the senior level. In addition, the majority of the respondents were aged 46 and above (42.9%), 41.5% were aged 36 to 45, and the remaining 15.7% were aged 26 to 35. Most respondents have teaching experience between 11 to more than 20 years (74.2%), thus indicating that the respondents have sufficient knowledge and experience in T&L. More than half of the respondents work in public institutions (87.1%), while 12.9% are in private institutions.

**Table 1:** Demographic Profile

| Items | Measures | Frequency | Percentage (%) |
|---|---|---|---|
| Gender | Male | 48 | 22.1 |
| | Female | 169 | 77.9 |
| Age | Between 26-35 | 34 | 15.7 |
| | Between 36-45 | 90 | 41.5 |
| | 46 and above | 93 | 42.9 |
| Academic Qualification | Master level | 92 | 42.4 |
| | PhD level | 125 | 42.4 |
| Teaching experience | 1-5 years | 28 | 12.9 |
| | 6-10 years | 28 | 12.9 |
| | 11-15 years | 60 | 27.6 |
| | 16-20 years | 39 | 18 |
| | >20 years | 62 | 28.6 |
| Working Place | Public institutions | 189 | 87.1 |
| | Private institutions | 28 | 12.9 |

**Measurement Model Assessment**

The measurement model should meet all four PLS-SEM criteria: indicator reliability, internal consistency, convergent validity, and discriminant validity. The indicator reliability identifies item loadings of 0.708

or more to ensure that the item is reliable (Hair et al., 2021). As Table 2 demonstrates, all item loadings are above 0.708 except for two items under human resources and ODL performance (HR1, ODL3). Nevertheless, these two items are not being removed since they represent the important measurement items of the variables. This finding aligns with the suggestion by Hair et al. (2021), where items loading between 0.4 to 0.7 can be maintained, provided the composite reliability (CR) and average variance extracted (AVE) have met the threshold values.

Table 2 also shows that the CR used to measure the internal consistency for the measurement model ranges from 0.878 to 0.924, indicating that they are above the cut-off of 0.70, as prior researchers recommend (Gefen et al., 2000). Finally, the third assessment for the measurement model, which is used to ascertain construct validity, is demonstrated by AVE ranging from 0.569 to 0.753. Similarly, the AVE values exceed the recommended value of 0.5 (Hair et al., 2021), demonstrating that, on average, all variables have explained more than half of the variability in their visible measurement items. The heterotrait-monotrait ratio of correlations (HTMT) was used to assess the discriminant validity based on the multitrait-multimethod matrix proposed by Henseler et al. (2015).

**Table 2:** Construct Validity and Reliability

| Construct | Items | Loadings | AVE | CR |
|---|---|---|---|---|
| Institutional Resources | IR1 | 0.750 | 0.640 | 0.914 |
| | IR2 | 0.820 | | |
| | IR3 | 0.830 | | |
| | IR4 | 0.778 | | |
| | IR5 | 0.829 | | |
| | IR6 | 0.791 | | |
| Technology Resources | TR1 | 0.858 | 0.753 | 0.924 |
| | TR2 | 0.892 | | |
| | TR3 | 0.871 | | |
| | TR4 | 0.849 | | |
| Human Resources | HR1 | 0.626 | 0.593 | 0.878 |
| | HR2 | 0.762 | | |
| | HR3 | 0.742 | | |
| | HR4 | 0.870 | | |
| | HR5 | 0.828 | | |
| ODL performance | ODL1 | 0.778 | 0.569 | 0.922 |
| | ODL2 | 0.794 | | |
| | ODL3 | 0.621 | | |
| | ODL4 | 0.787 | | |
| | ODL5 | 0.779 | | |
| | ODL6 | 0.757 | | |
| | ODL7 | 0.744 | | |
| | ODL8 | 0.757 | | |
| | ODL9 | 0.756 | | |

The HTMT method calculates the actual correlation between two accurately measured constructs (Henseler et al., 2015). In the opinion of Henseler et al. (2015), a value of the HTMT exceeding 0.85 indicates the absence of discriminant validity. Table 3 exhibits that HTMT for all constructs is less than 0.85, thus signifying that discriminant validity has been determined. Overall, the findings from the

measurement model demonstrated that each measuring item had sufficient reliability, convergent validity, and discriminant validity.

**Table 3:** Discriminant Validity_ Heterotrait-Monotrait Ratio (HTMT)

| | Institutional Resources | Technology Resources | Human resources |
|---|---|---|---|
| Institutional Resources | | | |
| Technology Resources | 0.804 | | |
| Human Resources | 0.838 | 0.656 | |
| ODL Performance | 0.598 | 0.597 | 0.413 |

**Structural Model Assessment**

The coefficient of determination (R2), path coefficient (β), and effect size (f2) are used to evaluate the study's structural model. This structural model determined the testing of the hypotheses. The findings of the path analysis and hypotheses testing are shown in Figure 1 and Table 4. According to the suggestion of Hair et al. (2017), 5,000 re-samples were used to construct the path coefficients and the accompanying t-values using the SmartPLS bootstrapping method. The results revealed that institutional resources significantly influence ODL performance (β = 0.391, t-value = 4.635) at a p < 0.01 significance level, suggesting that H1 is supported. In addition, H2, which theorized that technology resources significantly influence ODL performance (β = 0.320, t-value = 4.102), is also supported at a p < 0.01 significance level. No evidence was found to support the relationship between human resources and ODL performance (β = -0.093, t-value = 1.160). Thus, H3 is not supported.

The R2 of the model, as illustrated in Figure 1, indicates that 35.6% of the variance in ODL performance is explained by institutional, technology, and human resources. In Table 4, the variance inflation factor (VIF) exhibits values below the suggested threshold of 5.00 (Hair et al., 2021). Thus, the findings indicate that no multicollinearity exists in the model. Furthermore, the effect sizes (f2) of institutional and technology resources are 0.080 and 0.078, respectively, thus indicating a small effect on ODL performance, as Cohen (1988) suggested. On the other hand, human resources do not have any impact on ODL performance. Additionally, the Q2 value is 0.207, which is greater than 0, suggesting predictive relevance (Hair et al., 2021).

**Table 4:** Structural Model of Bootstrapping Results

| | | Std. Beta | t-value | Decision | $f^2$ | VIF |
|---|---|---|---|---|---|---|
| H1 | Institutional Resources -> ODL Performance | 0.391 | 4.635* | Supported | 0.080 | 2.958 |
| H2 | Technology Resources -> ODL Performance | 0.320 | 4.102* | Supported | 0.078 | 2.056 |
| H3 | Human Resources -> ODL Performance | -0.093 | 1.160 | Not supported | 0.006 | 2.139 |
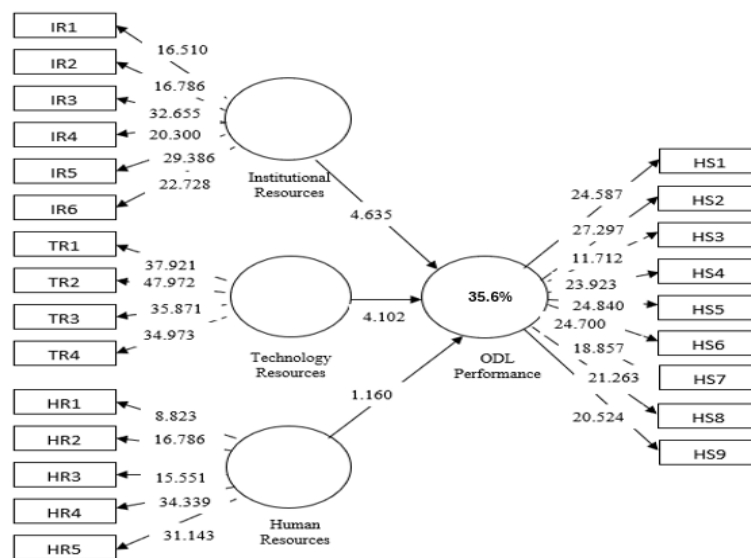
**Figure 1:** Structural Model of Institutional, Technology and Human Resources on ODL Performance in HEIs

## DISCUSSION

The results of this study suggest that the institutional and technology resources substantially impact ODL performance, requiring HEIs to keep up with technological advances and swiftly adjust to a new norm in the educational environment. Meanwhile, human resources insignificantly affect the ODL performance.

### Institutional Resources and ODL Performance in HEIs

Institutional resources are a critical factor contributing towards ODL performance. Thus, the university's management must provide learner support services for ODL practices, which could involve updating or redesigning the T&L process to align with ODL practices. With institutional support, reducing disruption in the ODL learning process across departmental teams is possible. Educators require support from the administration in implementing the quality standards and rubric of online courses (Martin et al., 2019). The current face-to-face T&L pedagogy requires some changes so that it can be in line with ODL pedagogy.

HEIs can improve their ODL performance by comparing the best practices of ODL being used by other local and worldwide educational institutions. Then, universities and faculties should use this as a benchmark as institutions play significant roles as agents of change (Caeiro et al., 2020). Instilling the new concepts of flexibility, timeliness, and attentiveness in T&L can assist ODL in being successful. Collaborative ODL-related activities supported by the institutions will also help sustain ODL practice throughout and after the pandemic period of COVID-19. Besides, collaborative ODL-related activities also have the potential to improve the university's competitive standing while also expanding access options for students and educators.

Since ODL is a new norm for most universities in Malaysia, the management is also struggling to find ways and make efforts to ensure that educators can effectively and efficiently shift from face-to-face sessions to ODL teaching and learning approaches. Most organisations are facing this scenario because they are unable to offer their employees sufficient information about their management strategy or their

responses to the pandemic (Elsafty & Ragheb, 2020). Although this unpreparedness is to be anticipated, universities should be able to plan and distribute resources, coordinate the necessary mechanisms, and make effective use of institutional resources and expertise (Liu et al., 2020). Universities must also have explicit workplace norms during ODL to prevent stress and boost educators' confidence and motivation to complete their jobs (Wong et al., 2020). If universities fail to be prepared and meet a certain standard that is perceived by the stakeholder, it will tarnish their reputation.

Based on the COVID-19 pandemic experience, the university or faculty should implement less formal bureaucracy and exert trust for the educators to conduct ODL activities. The effectiveness of a remote working environment is also dependent on management's understanding of virtual employee monitoring (Adisa et al., 2023). The university or faculty should also implement good governance to minimise conflicts that arise during the ODL implementation and be committed to disseminating clear information concerning ODL to all academic and non-academic staff.

**Technological Resources and ODL Performance**

The study's results also suggest that the availability of technology resources is critical for the long-term viability of ODL. When a university or faculty is equipped with the necessary technology resources (technical people, infrastructure, and facilities), it can support the Industrial Revolution 4.0 and force institutions to deal with a digital transformation in all dimensions (Benavides et al., 2020). Nevertheless, many universities are developing specific digital strategies in reaction to the massive shift towards using new technology, yet lack the vision, capability, or commitment to implement them effectively (Lilian et al., 2021). With the support of new technology, learning has become more open and flexible which in turn enhances learners' learning experience (Yong & Thi, 2022). The HEIs need to maintain and update regularly their LMS support which allows access to online or digital T&L materials for ODL. To guarantee that all information is adequately shared, the university's management should ultimately support the integrated information management system for ODL (student database, administration, marketing, and sales). In addition, there is a need to include platforms that can fit into the core technology environment and for teachers to adopt an innovative mindset (Badiozaman et al., 2020). As a result, educators and other support staff will require time to create relevant ODL skills, such as digital, technological, and practical teaching skills, to facilitate meaningful learner-centred learning practices (Badiozaman et al., 2020; Kant, 2019). Thus, educators' skills and ability to implement ODL effectively in the pandemic era are critical to the successful implementation of a sustainable ODL.

Another essential aspect that should be considered is ensuring that students and educators possess suitable equipment to facilitate the teaching and learning process. For instance, students should have at least a basic gadget (for example, a desktop computer or laptop) that would provide them easy access to teaching and learning materials, attend online lectures, and prepare their assignments. According to Rudhumbu (2021), technologies significantly support distance education during COVID-19. Using technological support became a cultural and social norm during the pandemic (Rudhumbu, 2021), and lecturers were forced to create innovative e-learning (Prasetyo et al., 2021). The sustainability of ODL will improve the quality of teaching and learning if educators employ an attractive and innovative platform that improves student performance.

It is critical to ensure that educators are the experts within the system. Santoso and Lestari (2019) asserted that information and communication technology literacy is the crucial component and foundation of the education sector during unprecedented times. Students with high technology literacy can gain numerous benefits, among which is the ease of procuring diverse learning sources to enhance their competence in learning. Nevertheless, students with inadequate technology literacy will struggle to study, particularly

through ODL (Siron et al., 2020). Knowledge of technological equipment and fundamental abilities in operating technology are crucial technical literacy that fosters the creation of a highly successful ODL environment. In order to apply ODL more successfully, basic technological literacy in the usage of technology systems must be taught and increased.

## Human Resources and ODL Performance

The findings indicate that human resources insignificantly influence ODL performance. Even though the educators claimed that their university has provided sufficient training and enrichment programs to enhance their professionalism, however necessary competency skills and a conducive online learning environment could not be developed overnight, especially during a crisis (Yong & Thi, 2022; Lilian et al., 2021). Educators play a crucial role in the digital learning environment, shaping students' metacognitive awareness. However, management often lacks preparedness for crises, leading to difficulties in providing adequate support to educators (Hamouche, 2023). The study aligns with educators' experiences, indicating that university management is unprepared and unable to provide sufficient training for ODL teaching. Educators transitioning from face-to-face to ODL face challenges, with limited support from management due to universities' lack of experience in ODL (Yong & Thi, 2022). Remote working and learning may lead to isolation, impacting educators' and students' mental health due to a lack of interaction, guidance, and communication. Additionally, working from home may be mentally taxing for educators, considering family distractions and multiple responsibilities (Prasad & Vaidya, 2020).

## IMPLICATIONS OF THE STUDY

This study may be of interest to HEIs as ODL is a great way for them to build their brand and improve their students' knowledge in the hunt for competitiveness and worldwide exposure (Appolloni et al., 2021). There is a need for HEIs to embrace ODL as a long-term response that will develop and improve over the next few years (Badiozaman et al., 2020).

## Theoretical Implications

This study adds to the growing body of writing on ODL implementation and the management of dynamic capabilities, both of which have the potential to improve higher education institutions' ability to thrive on a worldwide scale. Because of the ever-changing nature of educational policy, administrators of HEIs must be equally adaptable. This study paradigm helps clarify the part played by institutions and technology in maintaining HEIS through ODL. The COVID-19 pandemic creates an opportunity for the HEIs to strengthen their ability in ODL. Educators are moving away from traditional classroom settings and toward online learning environments to better serve students and expand educational possibilities on a worldwide scale.

## Practical Implications

The findings provide insight into continuous efforts that needed to be directed to improve ODL experience in HEIs. During the pandemic, most of the HEIs were unprepared with clear pedagogy in T&L for ODL as well as lacking resources to the support ODL system. For instance, continuous and personalised professional development needs to be provided, focusing on pedagogical and technological support. HEIs should learn strategies and strengthen their capability to have a structured ODL system that is available to meet any changes in the education environment. The study's findings can help support faculty in adopting innovative teaching approaches, leveraging technology to improve teaching and learning, and

fostering collaborative teaching. For sustainable ODL policies, HEIs should provide effective support to both educators and students.

## CONCLUSION

In conclusion, this study highlights the significant contribution of institutional and technology resources to sustaining ODL practices, with human resources showing a limited impact. The challenges posed by the emergence of ODL, particularly for educators, emphasise the need for a comprehensive understanding of institutional, technological, and human resources. Strategic planning is crucial for normalising ODL, and dynamic management capabilities facilitate the sharing of best practices among institutions. Identifying value-added activities and securing support from the Ministry of Education are essential for HEIs to ensure sustainability.

Some limitations of this study provide opportunities for future research. The cross-sectional nature of the survey data limits the model's causal relationships. Furthermore, educators' perspectives do not fully represent the evaluation and judgement of the sustainability of ODL performance in HEIs. In future research, highly inclusive surveys from both the student perspective and the top management of HEIs will be used. The qualitative study could be best employed in future so that the understanding of the institution's level could provide better direction for the ODL implementation to support HEI sustainability. Finally, the data for this study are drawn from educators' perspectives in Malaysian institutions; thus, the results may not be completely simplified in other countries due to cultural differences.

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## CONFLICT OF INTEREST

The authors declare no conflicts of interest.

## AUTHOR CONTRIBUTIONS

**Indarawati Tarmuji**: Conceptualization, Methodology, Formal Analysis, Writing original draft. **Yusrina Mat Isa**: Formal analysis, Writing, Reviewing and Editing. **Seri Ayu Masuri Md Daud**: Writing, Reviewing and Editing. **Dayana Jalaludin**: Writing, Reviewing and Editing.

## DECLARATION OF GENERATIVE AI

During the preparation of this work, the authors used ChatGPT to enhance the clarity of the writing. After using ChatGPT, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

## DATA AVAILABILITY STATEMENT

Data is available on request from the authors.

# REFERENCES

Adisa, T. A., Ogbonnaya, C., & Adekoya, O. D. (2023). Remote working and employee engagement: A qualitative study of British workers during the pandemic. *Information Technology & People*, *36*(5), 1835-1850.

Aisha, N. & Ratra, A. (2022). Online education amid COVID-19 pandemic and its opportunities, challenges and psychological impacts among students and teachers: A systematic review. *Asian Association of Open Universities Journal*, *17*(3), 242-260. https://doi.org/10.1108/AAOUJ-03-2022-0028

Aldhafeeri, F. M., & Alotaibi, A. A. (2023). Reimagining education for successful and sustainable digital shifting. *SAGE Open*, *13*(1), 21582440231154474.

Alonso-García, M., Garrido-Letrán, T. M., & Sánchez-Alzola, A. (2021). Impact of COVID-19 on educational sustainability. Initial perceptions of the university community of the University of Cadiz. *Sustainability*, *13*(11), 5938. https://doi.org/10.3390/su13115938

Alzahrani, A. I., Mahmud, I., Ramayah, T., Alfarraj, O., & Alalwan, N. (2017). Extending the theory of planned behaviour (TPB) to explain online game playing among Malaysian undergraduate students. *Telematics and Informatics*, *34*(4), 239-251. https://doi.org/10.1016/j.tele.2016.07.001

Appolloni, A., Colasanti, N., Fantauzzi, C., Fiorani, G., & Frondizi, R. (2021). Distance learning as a resilience strategy during Covid-19: An analysis of the Italian context. *Sustainability*, *13*(3), 1388. https://doi.org/10.3390/su13031388

Arora, A.K. and Srinivasan, R. (2020). Impact of pandemic COVID-19 on the teaching-learning process: A study of higher education teachers. *Prabandhan: Indian Journal of Management*, *13*(4), 43-56.

Badiozaman, I. F.A., Leong, H. J., & Wong, W. (2020). Embracing educational disruption: A case study in making the shift to a remote learning environment. *Journal of Applied Research in Higher Education*, *14(*1), 1-15.

Barnová, S., Krásna, S., & Čepelová, S. (2020). Digital technologies as a means of teachers' professional development. *Online Journal for Research and Education*, 2313-1640.

Baturina, D. (2022). Pathways towards enhancing HEI's role. İn Păunescu, C., Lepik, K-L., Spencer, N. (Eds.). *The local social innovation ecosystem. Social innovation in higher education landscape, practices, and opportunities* (37-59). New York: Springer. DOI: https://doi.org/10.1007/978-3-030-84044-0_6.

Benavides, L. M. C., Tamayo Arias, J. A., Arango Serna, M. D., Branch Bedoya, J. W., & Burgos, D. (2020). Digital transformation in higher education institutions: A systematic literature review. *Sensors*, *20*(11), 3291.

Caeiro, S., Sandoval Hamón, L. A., Martins, R., & Bayas Aldaz, C. E. (2020). Sustainability assessment and benchmarking in higher education institutions: A critical reflection. *Sustainability*, *12*(2), 543.

Cañabate, D., Nogué, L., Serra, T., & Colomer, J. (2019). Supportive peer feedback in tertiary education: Analysis of pre-service teachers' perceptions. *Education Sciences*, *9*(4), 280. https://doi.org/10.3390/educsci9040280

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. 2nd Edition. Hillsdale, NJ: Lawrence Erlbaum Associates, Publishers.

Dhahri, A. A., Arain, S. Y., Memon, A. M., Rao, A., Khan, M. M., Hafeez, G., ... & Mian, M. A. (2020). The psychological impact of COVID-19 on medical education of final year students in Pakistan: A cross-sectional study. *Annals of Medicine and Surgery*, *60*, 445-450.

Elsafty, A. S., & Ragheb, M. (2020). The role of human resource management towards employee's retention during COVID-19 pandemic in the medical supplies sector. *Egypt Business and Management Studies*, *6*(2), 5059–5059. https://doi.org/10.11114/bms.v6i2.4899

Ershova, I., Belyaeva, O., & Obukhova, A. (2019). Investment in human capital education under the digital economy. *Economic Annals-XXI*, *180*(11-12), 69.

Gefen, D., Straub, D., & Boudreau, M. C. (2000). Structural equation modeling and regression: Guidelines for research practice. *Communications of the Association for Information Systems*, *4*(1), 7. https://doi.org/10.17705/1CAIS.00407

Gratz, E. and Looney, L. (2020). Faculty resistance to change: An examination of motivators and barriers to teaching online in higher education. *International Journal of Online Pedagogy and Course Design*, *10*(1), 1-14.

Hair, J. F., Hult, G. T. M., Ringle, C. M. & Sarstedt, M. 2017. *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM).* 2nd edition. Thousand Oaks: SAGE Publications

Hair Jr, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). *Partial least squares structural equation modeling (PLS-SEM) using R: A workbook* (197). Springer Nature.

Hamouche, S., (2023). Human resource management and the COVID-19 crisis: Implications, challenges, opportunities, and future organizational directions. *Journal of Management & Organization*, *29*, 799-814. https://doi.org/10.1017/jmo.2021.15

Hartshorne, R., Baumgartner, E., Kaplan-Rakowski, R., Mouza, C. & Ferdig, R.E. (2020). Special issue editorial: preservice and inservice professional development during the COVID-19 pandemic. *Journal of Technology and Teacher Education*, *28*(2), 137-147.

Helfat, C., Finkelstein, S., Mitchell, W., Peteraf, M., Singh, H., Teece, D. & Winter, S. (2007). *Dynamic Capabilities Understanding strategic change in organizations*. Blackwell Publishing.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modelling. *Journal of the Academy of Marketing Science*, *43*(1), 115-135. https://link.springer.com/article/10.1007/s11747-014-0403-8

Joshi, A., Vinay, M., & Bhaskar, P. (2021). Impact of coronavirus pandemic on the Indian education sector: perspectives of teachers on online teaching and assessments. *Interactive technology and smart education*, *18*(2), 205-226.

Kant, N. (2019). Competitiveness in ODL from stakeholders' perspective: A review and research agenda. *Turkish Online Journal of Distance Education*, *20*(3), 59-72. https://doi.org/10.17718/tojde.598221

Kaup, S., Jain, R., Shivalli, S., Pandey, S. and Kaup, S. (2020). Sustaining academics during COVID-19 pandemic: The role of remote teaching-learning. *Indian Journal of Ophthalmology*, *68*(6), 1220.

Lilian, A., Ah-Choo, K., & Soon-Hin, H. (2021). Investigating self-regulated learning strategies for digital learning relevancy. *Malaysian Journal of Learning and Instruction*, *18*(1), 29-64. https://doi.org/10.32890/mjli2021.18.1.2

Lim.M., (2020). The educating despite the COVID-19 outbreak: lessons from Singapore. *Times Higher Education*. https://www.timeshighereducation.com/blog/educating-despite-covid-19-outbreak-lessons-singapore

Liu, Y., Lee, J. M., & Lee, C. (2020). The challenges and opportunities of a global health crisis: The management and business implications of COVID-19 from an Asian perspective. *Asian Business & Management, 19,* 277–297. https://link.springer.com/article/10.1057/s41291-020-00119-x

Maity, S., Sahu, T. N., & Sen, N. (2021). Panoramic view of digital education in COVID-19: A new explored avenue. *Review of Education, 9*(2), 405-423.

Marín, V. I., Bond, M., Zawacki-Richter, O., Aydin, C. H., Bedenlier, S., Bozkurt, A., ... & Xiao, J. (2020). A comparative study of national infrastructures for digital (open) educational resources in higher education. *Open Praxis, 12*(2), 241-256.

Martin, F., Wang, C., Budhrani, K., Moore, R. L., & Jokiaho, A. (2019). Professional development support for the online instructor: Perspectives of U.S. and German instructors. *Online Journal of Distance Learning Administration, 22*(3).

Mayanja, J., Tibaingana, A., & Birevu, P. M. (2019). Promoting student support in open and distance learning using information and communication technologies. *Journal of Learning for Development, 6*(2), 177-186.

Murphy, M. P. (2020). COVID-19 and emergency eLearning: Consequences of the securitization of higher education for post-pandemic pedagogy. *Contemporary Security Policy, 41*(3), 492-505. https://doi.org/10.1080/13523260.2020.1761749

Nyangarika, A., & Bundala, F. S. (2020). Challenges facing administration system for quality improvement on ODL programs in Tanzania. *International Journal of Advance Research and Innovative Ideas in Education, 6*(2), 1259-1272. https://www.researchgate.net/publication/340502594

Por, F. P., & Muniandy, B. (2023). Development of self-regulated lifelong learning (SR3Ls) model in the era of IR4. 0 for post-pandemic economy. *Asian Association of Open Universities Journal, 18*(1), 78-91.

Powell, T. C., & Dent-Micallef, A. (1997). Information technology as competitive advantage: The role of human, business, and technology resources. *Strategic Management Journal, 18*(5),375-405.

Prasad, K., & Vaidya, R.W. (2020). Association among COVID-19 parameters, occupational stress and employee performance: An empirical study with reference to the agricultural research sector in Hyderabad Metro. *Sustainable Human Sphere, 16*(2), 235–253. https://www.researchgate.net/publication/341211360

Prasetyo, A. R., Nurtjahjanti, H., & Ardhiani, L. N. (2021). Impact of changes in teaching methods during the COVID-19 pandemic: The effect of integrative e-learning on readiness for change and interest in learning among Indonesian University students. *International Review of Research in Open and Distributed Learning, 22*(2), 87-101. https://doi.org/10.19173/irrodl.v22i2.5143

Puspitasari, K. A., & Oetoyo, B. (2018). Successful students in an Open and Distance Learning system. *Turkish Online Journal of Distance Education, 19*(2), 189-200. https://doi.org/10.17718/tojde.415837

Quick Facts Malaysia Educational Statistics, (2020). Education micro data planning sector, education planning and research division, Ministry of Education Malaysia. https://www.moe.gov.my/menumedia/media-cetak/penerbitan/quick-facts/3719-quick-facts-2020/file

Raaheim, A., Mathiassen, K., Moen, V., Lona, I., Gynnild, V., Bunæs, B. R., & Hasle, E. T. (2019). Digital assessment–how does it challenge local practices and national law? A Norwegian case study. *European Journal of Higher Education, 9*(2), 219-231. https://doi.org/10.1080/21568235.2018.1541420

Rafiq, M., Batool, S. H., Ali, A. F., & Ullah, M. (2021). University libraries response to COVID-19 pandemic: A developing country perspective. *The Journal of Academic Librarianship, 47*(1), 102280.

Romero-Hall, E., & Jaramillo Cherrez, N. (2023). Teaching in times of disruption: Faculty digital literacy in higher education during the COVID-19 pandemic. *Innovations in Education and Teaching International, 60*(2), 152-162.

Rudhumbu, N. (2021). University students' persistence with technology-mediated distance education: A response to COVID-19 and beyond in Zimbabwe. *International Review of Research in Open and Distributed Learning, 22*(4), 89-108. https://doi.org/10.19173/irrodl.v23i1.5758

Sales de Aguiar, T. R., & Paterson, A. S. (2018). Sustainability on campus: knowledge creation through social and environmental reporting. *Studies in Higher Education, 43*(11), 1882-1894. https://doi.org/10.1080/03075079.2017.1289506

Santoso, A., & Lestari, S. (2019). The roles of technology literacy and technology integration to improve students' teaching competencies. *KnE Social Sciences*, 243-256. https://doi.org/10.18502/kss.v3i11.4010

Schuck, R. K., & Lambert, R. (2020). "Am I doing enough?" Special educators' experiences with emergency remote teaching in Spring 2020. *Education Sciences, 10*(11), 320.

Sekaran, U., & Bougie, R. (2016). *Research methods for business: A skill-building approach*. John Wiley & Sons.

Siron, Y., Wibowo, A., & Narmaditya, B. S. (2020). Factors affecting the adoption of e-learning in Indonesia: Lessons from Covid-19. *Journal of Technology and Science Education, 10*(2), 282-295. http://dx.doi.org/10.3926/jotse.1025

Stephenson, M., & Torn, A. (2023). Review, rapid recall and reposition: How one HEI adapted delivery and design in the digital world in response to COVID-19. *Higher Education, Skills and Work-Based Learning, 13*(4), 834-845.

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal, 18*(7), 509-533.

Ugur, N. G. (2020). Digitalization in higher education: A qualitative approach. *International Journal of Technology in Education and Science, 4*(1), 18-25.

Wagner, M., & Schaltegger, S. (2004). The effect of corporate environmental strategy choice and environmental performance on competitiveness and economic performance: An empirical study of EU manufacturing. *European Management Journal, 22*(5), 557-572. https://doi.org/10.1016/j.emj.2004.09.013

Wong, E., Ho, K. F., Wong, S. Y. S., Cheung, A. W. L., & Yeoh, E. K. (2020). Workplace safety and coronavirus disease (COVID-19) pandemic: survey of employees. *Bull World Health Organ, 98*, 150.

Yong M.S., & Thi L.S., (2022). Online motivation during Covid-19 pandemic: The role of learning environment, student self-efficacy and learner-instructor interaction. *Malaysian Journal of Learning & Instruction, 19*(2), 213-249. https://doi.org/10.32890/mjli2022.19.2.8

Zen, I.S. (2017). Exploring the living learning laboratory: An approach to strengthen campus sustainability initiatives by using sustainability science approach. *International Journal of Sustainability in Higher Education, 18*(6), 939-955. https://doi.org/10.1108/IJSHE-09-2015-0154