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Research Article

Industry@POLYCC: A Centralized Decision Support Dashboard for Managing Industry Collaboration in Malaysian TVET Institutions

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Abstract: *This study reports the design, development, and impact evaluation of the Industry@POLYCC Dashboard, a centralized decision support platform for managing industry collaboration data across Malaysian polytechnics and community colleges. Adopting a design and development research approach, the system integrates standardized datasets on industry partners, collaboration indicators, and formal agreements into interactive visual dashboards. A quantitative survey involving institutional and departmental users indicates significant improvements in data accessibility, reporting efficiency, and decision-making effectiveness. The findings demonstrate the dashboard's potential as a national-level digital governance tool to strengthen evidence-based planning and strategic industry–academia collaboration within the Malaysian TVET ecosystem.*

1. INTRODUCTION

Particularly in technical and vocational education and training (TVET) systems, industry-academia collaboration has been recognized as a strategic mechanism to enhance graduate employability, curriculum relevance, and workforce readiness (Etzkowitz & Leydesdorff, 2000; Mohamad & Ali, 2019; Marginson, 2022). With the goal to address skills mismatch and match institutional outputs with dynamic labor market demands, Malaysia's Department of Polytechnic and Community College Education (DPCCE) is stepping up collaboration initiatives.

However, as these initiatives have grown, a substantial volume of collaboration data has been produced. This data is often managed using various formats, stored in silos, and presented manually. Institutional capacity to monitor performance, demonstrate impact, and effectively respond to ministerial and parliamentary reporting requirements is restricted by inconsistent data infrastructures (Brown & Green, 2019; Kitchin, 2014).

According to recent studies (Ahmad, 2022; Selwyn, 2021; Lee & Park, 2022), digital transformation in higher education governance requires integrated data infrastructures and analytics-driven tools to support evidence-based decision-making. In response, DPCCE began developing the Industry@POLYCC Dashboard, an integrated digital platform designed to collect, standardize, and highlight industry collaboration data from community colleges and polytechnics in Malaysia.

The objectives of this study aim to: (i) describe the Industry@POLYCC Dashboard's design and development; (ii) evaluate its functional impact on users and organizational processes; and (iii) establish the dashboard as a strategic decision support system within the broader structure of TVET's digital governance.

2. LITERATURE REVIEW

2.1 Dashboards as Decision Support Systems in Higher Education

As strategic decision support tools that transform institutional data into valuable managerial intelligence, digital dashboards have become increasingly popular in higher education (Few, 2013; Yigitbasioglu & Velcu, 2012). Centralized dashboards improved data accessibility, reporting efficiency, organizational transparency, and leadership responsiveness, based on empirical research (Khan & Ahmad, 2021; Lee & Park, 2022; Rosman et al., 2023).

Centralized databases, standardized data structures, near real-time updating mechanisms, and user-oriented visualization design are features of effective dashboards (Schwendimann et al., 2017). Dashboards additionally enable performance-based governance, inter-institutional benchmarking, and accountability in public-sector education systems (Brown & Green, 2019; Selwyn, 2021).

2.2 Industry–Academia Collaboration Data Management

Strengthening institutional engagement capacity, enhancing partnership sustainability, and guiding policy formulation all require systematic documentation and analytics of industry collaboration activities (Etzkowitz & Leydesdorff, 2000; Mohamad & Ali, 2019). However, the majority of the literature currently in publication focuses on the results of collaboration instead of the digital infrastructures which promote collaboration governance.

Based on recent research, TVET ecosystems lack nationally integrated platforms dedicated to industry collaboration intelligence (Ahmad, 2022; Rosman et al., 2021). By investigating the creation and deployment of a centralized, system-level dashboard designed to support industry collaboration governance, this study addresses this gap.

3. METHODOLOGY

3.1 Research Design

This study was designed using design and development research (DDR) so as to complete the process of systematic development of the Industry@PolyCC Dashboard and ultimately, quantitative impact evaluation to establish the usefulness of the Dashboard in practice. Research can be carried out with the DDR methodology when the objectives are to create, develop and test functional digital products

which are grounded in real organizational needs and operating conditions (Reeves, 2006; Richey & Klein, 2007).

3.2 Dashboard Development Process

The process of development of the dashboard was divided into four major stages:

i. **Needs Analysis:** This involves data gaps, reporting issues and user requirements identification by means of organized engagement with the DPCCE units and institutional officers.

ii. **Data Collection and Standardization:** Data on industry collaboration will be compiled using various institutional sources and then standardized data definitions, indicators, and reporting forms will be developed and implemented.

iii. Data Cleaning and Integration: Systematic elimination of duplicate record sets, resolution of inconsistencies, and compilation of validated data in centralized data repository.

iv. Dashboard Design and Development: Interactive visualization modules design and development on the basis of Looker Studio which has been chosen based on the factors of ease of use, cost-effectiveness and interoperability with web-based implementation.

3.3 Impact Evaluation

It was a quantitative online survey with 35 respondents consisting of Corporate, Industrial Services and Employability Centre (CISEC) officers and Industrial and Alumni Liaison Officers (PPIA) of 36 polytechnics, 105 community colleges, and central divisions. The survey tool was used to assess system usability, applicability to work functions, usage frequency and perceived effect on work performance and organisational performance.

3.1 Research Design

The proposed study uses a design and development research (DDR) strategy to inform the systematic development of the Industry@POLYCC Dashboard, which is, in turn, followed by a quantitative impact study to determine how effective the proposed tool is in a practice. The DDR methodology is suitable in research that seeks to design, develop and test operational digital artifacts based on practical organizational requirements and working conditions (Reeves, 2006; Richey & Klein, 2007).

3.2 Dashboard Development Process

The dashboard development process comprised four main phases:

1. **Needs Analysis:** Identification of data gaps, reporting challenges, and user requirements through structured engagement sessions with DPCCE divisions and institutional officers.
2. **Data Collection and Standardization:** Compilation of industry collaboration data from multiple institutional sources, followed by the development and application of standardized data definitions, indicators, and reporting formats.
3. **Data Cleaning and Integration:** Systematic removal of duplicate records, correction of inconsistencies, and consolidation of verified datasets into a centralized data repository.
4. **Dashboard Design and Development:** Design and development of interactive visualization modules using Looker Studio, selected for its accessibility, cost efficiency, and compatibility with web-based deployment.

3.3 Impact Evaluation

Quantitative online survey was done with 35 respondents who consisted of Corporate, Industrial Services and Employability Centre (CISEC) officers and Industrial and Alumni Liaison Officers (PPIA)

of 36 polytechnics, 105 community colleges, and central divisions. The survey instrument assessed the system usability, its applicability to work functions, usage, and perceived effect on work performance and organizational working.

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4. FINDINGS

The results have shown that Industry@POLYCC Dashboard played a significant role in improving the management of industry collaboration information among the participating institutions. The respondents indicated significant time savings in data retrieval, report preparation and verification. Over 80% of users said that the dashboard enhanced their capacity to track collaboration indicators, recognize strategic partners, as well as aid evidence-based planning.

The combination of industry directories, high-impact collaboration KPIs, and digital documentation modules allowed users to have one source of the truth in institutional reporting and managerial decision-making. The results are in line with the previous studies that proved the centralized dashboards to be effective in increasing organizational efficiency and analytical capability (Khan & Ahmad, 2021; Lee and Park, 2022; Rosman et al., 2023).

4.1 Dashboard Structure and Functional Modules

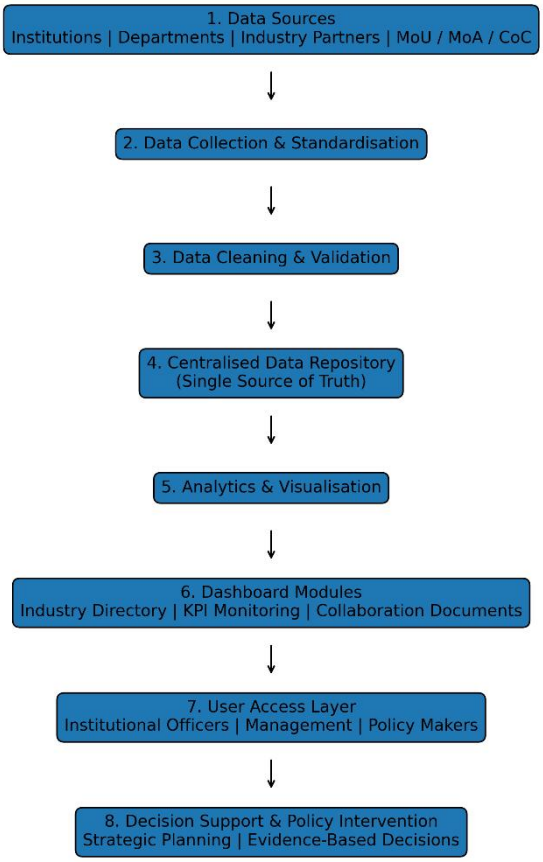

Figure 1. Conceptual architecture of the Industry@POLYCC Dashboard.

This figure represents the end-to-end decision support flow, whereby, multi-source industry collaboration data are first processed through data standardisation and integration, and finally, interactive dashboard modules serve to support managerial decision-making and policy intervention.

The industry cooperation data is integrated with three major components: (i) Industry Directory, (ii) High Impact Collaboration KPIs, and (iii) Collaboration Documents/MoU, MoA, and CoC with the Industry@POLYCC Dashboard. The dataset is filtered based on the institution/enterprise, industry, collaboration type, and year to facilitate easy and thorough analysis.

4.2 Usage Patterns and Usability

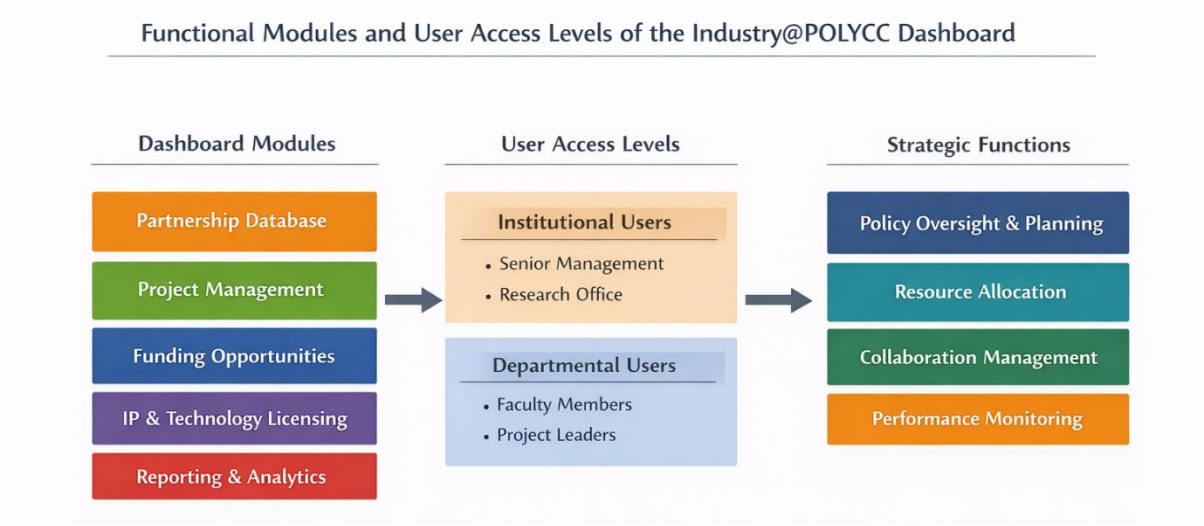

Figure 2. Functional modules and user access levels of the Industry@POLYCC Dashboard.

The figure presents the relationship between dashboard modules, categories of users at institutional and departmental levels, and their corresponding strategic functions in managing industry collaboration activities.

Survey findings indicate that the majority of respondents use the dashboard weekly or more frequently, with over 80% agreeing or strongly agreeing that the system is user-friendly and responsive. The dashboard's ability to provide quick access to relevant information significantly reduced time spent on manual data searches and report preparation.

4.3 System Performance and Improvement Needs

While overall system performance was rated positively, a minority of respondents reported occasional technical issues such as server downtime. Respondents also recommended enhancements including additional filters, improved visualizations, and better mobile accessibility, indicating opportunities for iterative system improvement.

Table 1. Summary of Industry@POLYCC Dashboard modules and strategic functions.

Module	Description	Key Users	Strategic Value
Industry Directory	Centralised industry collaboration database	Institutions, Management	Faster partner identification and engagement
KPI Collaboration	Monitoring of high-impact collaboration KPIs	Departmental leadership	Evidence-based planning and intervention

Module	Description	Key Users	Strategic Value
Collaboration Documents	Digital records of MoU, MoA, and CoC	Administrators	Compliance, audit readiness, and reporting

Table 2. Summary of impact survey findings on dashboard usage.

Dimension	Agree / Strongly Agree (%)	Interpretation
User friendliness	>95	High system usability
Task relevance	>65	Strong alignment with job functions
Decision support	>80	Significant strategic value
Productivity impact	>85	Positive organisational impact

5. DISCUSSION

Findings confirm existing works in emphasizing the importance of centralized dashboards to improve data visibility, transparency in organizations, and decision-making in higher education institutions (Yigitbasioglu & Velcu, 2012; Lee & Park, 2022). In addition to improving process effectiveness, the Industry@POLYCC Dashboard builds credibility within the institutions to respond quickly to audits, briefings with the ministers, and national reporting obligations.

At the systemic level, the implementation of Industry@POLYCC encapsulates the global shifts toward data-driven governance and digital public-sector transformation (Kitchin 2014; Selwyn 2021), positioning the dashboard as strategic infrastructure for national TVET policy intelligence.

6. CONCLUSION

Conclusion of this research work is that the Industry@POLYCC Dashboard is indeed a successful digital solution at the national level that can help manage the data of industry collaborations for polytechnics and communities in Malaysia by consolidating disparate data sources into meaningful management intelligence. Future research studies can build upon this research by applying predictive analytics and measuring the impact of innovative research like this one over a period of time to harness maximum synergy from the collaboration systems of industries and academia.

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