HUMAN SUSTAINABLE PROCEDIA
e-ISSN: 2710-5962

HSP

Vol. 5 No. 1 (2025) 1-10
https://publisher.uthm.edu.my/periodicals/index.php/hsp

Leveraging Dashboard Analytics for Enhanced Sustainability Monitoring in University Campuses

Masnita Misiran[1,2], Zahayu Md Yusof[1,2]*, Nor Idayu Mahat[1], Suhaida Abdullah[1], Hasimah Sapiri[1]

[1] *School of Quantitative Sciences, Universiti Utara Malaysia*
06010 Sintok Kedah MALAYSIA
[2] *Centre for Testing, Measurement and Appraisal, Universiti Utara Malaysia*
06010 Sintok Kedah, MALAYSIA

*Corresponding Author: zahayu@uum.edu.my
DOI: https://doi.org/10.30880/hsp.2025.05.01.001

Article Info

Received: 4 Dec 2024
Accepted: 5 April 2025
Available online: 1 June 2025

Keywords

Dashboard Analytics, Sustainability Monitoring, Data-Driven Decision Making

Abstract

The use of dashboard analytics—more especially, Google Onlooker Studio—as an affordable and easily available instrument for tracking sustainability initiatives on college campuses is examined in this article. This paper proposes a framework for using dashboard analytics to support data-driven decision-making processes in promoting sustainability within academic institutions, drawing on real-world examples such as the creation of dashboards for UUM Living Campus 2030, the Drive-thru Recycle Center initiative, and University Social Responsibility community outreach. These dashboards make it possible to track, evaluate, and optimize many facets of sustainability projects, which will ultimately result in better results and more effective use of available resources.

1. Introduction

There are 56 departments in the complex structure of UUM, and each one has a specific function in the running of the institution. Of these, sixteen academic schools stand out as hubs of knowledge and creativity. Nonetheless, a major obstacle still exists: departments frequently function independently, impeding coordinated attempts to achieve sustainability. Changing this perspective to one of collaboration is essential for shared advancement. Therefore, it is imperative to break out from this compartmentalized approach in order to tackle the complex issues of sustainability that the university community faces.

A key component of the goal of sustainability is making wise decisions. Using empirical information to inform decisions instead of relying just on intuition, data-driven decision-making is a potent strategy (Rejikumar et al., 2020; Troisi et al., 2020; Awan et al., 2021; Elgendy et al., 2022). However, obtaining and analyzing pertinent data might be challenging in an intricate organizational structure like UUM. Dashboard analytics are useful in this situation. Dashboard analytics are an indispensable resource for overseeing and directing sustainability programs on college campuses. Dashboard analytics provide a holistic picture of sustainability parameters by combining and presenting data from multiple sources, enabling well-informed decision-making processes. Dashboard analytics deliver real-time information that motivate strategic action in a variety of contexts, including energy usage tracking, trash management, and community involvement evaluations.

Dashboard analytics play an increasingly important role as UUM struggles to promote individual responsibility, encourage teamwork, and widen its focus on sustainability. These technologies enable stakeholders to make proactive, data-driven decisions that further sustainability goals while also streamlining the collection and processing of data.

The campus at UUM is vibrant, a tiny town with more than 25,000 inhabitants. Fostering a sense of shared accountability for sustainable living is still difficult. Real progress requires a shift away from dependency on others and toward individual initiative or being an engaged citizen (Reis, 2020; Huttunen et al., 2022; Luz et al., 2024). Overcoming the obstacles of shared responsibility requires the university community as a whole to be encouraged to take ownership of sustainability projects. Although environmental measures are important, UUM's sustainability focus needs to be expanded. In addition to environmental issues, sustainability takes into account social, economic, and cultural factors (Farley & Smith, 2020; Miceli et al., 2021; Agrawal et al., 2022). A shift in perspective is needed to embrace sustainability in its entirety. Therefore, recognizing sustainability as a holistic endeavor allows for a more comprehensive approach to addressing the interconnected challenges faced by UUM.

A wealth of talents exists within university communities can support sustainability initiatives (Mawonde & Togo, 2021; Steele & Rickards, 2021; Agusdinata, 2022). Students, faculty, and researchers all have important abilities that, with the right mobilization, can lead to significant change. But doing this call for cooperation and a common goal. Through using the varied skills present in the university population, UUM can create more robust collaborations and creative responses to sustainability issues. Sustainable progress is really about empowering people to assume leadership roles in sustainability efforts.

UUM has the potential to develop a community of sustainability advocates by encouraging a sense of responsibility and confidence in their capacity to make an impact. Therefore, encouraging people to take initiative not only improves sustainability initiatives but also cultivates an innovative and accountable culture within the university community. The task of encouraging need-based consumption presents a challenge for UUM in a world of consumerism. Resource conservation requires educating the public about thoughtful consumption practices (Gupta & Verma, 2020; Wamsler, 2020; Sari et al., 2023). Transitioning to a need-based consumption model is consistent with UUM's sustainability objectives and fosters a campus community that is more ecologically aware.

Furthermore, a large number of students originate from low-income families where sustainability is frequently subordinated to survival (Morris & Tucker, 2023). Taking a more global view can enable people to recognize their place in larger sustainability initiatives. A stronger commitment to sustainability is fostered by integrating global perspectives into sustainability education, which gives students the opportunity to see their effect beyond the here-and-now. A comprehensive strategy that incorporates legislative changes, cultural transformations, and educational programs is needed to address these issues. UUM has the potential to set the standard for a more sustainable future by fostering empowerment, teamwork, and a comprehensive grasp of sustainability.

In this article, we aim to investigate the potential of dashboard analytics in addressing UUM's complex sustainability concerns. We want to provide insights and direction for improving sustainability efforts inside university campuses by emphasizing the significance of data-driven decision-making and introducing dashboard analytics as a potent tool for monitoring and managing sustainability programs. We hope to show how dashboard analytics may enable stakeholders to make decisions that actually move UUM and beyond toward a more sustainable future by providing useful examples and perceptive analysis.

2. Dashboard Analytics in University Sustainability Monitoring

Dashboard analytics are an advanced, yet approachable, method of visualizing and analyzing data. In essence, a dashboard allows users to quickly identify trends, patterns, and insights by aggregating and presenting data from several sources in a visually intuitive style (Orlovskyi & Kopp, 2020; Al-Sulaiti et al., 2021). Dashboard analytics are essential for giving real-time visibility into important data pertaining to social, economic, and environmental sustainability programs in the context of university sustainability monitoring.

Moreover, dashboard analytics have the potential to become primary decision-making tools within university settings. Dashboards help stakeholders make data-driven decisions that advance sustainability goals by providing a single platform for tracking and managing sustainability metrics. With the help of these technologies, administrators, teachers, and other decision-makers may better allocate resources, pinpoint areas in need of development, and monitor the long-term effects of sustainability programs.

In this case, Google Onlooker Studio provides a number of noteworthy benefits for dashboard building. It is accessible to a broad variety of stakeholders, including administrators, staff, students, and community members, thanks to its user-friendly design and straightforward interface. For the university community as a whole to support and participate widely in sustainability projects, this accessibility is essential.

Second, a great deal of flexibility and customization options are offered by Onlooker Studio, enabling customers to personalize dashboards to suit their own requirements and tastes. Using Onlooker Studio, customers may select pertinent metrics, customize visualization styles, and set up interactive features to create dashboards that closely match their sustainability priorities and goals.

Human Sustainable Procedia Vol. 5 No. 1 (2025) p. 1-10

Additionally, Google Onlooker Studio easily connects with other Google Workspace programs, such Google Drive and Sheets. By enabling users to import, analyze, and visualize data directly from their current Google Workspace environment, this connection simplifies data management procedures. This means that users can make the most of Google's array of productivity tools to expedite the creation and upkeep of dashboards.

Onlooker Studio also provides cloud-based hosting and sharing features, which make it simple for users to publish and share dashboards with a large audience. With its powerful collaboration and dissemination tools, Onlooker Studio allows dashboards to be shared with internal stakeholders or made publicly available to the larger community, maximising the impact and outreach of sustainability monitoring initiatives.

All things considered, Google Onlooker Studio's customisation choices, cloud-based sharing capabilities, seamless interaction with Google Workspace, and user-friendly design make it the perfect platform for creating and implementing sustainability dashboards in academic environments like UUM. Institutions may efficiently monitor, manage, and communicate sustainability performance by utilizing Onlooker Studio's capabilities, which will help them get closer to their sustainability goals.

2.1 Case Studies

2.1.1 Dashboard Analytics for UUM Living Campus 2030

With the use of this dashboard, the University Committee can monitor and strategize the next steps for the many clusters involved in making sure the university's efforts to become a sustainable campus by 2030 are moving forward as intended. This dashboard provides real-time insights into each cluster's progress by aggregating data on numerous sustainability measures, including resources management, talent development, and community involvement initiatives. Decision-makers can pinpoint areas for development and use resources wisely to meet the broad sustainability objectives of the UUM Living Campus 2030 plan when important performance indicators are visualized clearly.

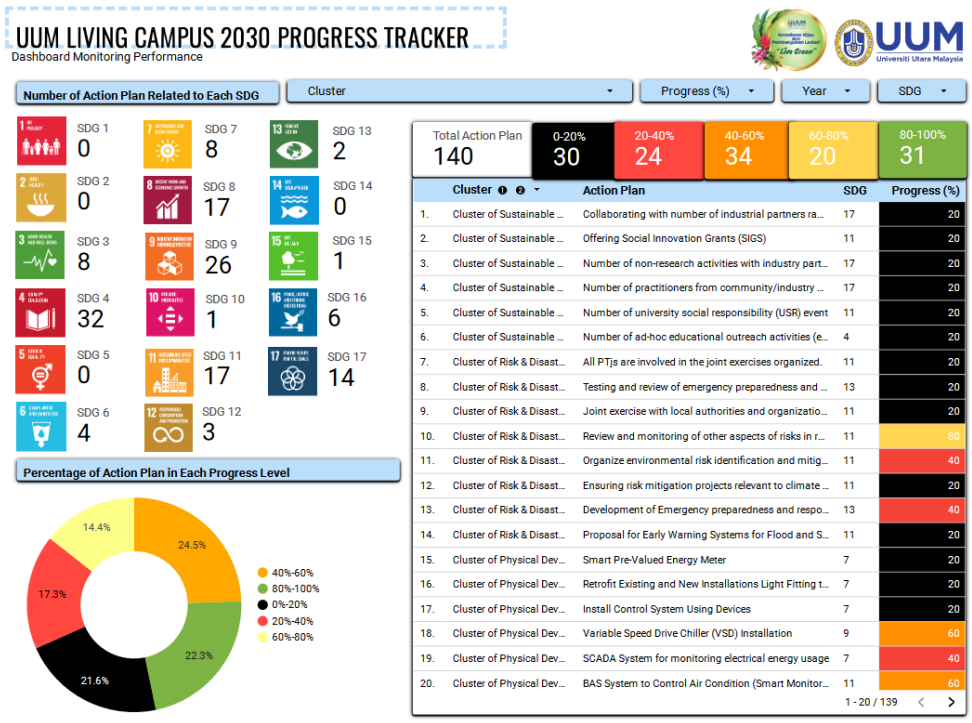

Fig. 1 *UUM Living Campus Progress Tracker*

2.1.2 Drive-thru Recycle Centre

The institution can monitor campus recycling efforts with this dashboard. It offers information on how many resources are kept out of landfills, how recycling affects the environment, and how much money recycling brings to UUM and the neighborhood. Decision-makers may evaluate the success of the Drive-thru Recycle Center program and make wise choices to further encourage recycling initiatives within the institution and beyond by displaying data on recycling rates, material kinds collected, and revenue produced.

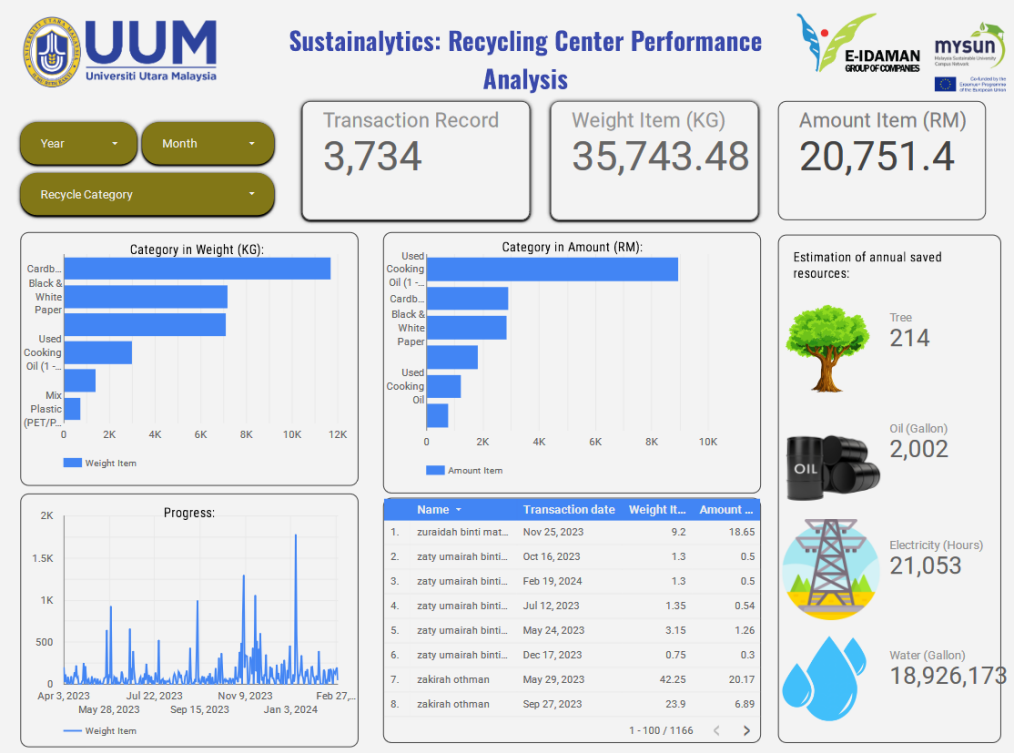

Fig. 2 *Drive-thru Recycle Centre Dashboard Analytics*

2.1.3 University Social Responsibility (USR) Community Outreach

Under the University Social Responsibility (USR) program, UUM's community outreach programs are monitored through this dashboard. Its records information on the quantity of individuals involved, the kind of feedback given, and the results attained from different outreach initiatives. Through the examination of engagement indicators and participant comments, decision-makers can acquire important knowledge to enhance the implementation and results of outreach initiatives in the future. This dashboard is a useful tool for monitoring the success of community involvement campaigns and encouraging ongoing enhancements to USR projects.

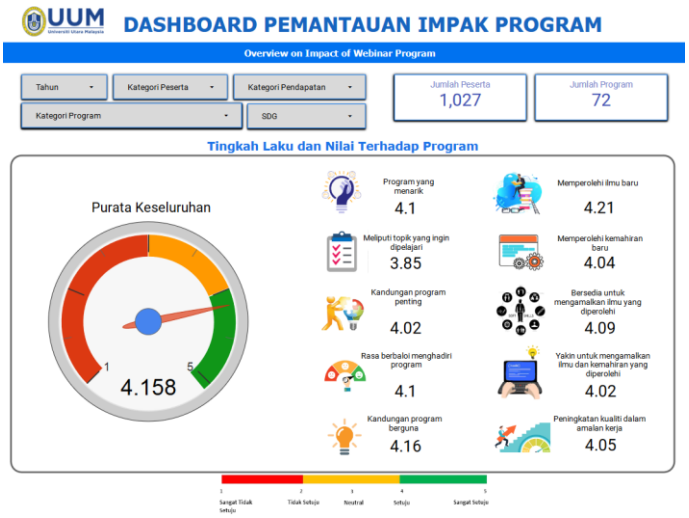

Fig. 3 *USR Feedback Dashboard Analytics*

Human Sustainable Procedia Vol. 5 No. 1 (2025) p. 1-10

3. Design and Development of Sustainability Dashboard

Dashboard analytics are an advanced, yet approachable, method of visualizing and analyzing data. In essence, a dashboard compiles and displays information from multiple sources in a way that is visually understandable so that users may identify trends, patterns, and insights with ease. Dashboard analytics are essential for giving real-time visibility into important data pertaining to social, economic, and environmental sustainability programs in the context of university sustainability monitoring.

The design and development of a sustainability dashboard are pivotal steps in effectively monitoring and managing sustainability initiatives within a university setting like UUM. This section outlines the key considerations and processes involved in creating a comprehensive dashboard tailored to the specific needs and objectives of UUM's sustainability agenda.

3.1.1 Define Objectives and Metrics

Establishing precise goals and key performance indicators (KPIs) that support UUM's sustainability objectives is the first stage in creating a sustainability dashboard. In order to make sure that the dashboard meets the information needs and goals of stakeholders—including faculty members, university officials, and sustainability committees—consultations are necessary. measures may include water use, energy use, waste diversion indicators, and measures related to community involvement, among others.

3.1.2 Data Collection and Integration

The following stage after establishing the goals and metrics is to compile and combine pertinent data from different university sources. Utility bills, waste management systems, transportation logs, student involvement platforms, and community outreach initiatives are a few examples of the sources of this data. Data integration is the process of gathering and standardizing data for analysis through the use of databases, spreadsheets, APIs, and other data management technologies.

3.1.3 Choose Visualization Techniques

In order to make complex sustainability statistics comprehensible and useful, visualization is essential. A range of visualization tools, such as charts, graphs, maps, tables, and infographics, may be used, depending on the type of data and the preferences of stakeholders. The objective is to show data in a way that makes sense, is easy to understand, and is visually appealing so that decisions can be made quickly.

3.1.4 Design User Interface and Interactivity

Usability and accessibility should be given top priority in the dashboard's user interface (UI) design in order to cater to a wide range of users. This entails creating a user-friendly interface, logically arranging the content, and adding navigational elements that facilitate users' exploration of various metrics and in-depth analysis of particular data points. Customized data displays are made possible by interactive features like filters, dropdown menus, and clickable components, which also increase user engagement.

3.1.5 Test and Iterate

To make sure the dashboard satisfies end users' needs and expectations, end users must test it. This could entail running usability tests, getting input from focus groups or surveys, and watching people as they engage with the dashboard in real time. Iterative modifications can be made to the dashboard's design, functionality, and user experience based on feedback and insights obtained from testing.

3.1.6 Implement and Deploy

The dashboard is prepared for deployment and use after the design and development stages are finished. This entails setting up access permissions to provide the proper degrees of security and privacy and deploying the dashboard on an appropriate platform, like Google Onlooker Studio. To acquaint users with the features and functioning of the dashboard, training sessions may be held.

3.1.7 Monitor and Maintain

The sustainability dashboard's long-term usefulness and relevance depend on ongoing maintenance and monitoring. This entails updating data on a regular basis, fixing technological problems, adding new features or metrics as needed, and giving users continuous support. The dashboard's influence on decision-making may be evaluated on a regular basis in order to pinpoint areas that require improvement.

In conclusion, creating a sustainability dashboard for UUM requires a methodical process that includes setting goals, gathering and combining data, selecting visualization methods, creating user interfaces, testing and refining, putting the system into place and deploying it, as well as keeping an eye on it. By implementing these procedures and involving interested parties at every stage, UUM can develop a strong instrument for overseeing, directing, and expanding its environmental programs.

4. Utilizing Dashboard Analytics for Decision-Making

Dashboard analytics give stakeholders instant access to important sustainability indicators and trends, making them a potent tool for well-informed decision-making. This section looks at how UUM can use dashboard analytics to inform strategic choices that further the institution's sustainability's objectives.

4.1.1 Data-Driven Insights

Stakeholders at UUM can access a multitude of data on sustainability performance through dashboard analytics, including measures related to community participation, waste management, and energy consumption. Decision-makers can discern trends, patterns, and opportunities for enhancement in a timely manner by utilizing an interactive and intuitive framework to visualize this data. Administrators have the capacity to monitor the advancement of sustainability goals, faculty members evaluate the success of instructional programs, and student leaders keep tabs on peer participation.

4.1.2 Performance Monitoring

Monitoring performance against key performance indicators (KPIs) connected to sustainability goals is one of dashboard analytics' main uses. Real-time insight into measures like water usage, recycling rates, and carbon emissions allows stakeholders to evaluate the success of current programs and pinpoint areas that might require more action. For example, administrators can direct resources toward energy-saving initiatives or infrastructure changes to increase efficiency if energy usage is rising higher than intended levels.

4.1.3 Resource Allocation

Decisions about the distribution of UUM's resources are influenced by insightful information from dashboard analytics. Making better use of data on sustainability projects and their effects allows decision-makers to better deploy material, human, and financial resources. For example, more funding might be provided to scale up the implementation of a specific project or program if it is seen to have a high return on investment in terms of community involvement or carbon reduction. On the other hand, funds might be diverted from projects that aren't producing the expected results.

4.1.4 Identifying Opportunities and Risks

Stakeholders can recognize new sustainability-related possibilities and dangers thanks to dashboard analytics. Decision-makers are able to foresee future obstacles and take proactive measures to solve them by evaluating data on market trends, legislative changes, and stakeholder preferences. For example, UUM may decide to commit funds to assisting the growth of a fresh sustainability project that is gaining traction with instructors and students. Similarly, UUM can take proactive measures to guarantee compliance and reduce interruptions in the event that a regulatory change is expected to affect waste management procedures.

Human Sustainable Procedia Vol. 5 No. 1 (2025) p. 1-10

4.1.5 Stakeholder Engagement

Dashboard analytics involve stakeholders in the decision-making process, which promotes accountability and openness. Dashboards give stakeholders the chance to actively participate in sustainability projects and offer their ideas and feedback by giving them access to real-time data and performance measures. Students can track their personal carbon footprint and find ways to lessen their environmental impact, for instance, by using the dashboard. Faculty members can work with peers on interdisciplinary initiatives and present their research on sustainability-related themes using the dashboard.

4.1.6 Continuous Improvement

Dashboard analytics help stakeholders to track success over time and refine their plans and efforts, which promotes a culture of continuous improvement. Through consistent evaluation of performance measures and comparison with industry norms and optimal methodologies, decision-makers can pinpoint opportunities for enhancement and novelty. For instance, stakeholders can examine the underlying causes of a sustainability initiative's failure to produce the desired results and modify their strategy accordingly. This iterative process of reflection and adaptation ensures that UUM remains responsive to changing conditions and evolving sustainability challenges.

In conclusion, dashboard analytics are a potent instrument for UUM decision-making because they offer data-driven insights, track performance, efficiently allocate resources, recognize opportunities and dangers, include stakeholders, and promote continuous improvement. UUM can make wise decisions that advance its sustainability objectives and build a more resilient and sustainable campus community by utilizing the possibilities of dashboard analytics.

5. Challenges and Future Direction

5.1 Challenges

Although dashboard analytics are a great tool for promoting sustainability initiatives at colleges like UUM, there are some challenges and considerations that need to be taken into account in order to get the most out of them. This section delves into several significant obstacles and suggests possible avenues for utilizing dashboard analytics in the context of university sustainability in the future.

5.1.1 Data Quality and Availability

Assuring the availability and quality of data is one of the main issue's dashboard analytics in university sustainability faces. Accuracy, timeliness, and completeness of data can be problems for universities, especially when combining data from many sources throughout campus. To increase data quality and reliability over time, addressing these issues calls for investments in stakeholder involvement, data management systems, and data validation procedures.

5.1.2 Stakeholder Engagement and Adoption

Promoting stakeholder participation and dashboard analytics usage within the university community is another difficulty. Although dashboards provide insightful information and aid in decision-making, their efficacy depends on the active involvement and support of stakeholders at all levels. To increase user capability, promote broad campus acceptance, and increase awareness of dashboard analytics, universities need to make investments in outreach, training, and communication initiatives.

5.1.3 Technical Complexity and Expertise

Implementing and maintaining dashboard analytics can be technically challenging, requiring specific knowledge and proficiency in data administration, analytics, and visualization. Universities may have trouble finding and keeping competent staff members with the technical know-how needed to create, build, and oversee dashboard analytics systems. Investing in staff and faculty training and professional development programs to increase their competence in data analytics and dashboard building could be one way to address this difficulty.

5.1.4 Integration and Scalability

The expansion of sustainability programs and the collection of progressively larger amounts of data by universities necessitate the integration and scalability of dashboard analytics systems. Universities need to create scalable and adaptable dashboard systems that can handle changing data requirements and sustain the expansion of sustainability initiatives over time. To facilitate seamless integration and scalability, this may entail utilizing open-source technologies, scalable data architectures, and cloud-based platforms.

5.1.5 Privacy and Security Concerns

Dashboard analytics for university sustainability face privacy and security concerns, especially when handling sensitive or private data. Universities need to adhere to legal standards and put strong data privacy and security safeguards in place to safeguard sensitive data. To protect data integrity and confidentiality, this may entail anonymizing data, limiting access permissions, and putting encryption and authentication methods in place.

5.2 Future Direction

Dashboard analytics have enormous potential to spur sustainable innovation at universities like UUM, notwithstanding these obstacles. Looking ahead, the following prospective paths could improve dashboard analytics' efficacy and impact on university sustainability even more:

5.2.1 Advanced Analytics and Predictive Modelling

Universities can foresee future results and obtain deeper insights into sustainability trends by utilizing advanced analytics approaches like predictive modeling and machine learning. Universities can predict new sustainability concerns, spot areas for intervention, and allocate resources as efficiently as possible by looking for trends in past data.

5.2.2 Stakeholder-Centric Design and Engagement

Universities may build and engage dashboards with a stakeholder-centric strategy that prioritizes user needs, preferences, and feedback. Universities can guarantee that dashboards are intuitive, user-friendly, and customized to meet the unique information demands of various user groups by include stakeholders in the design and development process. Universities can also use tactics like gamification, rewards, and social recognition to encourage stakeholders to actively engage and participate.

5.2.3 Integration with Sustainability Education and Research

Dashboard analytics can be incorporated by universities into research and education programs related to sustainability, giving staff and students the chance to interact with actual sustainability data and support ongoing initiatives. University curricula and research projects can encourage interdisciplinary collaboration, experiential learning, and innovation in sustainability science and practice by integrating dashboard analytics.

5.2.4 Collaboration and Knowledge Sharing

Through the creation of networks, communities of practice, and collaborations with other academic institutions, business partners, and governmental organizations, universities can promote cooperation and the exchange of knowledge regarding dashboard analytics. Universities may expedite their progress towards sustainability objectives and establish a more interconnected and cooperative environment for sustainability innovation by exchanging best practices, insights gained, and success stories.

5.2.5 Continuous Improvement and Iteration

Iteration and ongoing improvement must be given top priority by universities when designing, developing, and implementing dashboard analytics systems. Universities can identify areas for optimization and refinement, ensuring that dashboard analytics remain relevant, efficient, and responsive to changing sustainability challenges and opportunities, by asking users for feedback, keeping an eye on performance metrics, and conducting regular evaluations.

In conclusion, dashboard analytics offer tremendous potential for promoting sustainability innovation and impact, even as they pose difficulties and concerns for academic institutions such as UUM. Universities can fully utilize dashboard analytics to promote sustainability goals and build a more resilient and sustainable future by tackling issues with data quality, stakeholder involvement, technical complexity, integration, privacy, and security.

6. Conclusion

In conclusion, dashboard analytics are an effective instrument for promoting sustainability programs at institutions like UUM. They provide a number of advantages and chances to further the objectives of environmental, social, and economic sustainability. Universities may track their progress toward goals, make defensible decisions that lead to significant change, and obtain important insights into sustainability performance metrics through the design, development, and deployment of dashboard analytics systems.

The potential advantages of dashboard analytics deployment significantly outweigh the difficulties and considerations that come with it, including data quality, stakeholder participation, technical complexity, integration, and privacy and security issues. Universities can fully realize the potential of dashboard analytics to build a more resilient and sustainable future by taking proactive measures to solve these issues and by taking use of newly created opportunities for innovation and collaboration.

Future directions for dashboard analytics in university sustainability include the following: collaboration and knowledge sharing, stakeholder-centric design and engagement, advanced analytics and predictive modeling, integration with sustainability education and research, and continuous improvement and iteration. Universities may spur good change both within and outside of the campus community and expedite progress towards their sustainability goals by embracing these future trends and taking a proactive and strategic approach to dashboard analytics.

Dashboard analytics, in their whole, provide universities such as UUM with a route to a more sustainable future by giving them the means and the knowledge to stimulate creativity, encourage teamwork, and produce long-term effects. Universities can set an example for others to follow by showcasing their dedication to sustainability through the utilization of dashboard statistics. By working together, we can create a more promising and sustainable future for future generations.

Acknowledgement

The author would like to express sincere gratitude to Universiti Utara Malaysia (UUM) and the School of Quantitative Sciences for their invaluable support in facilitating this research. The resources and guidance provided have been instrumental in the successful completion of this study. Special thanks are also extended to colleagues and staff at UUM for their encouragement and collaboration throughout this research journey.

Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

Author Contribution

The authors confirm contribution to the paper as follows: ***study conception and design:*** *Masnita, Idayu;* ***data collection:*** *Masnita, Idayu, Zahayu;* ***analysis and interpretation of results:*** *Masnita, Zahayu, Suhaida, Hasimah;* ***draft manuscript preparation:*** *Suhaida, Hasimah. All authors reviewed the results and approved the final version of the manuscript.*

References

Agrawal, A., Brandhorst, S., Jain, M., Liao, C., Pradhan, N., & Solomon, D. (2022). From environmental governance to governance for sustainability. *One Earth*, 5(6), 615-621.

Agusdinata, D. B. (2022). The role of universities in SDGs solution co-creation and implementation: a human-centered design and shared-action learning process. *Sustainability Science*, 17(4), 1589-1604.

Al-Sulaiti, A., Mansour, M., Al-Yafei, H., Aseel, S., Kucukvar, M., & Onat, N. C. (2021, April). Using data analytics and visualization dashboard for engineering, procurement, and construction project's performance assessment. In 2021 IEEE 8th International Conference on Industrial Engineering and Applications (ICIEA) (pp. 207-211). IEEE.

Awan, U., Shamim, S., Khan, Z., Zia, N. U., Shariq, S. M., & Khan, M. N. (2021). Big data analytics capability and decision-making: The role of data-driven insight on circular economy performance. *Technological Forecasting and Social Change*, 168, 120766.

Elgendy, N., Elragal, A., & Päivärinta, T. (2022). DECAS: a modern data-driven decision theory for big data and analytics. *Journal of Decision Systems*, 31(4), 337-373.

Farley, H. M., & Smith, Z. A. (2020). Sustainability: if it's everything, is it nothing?. Routledge.

Gupta, S., & Verma, H. V. (2020). Mindfulness, mindful consumption, and life satisfaction: an experiment with higher education students. *Journal of Applied Research in Higher Education*, 12(3), 456-474.

Huttunen, S., Ojanen, M., Ott, A., & Saarikoski, H. (2022). What about citizens? A literature review of citizen engagement in sustainability transitions research. *Energy Research & Social Science*, 91, 102714.

Luz, A., & Kayode Sheriffdeen, E. F. (2024). Identifying and Understanding Susceptible Followers in Educational Settings.

Mawonde, A., & Togo, M. (2021). Challenges of involving students in campus SDGs-related practices in an ODeL context: The case of the University of South Africa (Unisa). *International Journal of Sustainability in Higher Education*, 22(7), 1487-1502.

Miceli, A., Hagen, B., Riccardi, M. P., Sotti, F., & Settembre-Blundo, D. (2021). Thriving, not just surviving in changing times: How sustainability, agility and digitalization intertwine with organizational resilience. *Sustainability*, 13(4), 2052.

Morris, M. H., & Tucker, R. (2023). The entrepreneurial mindset and poverty. *Journal of Small Business Management*, 61(1), 102-131.

Orlovskyi, D. L., & Kopp, A. M. (2020). A business intelligence dashboard design approach to improve data analytics and decision making. CEUR Workshop Proceedings.

Reis, P. (2020). Environmental citizenship and youth activism. Conceptualizing environmental citizenship for 21st century education, 139-148.

Rejikumar, G., Aswathy Asokan, A., & Sreedharan, V. R. (2020). Impact of data-driven decision-making in Lean Six Sigma: an empirical analysis. *Total Quality Management & Business Excellence*, 31(3-4), 279-296.

Sari, I. G., Anggia, Y., Andrasari, M., & Rahman, A. (2023). Early Childhood Economic Education Model to Suppress Consumerism. ABDIMAS TALENTA: *Jurnal Pengabdian Kepada Masyarakat*, 8(2), 1192-1197.

Steele, W., & Rickards, L. (2021). The role of the university in society. In The Sustainable Development Goals in Higher Education (pp. 67-106). Palgrave Macmillan, Cham.

Troisi, O., Maione, G., Grimaldi, M., & Loia, F. (2020). Growth hacking: Insights on data-driven decision-making from three firms. *Industrial Marketing Management*, 90, 538-557.

Wamsler, C. (2020). Education for sustainability: Fostering a more conscious society and transformation towards sustainability. *Int. J. Sustain. High. Educ. 21*, 112–130.