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PERCEPTION OF BARRIERS TO DATA DRIVEN DECISION MAKING PRACTICES IN PUBLIC SECTOR UNIVERSITIES OF SOUTHERN KHYBER PAKHTUNKHWA PAKISTAN

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ABSTRACT

Data driven decision making (DDDM) has become an important approach for improving evidence based planning, resource allocation and institutional decision making process in higher education. Public sector universities are increasingly generating and using academic, administrative, financial, planning and development and research related data to support effective institutional decision making. The aim of the study is to investigate the data driven decision making practice and barriers to implement it. All the heads of department, deans of faculty and administrative officers of the public sectors universities of southern Khyber Pakhtunkhwa are constituted the population of the study. The self developed valid and reliable questionnaire was distributed among all the participants for the collection of data. Data was collected from 71% population. For statistical analysis, descriptive statistics (Mean and Standard Deviation) and inferential statistics (one way ANOVA) are used. The findings reveals that data is used in academic and administrative affairs, strategic planning and resource allocation, teaching effectiveness and curriculum review process, and students retention, success and dropout rates but the centralization of power, technological tools, lack of skilled personnel, administrative workload, political interference, data verification, limited ICT infrastructure, insufficient financial resources and leadership commitment are the barriers to implement data driven decision making. The results also reveal an important gap between the availability and use of technological tools. There is no statistical difference among the perceptions of heads of department, deans of faculty and administrative officers. The findings may help university administrators and higher education policymakers to promote systematic and evidence based decision making practices in public sector universities.

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Introduction:

Data driven decision making in higher education means the systematic organization, collection, analysis and interpretation of data from several resources to make decision in order to improve organization and student's success. The main goal of higher education institution is to offer quality education. Higher education institution's statutory bodies take decision making process to achieve set goals. Many modern universities improve their traditional decision making process to solve the related problems. Universities use technological software just like learning management system and student information system which have data that help to improve decision making process. The implementation of these technologies in developing countries is in initial stage and their impact on quality of education is being limited. These technologies have positive effects such as better academic performance, better decision making process, advance ICT skills, improved communication and timely information. Further study should be done on quantifying the contribution of data decision making through statistical analysis of data. (Afsaw et al., 2023). The data has no value if decision making process does not take information to make decision. Data support decisions have many advantages but are still not utilized in higher education institutions (Gaftandzhieva et al., 2023,).

The importance of data driven decision making in higher education institutions is very crucial for achieving sustainable development goals specially SDG 4(quality education) and SDG 10(reduced inequalities). Higher education institutions can improve the efficacy and employability of their graduates with the help of integrating data driven decision in the 21 century. Higher education institutions are facing several problems related to economic, environmental, political, employability, technical, and social and health departments as they are progressing and changing quickly. The institutional resistance to data driven decision making may be investigated. The barriers and challenges may be identified for adoption of data driven decision transformation and data literacy in higher education institutions (Chigbu & Makapela 2025).

The data is utilized for individualized learning and new teaching methodologies. The educational data is used for admission in institution, compare the graduated students with market demand, making student's portfolio, managing the behavior of students, improve teaching quality, benchmarking, evidence based learning and teaching style, allocating financial support and monitoring educational system(Jin et al.,2024).

Higher Education Institutions are using increasingly data analysis to enhance the decision making to improve the performance the students and quality of education. Higher Education Institutions are confronting mountainous challenges such as low enrolment rate, financial problems, the problems of dropout and retention strategies, the data driven decisions are the critical solution of these challenges. There is necessity to implement and integrate data analysis in the decision making process such as the analysis of retention, students learning analysis, the analysis of enrolment, the analysis of academic performance of students and the analysis of financial issues. The integration of data analysis with decision making process is also necessary to maximize the students' success, the performance of faculty and sustainable financial environment. (Gonugunta & Leo, 2024).

Higher education institutions are increasingly using data for planning, teaching, and operational decisions making, but the effective integration of Data Driven Decision Making (DDDM) within institutional operations remains unidentified and underexplored. Research confirms that Data Driven Decision Making (DDDM) system has capabilities to improve institutional quality and management, yet successful implementation depends upon institutional culture, resource allocation and access (Bentayao, 2025). Data Driven Decision Making (DDDM) has been widely used for educational practices such as assessment strategies, empirical research focusing on institutional level decision processes in higher education is limited (Kaspi & Venkatraman, 2023). Moreover, comprehensive reviews of Data Driven Decision Making (DDDM) in higher education reveal that its application in the fields such as academic analytics, strategic planning, and quality assurance, but significant gaps persist in elaborating data in the areas of institutional effectiveness and policy change (Bouwma-Gearhart & Collins, 2025).

In the present age which is overloaded by technology and information, the ability to make data decision making process is crucial. Traditional decision making process depend upon intuition, feelings and judgmental procedure to solve complex problems in complex situation. The new technology provide advance tools which enhance decision making abilities and the data is the main pillar in decision making process.

Objectives of the Study

1. To assess the current practices of data driven decision making in public sector universities of Southern Khyber Pakhtunkhwa.
2. To identify the major barriers to effective data-driven decision-making in public sector universities of Southern Khyber Pakhtunkhwa.
3. To investigate data driven decision making technology tools in universities.
4. To compare the views of Heads of department, Deans, and administrative officers regarding data-driven decision-making practices in public sector universities of Southern Khyber Pakhtunkhwa.

Research Questions

1. What are the current practices of data driven decision making in public sector universities of Southern Khyber Pakhtunkhwa?
2. What are the major barriers to effective data driven decision making in public sector universities of Southern Khyber Pakhtunkhwa?
3. Which technological tools are used in data driven leadership in universities?
4. Is there a significant difference among the views of Heads of department, Deans, and administrative officers regarding data driven decision making practices and barriers?

Methods and Procedures:

The population of the study comprised academic and administrative leaders working in public sector universities located in the southern districts of Khyber Pakhtunkhwa, Pakistan. The target population included senior academic and administrative leaders who were directly involved in

institutional decision making processes. The academic leaders consisted of Vice Chancellors (where accessible), Deans of Faculties, Heads of Academic Departments (HODs) and Chairpersons responsible for academic planning and governance. The administrative leaders included Registrars, Treasurers, Controllers of Examinations, Directors of Information Technology, Directors of Quality Enhancement Cells (QECs), Directors of Planning and Development, Directors of works, directors of ASRB, directors of ORIC, directors of academics provost, librarians directors sports, directors admissions, directors of transports, registrars, treasurers and other senior administrators occupying strategic management positions. Therefore, academic and administrative leaders constituted the most relevant and appropriate population for achieving the objectives of this research. The quantitative component of the study employed a census approach, whereby data were collected from all members of the target population rather than selecting a representative sample. A census approach was considered appropriate because the target population was finite, manageable in size, and accessible to the researcher. However, the full census was not feasible due to ethical consideration, a stratified random sample of approximately n = 122 respondents, calculated using the finite population correction method with a 95% confidence level was used for the collection of data. Proportionate allocation was assigned roughly 88 academic leaders and 34 administrative officers to the sample. The data collected through the questionnaires from 128 participants (71% of total population) was analyzed using the Statistical Package for the Social Sciences (SPSS) software. Descriptive and inferential statistical analyses were used to address the research objectives. Descriptive statistics, including means, and standard deviations were used to summarize the perceptions of the respondents regarding data driven decision making process and barriers and challenges to data driven decision making in higher education institutions. One way ANOVA was used to determine whether there is statistically difference among heads of department, deans of faculty and administrative officers regarding their perceptions of data driven decision making process and barriers and challenges to data driven decision making.

Findings:

The findings show the overall perceptions of respondents regarding data driven decision making practices in higher education institutions. The overall mean (M = 3.50, SD = 0.68) indicates that respondents generally agreed that data driven decision making practices are being implemented. The highest agreement was reported for the use of data in strategic planning and resource allocation (M = 3.75, SD = 0.90), followed by decision-makers giving value to data based decisions (M = 3.63, SD = 0.94) and using academic and administrative data to improve student success (M = 3.63, SD = 1.04). Respondents also agreed that decisions are sometimes influenced more by senior officials' opinions than institutional data (M = 3.61, SD = 1.00). Comparatively lower agreement was found regarding centralized decision making (M = 3.32, SD = 1.09), technological tools and training (M = 3.33, SD = 1.07), and access to high quality, valid, and reliable data (M = 3.39, SD = 1.07). Overall, the findings suggest that data driven decision making is moderately practiced in the surveyed higher public sector universities, although improvements are needed in technological support, training, data quality, and the use of data for institutional decisions.

The findings interpret respondents' perceptions regarding the barriers to adopting data driven decision making in higher education institutions. Overall, respondents agreed that several factors hinder the implementation of data driven decision making (M = 3.72, SD = 0.51). The highest agreement was reported for lack of leadership commitment (M = 3.93, SD = 0.87), followed by political interference (M = 3.89, SD = 1.00) and lack of skilled personnel (M = 3.84, SD = 0.83). Respondents also agreed that limited ICT infrastructure (M = 3.77, SD = 0.75), insufficient financial resources (M = 3.73, SD = 1.03), slow decision-making due to data verification (M = 3.64, SD = 1.01), and resistance to change (M = 3.61, SD = 0.92) are important barriers. The comparatively lowest mean was reported for increased administrative workload due to excessive focus on data (M = 3.34, SD = 1.02), although respondents still showed moderate agreement. Overall, the findings indicate that respondents perceived leadership, political, human resource, technological, and financial factors as significant barriers to the effective adoption of data driven decision making.

The findings revealed that decision makers received inadequate training to analyze and interpret data (M = 2.77, SD = 1.18), while the provision of regular workshops and seminars on data-driven decision-making was also relatively low (M = 2.84, SD = 1.24). The use of students' data for decision-making showed a moderate level (M = 2.99, SD = 1.18), and the effectiveness of Student Information Systems (SIS) in supporting decision-making was also moderate (M = 2.87, SD = 1.17). Similarly, the use of Learning Management System (LMS) data to improve teaching and learning was moderate (M = 3.07, SD = 1.20). Institutional dashboards (M = 3.08, SD = 1.13) and Enterprise Resource Planning (ERP) systems (M = 3.09, SD = 1.10) were perceived as providing moderate support for decision-making. Learning analytics were moderately used to monitor student performance (M = 3.30, SD = 1.07), while artificial intelligence and advanced analytics tools also showed moderate utilization in institutional decision-making (M = 3.27, SD = 1.18). The highest mean score was reported for data visualization tools improving the understanding of institutional performance (M = 3.45, SD = 0.99). Overall, the findings indicate a moderate level of data literacy and utilization of data-related technologies for decision-making (M = 3.08, SD = 0.91).

One-way ANOVA conducted to compare the perceptions of Heads of Department, Deans of Faculty, and Administrative Officers regarding DDDM practices. The findings revealed no statistically significant difference among the three groups, $F(2, 125) = 1.82$, $p = .166$. Although Heads of Department reported the highest mean score (M = 3.57, SD = 0.63), followed by Administrative Officers (M = 3.48, SD = 0.68) and Deans of Faculty (M = 3.22, SD = 0.85), these differences were not statistically significant. Therefore, it was concluded that respondents' perceptions of DDDM practices did not differ significantly based on their positions.

One-way analysis of variance (ANOVA) was conducted to examine whether the perceptions of Heads of Department, Deans of Faculty, and Administrative Officers differed significantly regarding the barriers and challenges to data-driven decision making. The results revealed no statistically significant difference among the three groups, $F(2, 125) = 0.27$, $p = .766$. Deans of Faculty reported the highest mean score (M = 3.78, SD = 0.37), followed by Heads of Department (M = 3.72, SD = 0.49) and Administrative Officers (M = 3.67, SD = 0.60). However, these small differences in mean scores were not statistically significant. Since the p-value was greater than the

conventional significance level of .05, the differences in perceptions of barriers and challenges among the three groups were not statistically significant.

Discussion:

The findings of this study indicate that data driven decision making is emerging as an important institutional practice in the surveyed public sector universities, but it has not yet reached a fully mature or consistently institutionalized level. The strongest area of data driven decision making is the use of data for strategic planning and resource allocation, followed by the value placed on data based decisions and the use of academic and administrative data to support student success. However, technological support, staff training, data quality, and the continued influence of senior officials' opinions represent important areas requiring further development. This finding corresponds with the systematic review of Stojanov and Daniel (2024), which found that big data and analytics are widely used in higher education to support learning and teaching and, to a lesser extent, administrative decision making. The use of academic and administrative data for student success therefore reflects the broader movement toward evidence informed institutional management. Another important finding concerns the use of academic and administrative data to improve student success. The result suggests that data driven decision making in the participating universities is not restricted to financial or administrative planning but also extends to educational and student related concerns. The findings demonstrate that the surveyed universities are moving toward a data driven decision making culture but remain in a transitional stage. Data are recognized as valuable and are used particularly for strategic planning, resource allocation, and student related decisions. Nevertheless, the continued influence of senior officials' opinions, moderate access to reliable data, and limitations in technological tools and training indicate that traditional and data driven approaches coexist. Thus, strengthening institutional data capabilities and embedding evidence based decision making into organizational culture may be essential for universities for quality education and sustainable development. The finding is supported by Bentayao's (2025) systematic literature review, which identified strategic planning and resource allocation as important applications of data driven decision making systems in higher education. Consequently, the relatively strong use of data for strategic planning in the present study may indicate that universities are beginning to institutionalize data as an important resource for managerial and administrative planning. Stojanov and Daniel (2024) found that big data and analytics in higher education are increasingly applied to learning, teaching, and administration, with data-driven decision making being one of the major motivations for institutional analytics.

The most prominent barrier identified in the overall findings was lack of leadership commitment, the consistency across organizational groups indicates that leadership commitment is a central issue in the implementation of data driven decision making. The finding suggests that the availability of data and technology alone may not be sufficient to establish data driven decision making practices unless senior leaders actively support and encourage the use of evidence in decision making. Asfaw et al. (2025), in a three-round Delphi study involving higher education and ICT experts, identified organizational culture, the absence of data driven decision making policy, and inadequate data management policy among the most important barriers to data driven

decision making implementation. The third major barrier identified in the present study was lack of skilled personnel. This finding indicates that the effective use of institutional data may be constrained by insufficient human capacity to collect, manage, analyze, interpret, and apply data. Kalaitzopoulou et al. (2025) emphasized the importance of integrating institutional systems and investing in professional development to strengthen data literacy and establish a culture of data driven decision making. These findings correspond closely with the present study, suggesting that universities require not only data and technological systems but also employees who possess the knowledge and skills required to transform institutional data into meaningful evidence for decision making. Another important barrier identified by respondents was limited ICT infrastructure. The relatively consistent scores indicate that technological limitations are experienced across different levels of university administration. This finding is consistent with Asfaw et al. (2025), who identified network infrastructure as the most important facilitator of data driven decision making in their study of Ethiopian higher education institutions. The findings concerning insufficient financial resources provide further evidence that data driven decision making is dependent on institutional investment. Financial requirements may include purchasing and maintaining information systems, upgrading networks, integrating databases, employing specialized personnel, providing training, ensuring cybersecurity, and maintaining data infrastructure. Komljenovic et al. (2024) noted that universities face increasing technological and financial costs associated with establishing and maintaining digital ecosystems, including the management and storage of large amounts of data. Consequently, the present finding indicates that financial limitations may restrict universities' capacity to move from basic data collection toward sophisticated institutional analytics and systematic data driven decision making.

The findings of the present study indicate a moderate level of data literacy and utilization of technological tools for data-driven decision-making among higher education institutions. The results reveal an important gap between the availability and use of technological tools and the capacity of decision makers to effectively interpret and utilize data. This finding is consistent with recent international research indicating that higher education institutions require not only technological systems but also data literacy, professional development, and institutional cultures that enable decision makers to use data effectively (Kalaitzopoulou et al., 2025; Evenstein Sigalov et al., 2026). The present findings suggest that technological adoption requires parallel investment in human capacity and institutional support. Data driven decision making does not simply require access to data; it requires the ability to understand the quality, meaning, limitations, and implications of that data. Evenstein Sigalov et al. (2026) proposed an updated framework for data driven decision making in higher education that incorporates technological, pedagogical, and contextual data rather than treating technology as the sole basis for decision making. The finding indicates that students' academic and retention data are being used to some extent, but not at a level that would suggest fully institutionalized data driven decision making. This result is consistent with Stojanov and Daniel's (2024) which found that big data and analytics in higher education are predominantly used to support learning, while their use for teaching and administrative decision making is comparatively less developed. Learning Management System (LMS) data and learning analytics suggests that learning related data technologies are comparatively more established than formal data literacy practices. This finding is consistent with Kalaitzopoulou et al. (2025)

found that learning analytics and student data have considerable potential for improving educational practice but emphasized that staff require better data capabilities to use data effectively. The findings for institutional dashboards and ERP systems also indicate moderate technological support. This finding suggests that universities have some digital infrastructure for organizing and presenting institutional information, but these systems may not yet be fully integrated into decision making processes. Alkhwaldi et al. (2025) identified data driven decision making culture as an important antecedent of technology adoption.

Conclusion:

The findings demonstrate that the surveyed universities are moving toward a data driven decision making culture but remain in a transitional stage. Data are recognized as valuable and are used particularly for strategic planning, resource allocation, and student-related decisions. Nevertheless, the continued influence of senior officials' opinions, moderate access to reliable data, and limitations in technological tools and training indicate that traditional and data driven approaches coexist. Thus, strengthening institutional data capabilities and embedding evidence-based decision making into organizational culture may be essential for universities seeking to achieve more effective and sustainable development.

The findings demonstrate that the adoption of data driven decision making in the surveyed public sector universities is constrained by a combination of leadership, political, human-resource, technological, financial, and organizational barriers. Lack of leadership commitment emerged as the strongest overall barrier, lack of skilled personnel, limited ICT infrastructure and insufficient financial resources were also important constraints. The findings also showed that the perceptions of head of department, deans and administrative officers are same about the current data driven practices and barriers and barriers to data driven decision making.

The findings show that although universities have access to Student Information Systems (SIS), Learning Management Systems (LMS), learning analytics, institutional dashboards, Enterprise Resource Planning (ERP) systems, data visualization tools, and emerging artificial intelligence and advanced analytics applications, the development of human data capabilities has not progressed at the same pace as technological adoption. The use of student academic and retention data and learning analytics suggests that student-related digital information is increasingly incorporated into institutional practices, while the moderate utilization of dashboards, ERP systems, and advanced analytical technologies indicates that these tools have not yet become fully embedded within routine institutional decision-making processes

Recommendation:

1. Public sector universities should formally integrate data-driven decision-making into strategic planning, resource allocation, academic administration, and institutional quality assurance.
2. Regular training and professional development programmes should be provided to improve the data literacy and analytical skills of academic and administrative decision makers.

3. Senior management should provide adequate financial, technological, and human resources to support the effective implementation of DDDM.
4. Universities should make greater use of relevant student data to support student success, retention, academic performance, and timely institutional interventions.
5. Universities should minimize political interference and ensure transparent, evidence informed decision making.
6. Universities should improve ICT infrastructure and develop integrated data systems to support timely and reliable access to institutional data.
7. Universities should develop a supportive organizational culture that encourages transparent, collaborative, and evidence-informed decision-making.
8. Universities should enhance the practical use of SIS, LMS, ERP, dashboards, and learning analytics in routine institutional decision-making.

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