



## RESEARCH PAPER

# Information System Utilization and Data-Driven Decision-Making in Higher Education: Evidence from University Faculty

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## ABSTRACT

Higher education institutions increasingly rely on information systems to enable data-driven decision-making (DDDM), yet empirical evidence on how system usage, system quality, and the information quality mutually shape faculty decision behavior remains scarce. Grounded in the Technology Acceptance Model and the DeLone and McLean Information Systems Success Model, this study examines the combined influence of these three dimensions on DDDM among university faculty in Pakistan. Using a quantitative, cross-sectional survey design, data were collected from 220 faculty members across public and private universities and analyzed via Partial Least Squares Structural Equation Modeling (PLS-SEM) in SmartPLS 4. The measurement model showed satisfactory reliability, convergent validity, and discriminant validity. Structural results revealed that system usage ( $\beta = .200$ ), system quality ( $\beta = .338$ ), and information quality ( $\beta = .439$ ) each significantly and positively predicted DDDM, with information quality emerging as the strongest driver; the model explained 80.5% of the variance in DDDM ( $R^2 = .805$ ). These findings indicate that information quality, rather than system usage alone, is the primary lever for effective DDDM in higher education. The study extends technology acceptance and information systems success theory to the higher education context and offers practical guidance for strengthening information quality and system design in Pakistani universities.

**KEYWORDS** Data-Driven Decision Making, Information System Utilization, System Quality, Information Quality, Higher Education, PLS-SEM

## Introduction

Institutions in higher education generate large quantities of digital data during their normal operations. So much data that it cannot be managed in an adequate manner by means of manual systems or even by using simple spreadsheet programs. Dedicated information systems of universities are needed for these purposes. These systems are used not only for the automation of routine tasks but also to create a complete IT infrastructure to monitor, coordinate and support academic and research activities as well as to support decision making (Abugabah et al., 2015).

Data-driven decision-making (DDDM) is becoming an important criterion for the management of modern higher education institutions. For this purpose, the data that universities collect and hold in their various institutions are evaluated for teaching and research performance, for allocating resources, and for longer-term strategic planning (Akgunduz & Kinik Topalsan, 2024; Schöpfel et al., 2020). In order to facilitate the use of data from various institutions within a university for DDDM, many universities have

implemented Enterprise Resource Planning (ERP) systems. These systems integrate various administrative, financial, and academic functions within a university into one unit by means of a single technological system (Çelik & Ayaz, 2025). Although a university possesses usable data, its implementation in decision-making is problematic, however. The problems encountered by universities in using their data are of three types. First, the data that are held by various institutions within a university are scattered and fragmented (Farah Saeed et al., 2025). Second, the information that is collected from various sources within a university are not integrated, and thus cannot be easily retrieved from these various sources. Third, universities lack the practical methods and experience to transform the available data into decisions (Azeroual et al., 2019; Gaftandzhieva et al., 2023; Trinidad et al., 2024).

The effective interaction between university information systems and their principal user's faculty and staff whose academic work depends on these systems, is an issue of current relevance. To achieve the effective interaction between a university information system and users, two conditions have to be fulfilled at the same time: (1) the users must be willing to use the information system; a well-designed information system is of no use when it is not used, and (2) the information provided by the information system has to be reliable, accurate, complete and up-to-date to support the corresponding decisions (Wei & Cao, 2025). Although usable data is available, its effective incorporation into the institutional decision-making process is not given automatically.

To explore how information systems affect decision-making, first the extent to which information systems are actually used must be established. For this purpose, reference can be made to other works, such as the Technology Acceptance Model (TAM) proposed by Davis (1989) to explain the use of information y. This model assumes that there is potential for use of information systems that are perceived to be useful and easy to use. However, with use of information systems over time, ways of working are changed and affected greatly. Therefore, in addition to determining success of information systems, it is essential to establish how to achieve success of other important aspects of information systems.

The higher education sector in Pakistan, which includes universities and colleges, must properly address the three most critical core issues, and it can only succeed if these three issues are properly resolved. The first is to improve digital infrastructure, better build and put into use digital-related basic hardware and supporting conditions, and fill the gaps in this area. The second is to clarify the accountability mechanism, clearly define who is responsible for what, who to hold accountable when problems arise, and what rules to follow to enforce accountability, rather than operating in a state of ambiguity. The third is to abandon the previous practice of making arbitrary decisions, and instead make judgments and decisions in management based on actual evidence and real conditions, that is, replace arbitrary decision-making with evidence-based management.

The information systems used in universities do not merely process data from a small, isolated part of the school they must collect and handle all relevant data covering the entire campus, whether generated by teaching work, accumulated through daily administrative operations, or required for logistical support. Whether such a system can truly fulfil its functions does not depend solely on the system's own performance; it also relies on several institutional conditions of the university, a conclusion clearly stated in the 2025 study by Medero et al. The study lists three specific conditions: the university's organizational structure, the information sharing mechanism between different teams, and the core institutional characteristics of the university itself. These conditions do not exist in isolation, disconnected from one another. Instead, they are intertwined, mutually

dependent and mutually influential, with none able to function without the others. Only by thoroughly clarifying how these conditions interact and impact one another is it possible to build a viable, data-supported management framework. Understanding these interactive relationships is an indispensable, unavoidable step.

This study explores a set of functional logics among university faculty and staff within Pakistan. First, it decomposes three core dimensions used to measure the usage status of information systems. The first dimension is system usage, that is, whether the aforementioned information processing system is utilized by the group and how it is used in daily routines; the second dimension is system quality itself, that is, whether this system is easy to use; the third dimension is information quality, that is, whether the information stored in the system is reliable and of sufficiently high quality. The core issue this study aims to clarify is how the conditions of these three dimensions impact the decision-making behaviours of these faculty and staff specifically, the "data-driven decision-making behaviours" that are judged and advanced relying on data.

## **Literature Review**

The purpose of implementing Enterprise Resource Planning (ERP) systems in organizations is to enable full utilization of all information sources to support administrative activities. As noted earlier, the work performance of users of information systems can be influenced by several factors, with three critical determinants of work performance of university staff in Australian higher education institutions' being system quality, task-technology fit, and information quality. Although there are many negative aspects associated with ERP systems, more than 50% of the ERP system implementations exceed their budgets and go over their scheduled time frames and fail to deliver value as anticipated (Binrui et al., 2025; Trinidad et al., 2024). The implementation of an ERP system is mostly complex because of its implementation within a decentralized environment that includes many stakeholders, with divergent interests. The fear of stakeholders losing power and the resistance to change that many of them exhibit need to be managed (Gaftandzhieva, Hussain, Hilčenko, et al., 2023; Mustapha et al., 2023).

The Technology Acceptance Model (TAM) by Davis (1989) explains why people use information systems in work environments. Two major variables determine if users will use information systems and how much they will use them: perceived usefulness and perceived ease of use. Studies in university settings that tested the application of TAM included a study of the adoption and effective use of information systems by faculty members in higher education (Attaran et al., 2018; Macfadyen & Dawson, 2012).

In addition to ERP systems, in the last few decades higher education institutions have started to implement a wide variety of new information systems, including Research Information Management Systems (RIMS). As Braun & Clarke (2006) noted, RIMS allow universities to set up databases to collect, organize and analyze data on research involving staff and projects as well as on publications, funding and patents. Data from RIMS can be used to monitor research as well as to assess and manage academic staff and to plan the institution's strategies and development (Braun & Clarke, 2006). However, RIMS face many challenges including achieving data integration, because information systems within universities are mostly independent, scattered and disconnected (Akgunduz and Kinik Topalsan, 2024). To deal with challenges of information integration, many alternatives have been proposed, for example, an Extract-Transform-Load (ETL) framework was proposed by Azeroual et al. (2019) to cleanse and consolidate disconnected information from various independent information systems in order to produce integrated, high-quality and reliable information.

Another important area in the governance of information at the university as an institution is effective records management, enabling information to be organized, stored and made accessible for administrative and decision-making purposes (Daniel ,2015). Managing records is a process that goes through several stages of a records' lifecycle (Gaftandzhieva, Hussain, Hilčenko, et al., 2023 ; Mertler,n.d.). Initially, records were managed on an ad-hoc basis. Consequently, accessibility and reliability of information managed in this manner were limited. In terms of costs, it is established that approximately 80% of records management costs are incurred at the creation stage (Chang and Dao, 2026). Therefore, in managing information as records, systematic classification and planning are critical in the creation stage of information.

This collection of prior research highlights the critical role of information systems, whether ERP systems and/or Research Information Management Systems, to support university decision-making and thus presents new avenues for research by exploring their combined impacts in greater depth. A novel approach is provided by using Partial Least Squares Structural Equation Modeling (PLS-SEM) in order to research how the interplay of a number of different factors – system usage, system quality and information quality – can affect the extent to which university staff use data to inform their decisions, in order to move from a number of single factors to an integrated account of the effects of these different dimensions.

### **Hypothesis Development and Conceptual Framework**

Information systems support academic management, research administration, and institutional planning in higher education. Effective system utilization enables faculty members to access and use institutional information for data-driven decision-making. Prior research identifies system usage, system quality, and information quality as key determinants of information system effectiveness (Abugabah et al., 2015; Azeroual et al., 2019; Schöpfel et al., 2020). Accordingly, this study examines the effects of these three dimensions on data-driven decision-making.

#### **System Usage and Data-Driven Decision-Making**

System usage refers to the frequency and extent of faculty interaction with information systems for academic and administrative tasks. Regular use facilitates access to institutional data and supports informed decision-making (Abugabah et al., 2015).

**H1:** *System usage positively influences data-driven decision-making in universities.*

#### **System Quality and Data-Driven Decision-Making**

System quality reflects the reliability, responsiveness, usability, and functionality of information systems. Reliable and user-friendly systems facilitate efficient data access and support effective decision-making (Abugabah et al., 2015).

**H2:** *System quality positively influences data-driven decision-making in universities.*

#### **Information Quality and Data-Driven Decision-Making**

Information quality concerns the accuracy, completeness, consistency, and timeliness of system-generated information. High-quality information enables faculty members to make informed decisions, whereas poor-quality information may reduce decision effectiveness (Azeroual et al., 2019; Schöpfel et al., 2020).

**H3:** *Information quality positively influences data-driven decision-making in universities.*

### Conceptual Framework

This study presents a conceptual framework which explains how system usage, system quality and information quality affect data-driven decision making by faculty members at a university. The study draws on established models in the Information Systems literature such as the Technology Acceptance Model (TAM) and the DeLone and McLean Information Systems Success Model. A conceptual model which outlines the key variables and their relationships is presented in Figure 1.

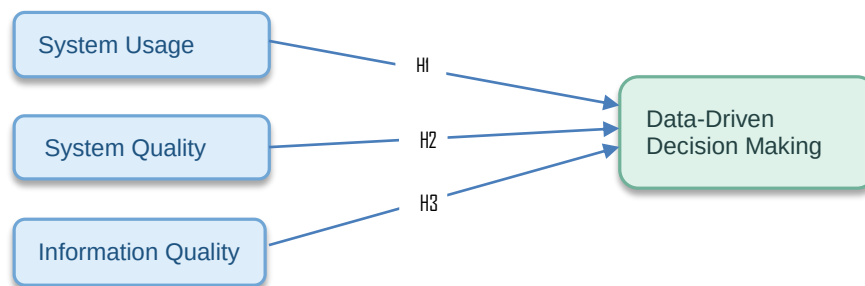


Figure 1. Conceptual framework illustrating the relationships between system usage, system quality, information quality, and data-driven decision making.

### Material and Methods

#### Research Design

This study employed a quantitative, cross-sectional survey design. Data were collected using a structured questionnaire based on a five-point Likert scale. System usage, system quality, and information quality served as the explanatory variables, while data-driven decision-making was the outcome variable.

#### Population and Sample

The target population comprised active faculty members from public and private universities in Punjab, Pakistan, who are involved in academic activities, research management, and decision-making processes and who regularly interact with institutional information systems. Data were collected through an online survey distributed across multiple public and private universities in Punjab using a convenience sampling technique. A total of 220 valid responses were obtained from faculty members across various academic ranks, including lecturers, assistant professors, associate professors, and professors.

#### Construction of Research Instrument

The questionnaire is organized into two sections. Section I includes several questions about the participants in the study, i.e. gender, age, academic position and employment at the university, teaching experience, etc. Part II contains measures for the four variables of interest, all to be rated on a 5-point Likert scale. The majority of the items in Sections II have been adapted from the Technology Acceptance Model (TAM) (Technology Acceptance Model, 1989). System quality and information quality are each measured by three items, based on the DeLone & McLean Information Systems Success Model (DeLone & McLean, 2003, 2012). Three of the items measure reliability and usability

of the system, whereas the remaining three items assess accuracy, completeness and timeliness of the information generated by the system. The eight items for the utilization of data for decision-making purposes were adapted from Abugabah et al. (2015). All items have been reviewed several times in order to check for clarity, relevance and applicability to the current study.

### Validity and reliability

To assess the measurement model of the above research, SmartPLS 4 was used to check the validity and reliability of the respective measures (Hair et al., 2022). First, all indicators had to reach a threshold of .70 (threshold  $\geq$  .70) for their standardized outer loadings. In a second step, SmartPLS 4 was used to calculate the Cronbach's alpha, the rho\_A and the composite reliability for the respective constructs. All values had to exceed the threshold of .70. The average variance extracted (AvE) was used to check the convergent validity of the respective constructs. All values had to exceed the threshold of .50. Cross-loadings, the Fornell-Larcker criterion and the HTMT ratio were used to check the discriminant validity of the respective factors.

### Data Analysis Techniques

All analyses were conducted using SPSS (version30) and SmartPLS (version 4.1.6). For the description of mean values, of standard deviations, and of the correlations, SPSS was used. To analyze the measurement model and the structural model of the research framework, Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed by using SmartPLS. For the measurement model, indicator reliability, internal consistency (inner and Cronbach's alpha), convergent validity (collateral validity and criterion validity) as well as discriminant validity (average variance extracted [AVE] exceeding shared variances of two endogenous variables) were analyzed. For the structural model, the paths within the research framework were estimated. All of the paths were tested for significance by means of bootstrapping (5,000 bootstrap samples). The coefficient of determination ( $R^2$ ) of all endogenous variables within the research framework was also estimated. All 220 valid questionnaires were included in the analysis. Because of the large number of single measures, each of them was measured at least at 10 occasions and thus the rule of at least 10 cases per indicator (Hair et al., 2022) is clearly fulfilled. Thus, the required amount of adequate data for the respective analyses is available.

## Results and Discussion

### Demographic Characteristics

**Table 1**  
**Demographic Profile of Respondents (N = 220)**

| Variable      | Category            | Frequency | Percentage (%) |
|---------------|---------------------|-----------|----------------|
| Gender        | Female              | 123       | 55.9           |
|               | Male                | 97        | 44.1           |
| Age           | Under 30            | 53        | 24.1           |
|               | 31-40               | 73        | 33.2           |
|               | 41-50               | 81        | 36.8           |
|               | Above 50            | 13        | 5.9            |
| Academic Rank | Lecturer            | 66        | 30.0           |
|               | Assistant Professor | 64        | 29.1           |
|               | Associate Professor | 76        | 34.5           |
|               | Professor           | 14        | 6.4            |

|                              |             |     |      |
|------------------------------|-------------|-----|------|
| Years of Teaching Experience | 1-5 years   | 53  | 24.1 |
|                              | 6-10 years  | 75  | 34.1 |
|                              | 11-15 years | 79  | 35.9 |
|                              | 16+ years   | 13  | 5.9  |
| University Type              | Private     | 110 | 50.0 |
|                              | Public      | 110 | 50.0 |

This study involved 220 participants with the majority of the participants (55.9%) being female and 44.1% male. The distribution of the participants in terms of type of university they were from was even, 50% from public universities and 50% from private universities. In terms of age, the majority of the participants (36.8%) were between 41 and 50 years of age. This was followed by participants who were between 31 and 40 years of age (33.2%), those under the age of 30 (24.1%), and those older than 50 years (5.9%). The demographics of the participants in terms of their level of seniority and their profession are as follows: associate professors (34.5%) were the majority followed by lecturers (30%), assistant professors (29.1%) and professors (6.4%). The distribution of the participants in terms of years of teaching experience was as follows: 11-15 years (35.9%), 6-10 years (34.1%), 1-5 years (24.1%), and more than 16 years (5.9%). See Table 1 for complete demographic profile of participants.

**Table 2**  
**Descriptive Statistics of Study Variables (N = 220)**

| Variable                           | Minimum | Maximum | Mean   | SD      | Skewness |
|------------------------------------|---------|---------|--------|---------|----------|
| System Usage (SU)                  | 1.75    | 5.00    | 3.7955 | 0.75223 | -0.184   |
| Information Quality (IQ)           | 1.33    | 5.00    | 3.9258 | 0.71516 | -0.206   |
| System Quality (SQ)                | 1.00    | 5.00    | 3.8848 | 0.78924 | -0.429   |
| Data-Driven Decision Making (DDDM) | 2.13    | 5.00    | 3.8920 | 0.70224 | -0.013   |

The descriptive statistics for the variables included in the study are presented in Table 2. Faculty perceptions of the use of information systems and data-driven decision-making were generally found to be positive, with means ranging from 3.80 to 3.93 on a 5-point scale. Of the variables included, Information quality had the highest mean ( $M = 3.93$ ,  $SD = .72$ ), followed by Data-driven decision-making ( $M = 3.92$ ,  $SD = .73$ ), Information system utilization ( $M = 3.91$ ,  $SD = .75$ ), and System usage ( $M = 3.80$ ,  $SD = .75$ ). The values for Skewness and Kurtosis for all of the variables included in the study were found to be within the acceptable ranges of  $|\text{skewness}| < 2$  and  $|\text{kurtosis}| < 7$ . Therefore, it appears that the data were distributed approximately normally and thus are appropriate for use in subsequent analyses.

**Table 3**  
**Pearson Correlation Coefficients between Study Variables (N = 220)**

| Variable                           | SU    | SQ    | IQ    | DDDM |
|------------------------------------|-------|-------|-------|------|
| System Usage (SU)                  | 1.00  |       |       |      |
| System Quality (SQ)                | 0.781 | 1.00  |       |      |
| Information Quality (IQ)           | 0.761 | 0.734 | 1.00  |      |
| Data-Driven Decision Making (DDDM) | 0.799 | 0.818 | 0.840 | 1.00 |

Note.  $N = 220$ . All correlations significant at  $p < .001$  (two-tailed).

Correlation results for the study measures are presented in Table 3. As expected, Data-driven decision-making measures strongly and positively correlated with Information quality, System quality and System usage measures ( $r = .84$ ,  $p < .001$ ;  $r = .82$ ,  $p < .001$ ;  $r = .80$ ,  $p < .001$ , respectively). While correlation is not causation, however, the structural model was investigated to more fully assess the predictive relationships among the study variables.

## Measurement Model Assessment

The measurement model of this study comprises four reflective constructs, namely System Usage (SU), System Quality (SQ), Information Quality (IQ), and Data-Driven Decision Making (DDDM). We assessed indicator loadings, internal consistency, convergent validity, and discriminant validity based on a comprehensive sample of 220 responses. For the purpose of assessing DDDM, eight indicators (DDDM1-DDDM8) were used. The other three constructs (System Usage, System Quality, and Information Quality) were assessed by four, three, and three indicators, respectively, corresponding to the eight indicators of DDDDM. The assessment was conducted by means of SmartPLS 4.

### Indicator Reliability

**Table 4**  
**Outer Loadings of the Measurement Model**

| Construct                   | Indicator | Loading |
|-----------------------------|-----------|---------|
| System Usage                | SU1       | .868    |
|                             | SU2       | .878    |
|                             | SU3       | .861    |
|                             | SU4       | .845    |
| System Quality              | SQ1       | .895    |
|                             | SQ2       | .894    |
|                             | SQ3       | .876    |
| Information Quality         | IQ1       | .849    |
|                             | IQ2       | .877    |
|                             | IQ3       | .861    |
| Data-Driven Decision Making | DDDM1     | .840    |
|                             | DDDM2     | .808    |
|                             | DDDM3     | .819    |
|                             | DDDM4     | .814    |
|                             | DDDM5     | .837    |
|                             | DDDM6     | .835    |
|                             | DDDM7     | .810    |
|                             | DDDM8     | .762    |

The standardized outer loadings ranged from .762 to .895, thus indicated acceptable indicator reliability (see Table 4). The loadings for the indicators related to System Usage were .845 to .878. System Quality's loadings were .876 to .895. The Information Quality indicators loaded between .849 and .877. The eight indicators measuring Data-Driven Decision-Making all loaded between .762 and .840. All loadings were above .70, therefore all of the indicators measured by this model were retained. Internal Consistency Reliability and Convergent Validity.

**Table 5**  
**Construct Reliability and Convergent Validity**

| AQ1                         | Cronbach's $\alpha$ | rho_A | Composite Reliability (rho_C) | AVE  |
|-----------------------------|---------------------|-------|-------------------------------|------|
| Data-Driven Decision Making | .928                | .929  | .941                          | .666 |
| Information Quality         | .827                | .829  | .897                          | .743 |
| System Quality              | .866                | .867  | .918                          | .789 |
| System Usage                | .886                | .887  | .921                          | .745 |

Table 5 presents the values for the reliability of the measurement model, i.e. the Cronbach's alpha ( $\alpha$ ), rho\_A and the composite reliability (rho\_C) for each of the first-order factors as well as the average variance extracted (AVE) for each of the factors. The values for all factors are above 0.70 for all three measures of reliability (Cronbach's alpha, avg of item-rho\_A and composite reliability of the factors). For Cronbach's alpha the average is 0.842 with a range of 0.827 to 0.928. Corresponding values for rho\_A are on average 0.86 with a range from 0.829 to 0.929. For the composite reliability of the first-order factors, the

values are on average 0.92 with a range from 0.897 to 0.941. The AVE-values for the factors are on average 0.722 with a range from 0.666 to 0.789. All of these values are greater than 0.5 and thus satisfy the test for convergent validity of the measurement model.

### Discriminant Validity

The discriminant validity of the measurement model was examined by using three different indicators, cross-loadings, the Fornell-Larcker criterion, and the heterotrait-monotrait ratio (HTMT) of correlations. The cross-loadings showed that the highest loading of all indicators was on the “right” dimension. This means that all indicators measuring Data-Driven Decision Making (DDDM) had the highest loading on DDDM, whereas Information Quality (IQ1-IQ3) was loaded highest on Information Quality, System Quality (SQ1-SQ3) on System Quality and System Usage (SU1-SU4) on System Usage.

However, one challenge appeared with the assessment of the HTMT values between Information Quality and DDDM. As depicted in Figure 14, the HTMT value of 0.958 (95% bootstrapped confidence interval: 0.903 to 1.009) includes 1.00. By contrast, the HTMT value of System Quality and DDDM equals 0.911 (95% confidence interval: 0.856 to 0.962) and thus does not include 1.00. All other HTMT values are even below 0.90. Applying the Fornell-Larcker criterion to the data, the cross-loadings for DDDM were found to be within acceptable limits, however. The findings also reveal a certain degree of conceptual and empirical overlap between DDDM and Information Quality, as illustrated by the HTMT and Fornell-Larcker values in Figure 14. In spite of these findings being defined as limitations of the measurement model, these indicators were nonetheless included in the final model, as their exclusion would have been based on arbitrary assessments.

### Structural Model Assessment

Following is the assessment of the measurement model, which is assessed through the structural model using VIF,  $R^2$ ,  $f^2$  and bootstrapped path coefficients (Figure 2).

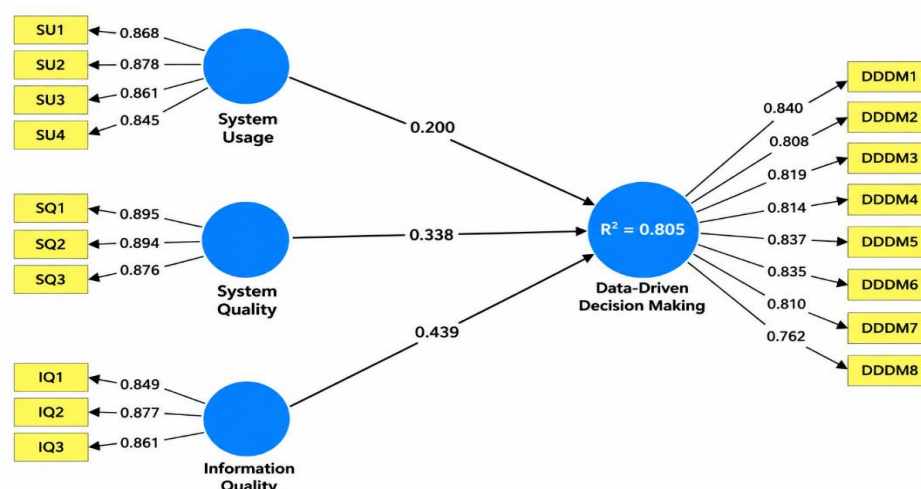


Figure 2. PLS-SEM results of the structural model.

### Collinearity Assessment

Table 6  
Inner-Model Collinearity Statistics

| Predictor                  | VIF   |
|----------------------------|-------|
| Information Quality → DDDM | 2.720 |
| System Quality → DDDM      | 2.926 |
| System Usage → DDDM        | 3.198 |

Collinearity among the predictors was assessed using inner-model VIF values (Table 6). The VIF values were 2.720 for Information Quality, 2.926 for System Quality, and 3.198 for System Usage—all below the conservative threshold of 5.00, indicating that multicollinearity did not pose a serious threat to estimation of the structural relationships.

### Coefficient of Determination.

**Table 7**  
**Coefficient of Determination**

| Endogenous Construct        | R <sup>2</sup> | Adjusted R <sup>2</sup> |
|-----------------------------|----------------|-------------------------|
| Data-Driven Decision Making | .805           | .803                    |

The model explained a substantial proportion of the variance in Data-Driven Decision Making (Table 7). The R<sup>2</sup> value for DDDM was .805, with an adjusted R<sup>2</sup> of .803, indicating that System Usage, System Quality, and Information Quality jointly explained approximately 80.5% of the variance in faculty members' data-driven decision-making

### Effect Size

**Table 8**  
**Effect Sizes**

| Relationship               | f <sup>2</sup> | Interpretation  |
|----------------------------|----------------|-----------------|
| System Usage → DDDM        | .065           | Small           |
| System Quality → DDDM      | .200           | Medium          |
| Information Quality → DDDM | .364           | Medium-to-large |

The effect size of the three predictors' impact on Data-Driven Decision Making is shown in Table 8. The analysis indicates that Information Quality has the biggest effect size (f<sup>2</sup> = .364), followed by System Quality (f<sup>2</sup> = .200), while the effect size for System Usage is smaller (f<sup>2</sup> = .065). In terms of explanatory contribution, Information Quality is therefore the most important predictor, followed by System Quality and then System Usage.

### Hypothesis Testing

**Table 9**  
**Structural Model and Hypothesis Testing**

| Hypotheses | Relationship               | β    | SD   | t     | p     | Decision  |
|------------|----------------------------|------|------|-------|-------|-----------|
| H1         | System Usage → DDDM        | .200 | .060 | 3.329 | .001  | Supported |
| H2         | System Quality → DDDM      | .338 | .060 | 5.676 | <.001 | Supported |
| H3         | Information Quality → DDDM | .439 | .057 | 7.655 | <.001 | Supported |

Tables 9 detail the results from the bootstrapping procedure running 5,000 iterations of 5,000 subsamples each. For Hypothesis 1, the relationship between System Usage and Data-Driven Decision Making was explored. The results indicated a positive correlation between the variables (β = .200, t = 3.329, p = .001). Supporting Hypothesis 2, System Quality was found to have a positive correlation with Data-Driven Decision Making (β = .338, t = 5.676, p < .001). Supporting Hypothesis 3, Information Quality was explored as the independent variable. A positive correlation was found between the variables of Information Quality and Data-Driven Decision Making (β = .439, t = 7.655, p < .001). Information Quality contained the largest standardized path coefficient, followed by System Quality and then by System Usage. Overall, these results provide empirical support for all three hypothesized relationships, indicating that faculty members' data-driven decision-making is positively associated with their use of university information systems,

the quality of those systems, and, in particular, the quality of the information those systems generate.

### Model Fit

This table shows several measures that test how well a model fits data. These are the model's SRMR (standardized root mean square residual), the difference between the model and the null model for the data (d\_ULS, d\_G), and the model's NFI (normed fit index). The SRMR for this model was approximately .050. So it was adequate. The NFI for this model was about .851. So it wasn't excellent. The two measures of discrepancy between this model and the null model for the data were .434 (d\_ULS) and .381 (d\_G). And the chi-square for this model was 485.768. Although SRMR values less than .05 are acceptable, the NFI values less than .90 are only moderate and thus fail to provide strong evidence for an excellent fit for this model.

**Table 10**  
**Model Fit**

| Fit Index  | Saturated Model | Estimated Model |
|------------|-----------------|-----------------|
| SRMR       | .050            | .050            |
| d_ULS      | .434            | .434            |
| d_G        | .381            | .381            |
| Chi-square | 485.768         | 485.768         |
| NFI        | .851            | .851            |

### Discussion

This study examined the influence of System Usage, System Quality and Information Quality on the Data-Driven Decision Making of university faculty members. In terms of statistical results, three hypotheses were supported. Information Quality had the biggest impact, followed by System Quality and then System Usage. The findings of this study offer more insight into the influencing information system characteristics of Data-Driven Decision Making within higher education.

### Information Quality and Data-Driven Decision-Making

Information Quality is the most powerful predictor of Data-Driven Decision-Making. Information Quality not only produced a significant positive effect ( $\beta = .439$ ,  $t = 7.655$ ,  $p < .001$ ) of the highest effect size ( $f^2 = .364$ ) among the variables included in the model, but the addition of Information Utilization and Information Sharing to the model provided additional insight as to the amount of variance in Data-Driven Decision-Making that was explained.

Information is constantly being generated by organizations on a daily basis. Such data, once produced, greatly affects the information that is generated by it and consequently affects the functioning of the organization's information systems (Azeroual et al., 2019). The quality of data as well as its integration within higher education organizations is crucial for enabling data-driven decision making within them (Gaftandzhieva et al., 2023). Even though a higher education organization might possess sufficient technological support for making decisions, poor data integration, inconsistencies, and data fragmentation can create a major barrier to effective decision-making within the organization. Thus, this study aimed at studying the interrelationship among three critical variables, namely Information Quality, Information Sharing and Data-Driven Decision-Making. The findings obtained from the analysis of the three variables indicated that among them Information Quality bears the greatest correlation with Data-Driven Decision-Making by Faculty Members. Thus, theoretically, Information Quality is

the most critical variable among the three variables studied within the realm of higher education organizations. Information Quality transforms the informational resources of an organization into data-driven decisions (DeLone & McLean, 2003, 2012). Information is constantly being generated by organizations on a daily basis. Such data, once produced, greatly affects the information that is generated by it and consequently affects the functioning of the organization's information systems (Azeroual et al., 2019). The quality of data as well as its integration within higher education organizations is crucial for enabling data-driven decision making within them (Gaftandzhieva et al., 2023). Even though a higher education organization might possess sufficient technological support for making decisions, poor data integration, inconsistencies, and data fragmentation can create a major barrier to effective decision-making within the organization. Thus, this study aimed at studying the interrelationship among three critical variables, namely Information Quality, Information Sharing and Data-Driven Decision-Making. The findings obtained from the analysis of the three variables indicated that among them Information Quality bears the greatest correlation with Data-Driven Decision-Making by Faculty Members. Thus, theoretically, Information Quality is the most critical variable among the three variables studied within the realm of higher education organizations. Information Quality transforms the informational resources of an organization into data-driven decisions (DeLone & McLean, 2003, 2012). Again, caution must be exercised given the high HTMT value of .958 (95% CI = .903–1.009) between Information Quality and DDDM. Thus, even though the former has been found to be positively and significantly related to the latter in the current study, future studies may need to probe more deeply into the nature of the relationship between these two closely related variables.

### **System Quality and Data-Driven Decision-Making**

System Quality had a significant positive effect on Data-Driven Decision-Making ( $\beta = .338$ ,  $t = 5.676$ ,  $p < .001$ ;  $f^2 = .200$ ), enabling faculty to use institutional data effectively. This aligns with research on information-system success (DeLone & McLean, 2003, 2012) and the contribution of ERP systems to faculty work (Abugabah et al., 2015). Notably, the effect of System Quality ( $\beta = .338$ ,  $f^2 = .200$ ) was smaller than Information Quality ( $\beta = .439$ ,  $f^2 = .364$ ), indicating that information quality is even more critical for supporting data-driven decisions.

### **System Usage and Data-Driven Decision-Making**

The findings of this study have a small effect size, with the specific value of  $f^2 = .065$ , which means the actual impact that this factor can produce is not significant. However, this conclusion is consistent with the Technology Acceptance Model proposed by Davis in 1989, as well as the research findings of Abugabah et al. in (2015). It also reconfirms that the use of this system can indeed provide support for daily work activities.

Nevertheless, the relatively modest effect of System Usage suggests that frequent system use does not by itself guarantee improved decision-making. Access to large volumes of data must be accompanied by the capacity to interpret and translate that data into meaningful information, reinforcing the broader observation that increasing data availability does not automatically produce better decisions.

### **Relative Importance of the Predictors**

There is substantial evidence to support the observed hierarchy of three variables: Information Quality ( $\beta = .439$ ) > System Quality ( $\beta = .338$ ) > System Usage ( $\beta = .200$ ). The corresponding effect sizes ( $f^2 = .364, .200, .065$ ) offer additional and consistent support of this hierarchy of variables. From a managerial perspective at universities, advantages of information systems are not to be solely pursued in technology adoption or increased System Usage. In line with the DeLone and McLean (2003, 2012) framework on the advantages of information systems, advantages are derived from several aspects of information system success. In this study the Information Quality in particular turned out to be critical for converting information system resources into decision support.

### **Explanatory Power of the Model**

#### **Theoretical Implications**

The overall model accounted for 80.5% of the variance in Data-Driven Decision-Making ( $R^2 = .805$ ; Adjusted  $R^2 = .803$ ). In other words, System Usage, System Quality and Information Quality explained a large proportion of the variance in Data-Driven Decision-Making, which confirms the core idea of the study and in addition shows how information system success models can be applied in an academic environment. Again, it has to be stressed that the model was estimated with a cross-sectional design, thus the  $R^2$  has to be understood as the model's explanatory power and not as the extent to which there are causal relations between the variables studied.

#### **Practical Implications**

University administrators must focus on the quality of information supplied to faculty and staff such as accuracy, timeliness, consistency, completeness and relevance. This echoes higher education findings around data quality and integration in supporting data-driven decision making (Gaftandzhieva et al., 2023). Furthermore, the reliability, usability, responsiveness and integration of existing systems must also be prioritized. Since the effect of System Usage was the smallest of the three studied variables ( $\beta = .200$ ), greater emphasis needs to be placed on assisting faculty develop analytic capabilities to interpret and make organizational decisions using the institutional data currently at their disposal. Simply using a system does not translate into organizational improvements for faculty and staff.

#### **Limitations and Future Research**

The use of a cross-sectional design, and reliance on self-reported data in this study constrains causal interpretation. Future research could benefit from a longer-term design, and use of objective data regarding system use, as well as additional variables such as the respondents' data literacy, analytical ability, leadership support and organizational culture. The considerable overlap between Information Quality and Data-Driven Decision Making (DDDM) indicates that these two constructs are in need of further refinement in future measurement models.

#### **Conclusion**

The study investigated relationships between several variables influencing data-driven decision making by faculty members at universities in Pakistan. The results indicated positive relationships between data-driven decision making and system usage, system quality, and information quality. Of these, information quality was the strongest predictor,

followed by system quality and system usage. The model explained 80.5% of the variance in data-driven decision making by the faculty members ( $R^2 = .805$ ). The findings stressed the significance of information-system characteristics for the utilization of institutional data by faculty members for their decisions. The most significant contribution of this study is the identification of information quality as the dominant predictor among the three factors examined, indicating that higher education institutions should look beyond mere technology adoption and system usage to focus on the accuracy, completeness, and reliability of the information their systems generate. Reliable systems and consistent system use remain necessary, but their value is diminished when the underlying information is inaccurate, outdated, or difficult to interpret. Taken together, these findings suggest that universities seeking to strengthen data-driven decision-making must adopt an integrated approach that combines high-quality information, dependable information systems, and purposeful system use, thereby supporting more informed academic and institutional decisions and advancing evidence-based practice in higher education.

### Recommendations

Building on these findings, universities should prioritize information quality by establishing data governance practices that ensure accuracy, completeness, consistency, and timeliness, including routine data audits and standardized data-entry protocols. System quality should be strengthened through improved reliability, responsiveness, and integration of institutional information systems, supported by consistent technical maintenance. Because system usage exerted the weakest effect, institutions should not assume that expanding system adoption alone will improve decision-making; faculty should instead be equipped with the data literacy and analytical skills needed to translate system-generated information into sound decisions. Reducing data fragmentation by integrating ERP, research information, and records management systems into a unified infrastructure would further improve consistency across institutional data sources. At the policy level, universities should formalize expectations that academic and administrative decisions be grounded in institutional data, backed by adequate training and resource allocation. Future research should employ longitudinal designs and objective measures of system use, examine additional factors such as leadership support and organizational culture, and clarify the conceptual distinction between information quality and data-driven decision-making, given the overlap observed in this study's measurement model.

### Declarations

#### Authors' Contribution

| Name of Author        | C | M | So                             | Va | Fo | I | R | D | O                        | E | Vi | Su | P | Fu |
|-----------------------|---|---|--------------------------------|----|----|---|---|---|--------------------------|---|----|----|---|----|
| Farah Saeed           | ✓ | ✓ | ✓                              | ✓  | ✓  | ✓ |   | ✓ | ✓                        | ✓ |    |    | ✓ | ✓  |
| Sara Saeed            |   | ✓ |                                |    |    | ✓ | ✓ | ✓ | ✓                        | ✓ | ✓  | ✓  |   |    |
| Bambang Budi Wiyono   | ✓ |   | ✓                              | ✓  |    |   | ✓ |   |                          | ✓ | ✓  | ✓  | ✓ |    |
| C : Conceptualization |   |   | I : Investigation              |    |    |   |   |   | Vi : Visualization       |   |    |    |   |    |
| M : Methodology       |   |   | R : Resources                  |    |    |   |   |   | Su : Supervision         |   |    |    |   |    |
| So : Software         |   |   | D : Data Curation              |    |    |   |   |   | P : Project              |   |    |    |   |    |
| Va : Validation       |   |   | O : Writing - Original Draft   |    |    |   |   |   | administration           |   |    |    |   |    |
| Fo : Formal analysis  |   |   | E : Writing - Review & Editing |    |    |   |   |   | Fu : Funding acquisition |   |    |    |   |    |

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The authors declared that no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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**Ethical Considerations**

The research observed all the appropriate ethical code of conduct of the affiliated institution. A voluntary participation was guaranteed for all participants. Throughout the research, participants' anonymity and confidentiality were respected. No personally identifiable information was collected from participants through their responses. All information collected from participants through their responses would remain confidential and would only be used within the scope of the present research.

**AI Use Statement**

The author declared no artificial intelligence (AI) tools were used to generate, analyze, or interpret the research data or to produce the scientific findings reported in this article. The authors take full responsibility for the content, analysis, interpretation, and conclusions presented in the manuscript.

**Data Availability Statement**

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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