

## ปัจจัยที่มีอิทธิพลต่อการนำเทคโนโลยีบิ๊กดาต้ามาใช้ในการดำเนินการ ของมหาวิทยาลัย

### The Influencing Factors of University Management's Big Data Technology Adoption

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#### บทคัดย่อ

บิ๊กดาต้าเป็นแนวคิดและเทคโนโลยีที่ได้รับความนิยมมากที่สุดในช่วงไม่กี่ปีที่ผ่านมา โดยมีอิทธิพลอย่างลึกซึ้งต่อการทำงาน ชีวิต และการศึกษาของ Liu & Zhou, 2018 มีหลายปัจจัยที่ส่งผลต่อการใช้เทคโนโลยีบิ๊กดาต้าในการจัดการมหาวิทยาลัย โดยเฉพาะปัจจัย TOE (เทคโนโลยี องค์กร และสิ่งแวดล้อม) ดังนั้นการศึกษานี้จึงมุ่งเน้นไปที่การตรวจสอบผลกระทบของปัจจัย TOE เหล่านี้ร่วมกับปัจจัยด้านประชากรศาสตร์ที่มีต่อการนำเทคโนโลยีบิ๊กดาต้ามาใช้ในการศึกษานี้ใช้แนวทางเชิงปริมาณโดยอิงจากแบบสอบถามที่ออกแบบเป็น 2 ภาษา ทั้งภาษาอังกฤษและภาษาจีน ในการศึกษาที่ใช้ผู้บริหารมหาวิทยาลัยในพื้นที่ของวิทยาลัยอาชีวศึกษาเศรษฐกิจและการค้าแห่งหนานหนานเป็นประชากร ผลที่ได้จากการศึกษาบ่งชี้ว่า ความแตกต่างในรายได้ต่อเดือน ตำแหน่งงาน และประสบการณ์การทำงานสร้างความแตกต่างในการนำเทคโนโลยีบิ๊กดาต้ามาใช้ จากการวิเคราะห์การถดถอยเชิงเส้นหลายตัวแปร พบว่า บริบททางเทคโนโลยีของมหาวิทยาลัย บริบทองค์กรของมหาวิทยาลัย และบริบทด้านสิ่งแวดล้อมของมหาวิทยาลัยมีผลกระทบเชิงบวกต่อการนำเทคโนโลยีบิ๊กดาต้ามาใช้

**คำสำคัญ:** การนำเทคโนโลยีบิ๊กดาต้ามาใช้ บริบททางเทคโนโลยีของมหาวิทยาลัย บริบทองค์กรของมหาวิทยาลัย  
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## Abstract

Big data is one of the most popular concepts and technologies in recent years. It has brought profound influence to our work, life, and study (Liu & Zhou, 2018). There are many factors affecting the use of big data technology in university management particularly the TOE (technology, organization, and environment) factor. Therefore, this paper aims to investigate the impacts of these TOE factors together with the demographic factors on the big data technology adoption. The quantitative method is applied in this study based on questionnaires which is designed in bilingual English and Chinese. The local university administrators of Yunnan Vocational College of Economy and Trade are used as population in this paper. The results obtained from the study indicate that differences in monthly income, working position, and working experiences generate differences in Big Data Technology Adoption. Based on the Multiple Linear Regression Analysis, it is found that University Technological Context, University Organizational Context, and University Environmental Context have positive impacts on Big Data Technology Adoption.

**Keywords:** Big Data Technology Adoption, University Technological Context, University Organizational Context, University Environmental Context

## Introduction

The amount of data in the field of university management is relatively small and the data noise is large, and because of its public welfare and non-profit characteristics, few people make use of information technology and big data to improve the efficiency of university management. The application of big data technology in university management has become an inevitable choice, but the application of big data technology in university management will be affected by many factors particularly these three factors, namely, technological context, organizational context, and environmental context.

In terms of technological context, the application of big data technology in the curriculum management plays an important role and helps improve the efficiency of curriculum teaching. However, teachers' ability in the application of big data is seriously insufficient and cannot meet the practical needs (Kim & Swanson, 2018). With respect to organizational context,

Wang and Xu (2020) indicate that the current efficient information management still lacks clear mechanism guarantees, and the motivation for information work is clearly insufficient. As far as the environmental context is concerned, Wu and Dong (2019) state that there are still many drawbacks in university data governance and many problems in university data. Clarifying these 3 influencing factors discussed above is of great significance for the rational application of big data and the improvement of university management efficiency. Therefore, this paper aims to investigate the impacts of TOE (technology, organization, and environment) factors together with the demographic factors on the big data technology adoption.

## Literature Review

### The Technology–Organization–Environment (TOE) Framework

The Technology–Organization–Environment (TOE) Framework is an organization-level theory explaining that three different elements of a firm's context influence adoption decisions. These three elements are the technological context, the organizational context, and the environmental context. All three are posited to influence technological innovation. (Baker, 2011; Ma, 2020; Wang, 2021). Sivarajah et al. (2024) find that both innovation capability and firm performance are significantly influenced by big data technology. However, Gangwar (2018) argues that TOE framework does not reveal the combination of technology, organization, and environment variables to affect the level of technology application in an organization.

### The Technological Context

The technological context includes all of the technologies that are relevant to the firm, that is, technologies that are already in use at the firm as well as those that are available in the marketplace but not currently in use. A firm's existing technologies are important in the adoption process because they set a broad limit on the scope and pace of technological change that a firm can undertake (Collins et al., 1988). Within the group of innovations that exists outside the firm are innovations of three types, those that create incremental, synthetic, or discontinuous changes. Innovations that produce incremental change, introduce new features or new versions of existing technologies represent the least amount of risk and change for the adopting organization (Tushman & Nadler, 1986).

Zhao (2019) states that building high-level digital campuses is an inevitable requirement for information management, and in order to achieve this goal, information technology should be emphasized. Alshqirate et al. (2019) state that the application of new technologies represented by big data in higher education will play a key role, and the establishment of integrated learning analysis solutions can improve the level of teaching management.

### **The Organizational Context**

The organizational context refers to the characteristics and resources of the firm, including linking structures between employees, intra-firm communication processes, firm size, and the amount of slack resources. There are several ways in which this context affects adoption and implementation decisions such as mechanisms that link internal subunits of the organization or span internal boundaries promote innovation (Galbraith, 1973). Top management can foster innovation by creating an organizational context that welcomes change and is supportive of innovations that further the firm's core mission and vision (Tushman & Nadler, 1986). Cai (2020) states that university information management should not only focus on the application of information technology, but also pay attention to management. Yu and Li (2020) state that university data governance is a new organizational method formed after the full development of big data in education. Thabit et al. (2020) suggested that in terms of content governance, decision-making, responsibility allocation of governance subjects, and monitoring of governance processes should be further optimized; Ford et al. (2017) state that data governance structure, roles and responsibilities of various entities in data governance, evaluation of data governance actions, and data governance policies will have a direct impact on the final effect of data governance. Prado et al. (2021) state that data governance has become an important guarantee for enterprise management to maintain stable operation. Apart from the data governance described above, Shu (2020) states that it is necessary to further integrate existing resources, achieve resource sharing, and gradually improve the level of management services to meet the teaching needs of universities. Sun and Zheng (2019) state that in the interaction between technology and organization, the characteristics of technology will affect a series of behaviors such as the adoption and application of technology.

### **The Environmental Context**

The environmental context includes the structure of the industry, the presence or

absence of technology service providers, and the regulatory environment. Industry structure has been investigated in several ways. For instance, intense competition stimulates the adoption of innovation (Mansfield, 1968; Mansfield et al., 1977). Also, dominant firms within the value chain can influence other value chain partners to innovate (Kamath & Liker, 1994). With regard to industry life cycle, it is argued that firms in rapidly growing industries tend to innovate more rapidly. In mature or declining industries, however, innovation practices are not clear-cut (Tornatzky & Fleischer, 1990). Firms that must pay high wages for skilled labor are often compelled to innovate through labor-saving innovations (Levin et al., 1987). Similarly, stringent safety and testing requirements can retard innovation in numerous industries. (Rees et al., 1984).

### Research Methodology

The quantitative method is applied in this study based on questionnaires. The local university administrators of Yunnan Vocational College of Economy and Trade are used as population in this paper. Since this population is uncountable due to the safety reasons, the sample size ( $n$ ) under the formula of Yamane (1967) is equal to approximately 400 units. However, in this study 405 units of questionnaires are needed by distributing to 3 different groups, namely, management cadres, grass-roots employees, and relevant teachers with 135 questionnaires for each group. The Multi-stage Sampling Method is applied in this study. In the first stage, the method of stratified sampling is adopted to select three groups from Yunnan Vocational College of Economy and Trade. In the second stage, a fixed sample size of 135 units is introduced for each group, and in the third stage, a convenience sampling method is used. The questionnaire is designed in bilingual English and Chinese. The validity of the questionnaires is successful under the IOC concept. The reliability test of University Technical Context, University Organizational Context, University Environmental Context University Environmental Context, and Big Data Technology Adoption are all successful evident by their Cronbach's  $\alpha$  Coefficients that are all higher than 0.8. The research selected the most appropriate descriptive statistics such as absolute frequency, percent frequency, arithmetic mean, and standard deviation to describe the data. For the arithmetic mean, the criteria for interpreting these means are based on Best (1970).

## Research Findings

## 1. Descriptive Statistics

## Demographic Factors

**Table 1** The Absolute Frequency and Percent Classified by Demographic Factors

| Demographic Factors |  | Classification                        | Frequency | Percent |
|---------------------|--|---------------------------------------|-----------|---------|
| Gender              |  | Male                                  | 166       | 40.99   |
|                     |  | Female                                | 239       | 59.01   |
| Age                 |  | 20 but less than 25 years old         | 219       | 54.07   |
|                     |  | 25 but less than 35 years old         | 135       | 33.33   |
|                     |  | 35 but less than 45 years old         | 42        | 10.37   |
|                     |  | 45 years old and higher               | 9         | 2.22    |
| Educational Level   |  | High School                           | 5         | 1.23    |
|                     |  | Junior College                        | 94        | 23.21   |
|                     |  | Bachelor's Degree                     | 207       | 51.11   |
|                     |  | Master's Degree or above              | 99        | 24.44   |
| Monthly Income      |  | Less than 3,000 yuan                  | 77        | 19.01   |
|                     |  | 3,000 but less than 5,000 yuan        | 151       | 37.28   |
|                     |  | 5,000 but less than 10,000 yuan       | 136       | 33.58   |
|                     |  | 10,000 yuan but less than 15,000 yuan | 23        | 5.68    |
|                     |  | 15,000 yuan and more                  | 18        | 4.44    |
| Job Position        |  | Grass-roots staff                     | 295       | 72.84   |
|                     |  | Middle-level cadres                   | 81        | 20.00   |
|                     |  | Senior leader                         | 29        | 7.16    |
| Working Experiences |  | Less than 1 year                      | 61        | 15.06   |
|                     |  | 1 years but less than 3 years         | 138       | 34.07   |
|                     |  | 3 years but less than 5 years         | 85        | 20.99   |
|                     |  | 5 years but less than 10 years        | 65        | 16.05   |
|                     |  | 10 years and above                    | 56        | 13.83   |
| Total               |  |                                       | 405       | 100.00  |

The descriptive statistical results of various demographic indicators shown in Table 1 suggest that there are relatively few males compared to females among the samples participating in this survey. In terms of age, most students are between 20 but less than 35 years old accounting for more than 87%. With respect to educational level, most of them recording about 51.11% enjoy Bachelor's Degree following by Master's Degree or Higher which is recorded as about 24.44%. They mostly have monthly income between 3,000 but less than 10,000 yuan accounting for approximately 71%. Most of them are grass-roots employees registering about 72.84%. With respect to working experiences, most of them gain 1 year but less than 3 years, following by 3 years but less than 5 years, and 5 years but less than 10 years, respectively.

### 1.2 Technology–Organization–Environment (TOE)

**Table 2** Descriptive Statistics of TOE (Technology–Organization–Environment)

| Classification         | Mean   | Standard Deviation | Mean Rank | Meaning |
|------------------------|--------|--------------------|-----------|---------|
| Environmental Context  | 4.0770 | .84500             | 1         | Agree   |
| Technological Context  | 4.0167 | .80467             | 2         | Agree   |
| Organizational Context | 3.9321 | .86994             | 3         | Agree   |
| TOE                    | 4.0086 | .78814             | -         | Agree   |

The results obtained from Table 2 review that Environmental Context is the most essential characteristic with a mean value of approximately 4.0770 following by Technological Context with a mean value of 4.0167 and Organizational Context with a mean value of 3.9321. For the overall, its mean value is recorded as about 4.0086 which is on the level of agree defined in the questionnaires. The Comparative Advantage is found to be the most important component of Technological Context while University Teaching is the most significant aspect of Organizational Context and Competitive Pressure is the most significant aspect of Environmental Context. (Table 3, Table 4, and Table 5).

**Table 3** Descriptive Statistics of Technological Context

| Classification        | Mean   | Standard Deviation | Mean Rank | Meaning |
|-----------------------|--------|--------------------|-----------|---------|
| Comparative Advantage | 4.2280 | .95261             | 1         | Agree   |
| Compatibility         | 4.1342 | .92118             | 2         | Agree   |
| Perceived Cost        | 3.9523 | .92003             | 3         | Agree   |

**Table 3** Descriptive Statistics of Technological Context (Continued)

| Classification        | Mean   | Standard Deviation | Mean Rank | Meaning |
|-----------------------|--------|--------------------|-----------|---------|
| Complexity            | 3.7523 | 1.02677            | 4         | Agree   |
| Technological Context | 4.0167 | .80467             | -         | Agree   |

**Table 4** Descriptive Statistics of Organizational Context

| Classification              | Mean   | Standard Deviation | Mean Rank | Meaning |
|-----------------------------|--------|--------------------|-----------|---------|
| University Teaching         | 3.9835 | .91393             | 1         | Agree   |
| Organizational Support      | 3.9350 | .92508             | 2         | Agree   |
| University Management Level | 3.9086 | .97191             | 3         | Agree   |
| Financial Ability           | 3.9012 | .95447             | 4         | Agree   |
| Organizational Context      | 3.9321 | .86994             | -         | Agree   |

**Table 5** Descriptive Statistics of Environmental Context

| Classification        | Mean   | Standard Deviation | Mean Rank | Meaning |
|-----------------------|--------|--------------------|-----------|---------|
| Competitive Pressure  | 4.1210 | .87748             | 1         | Agree   |
| Government Support    | 4.0329 | .91258             | 2         | Agree   |
| Environmental Context | 4.0770 | .84500             | -         | Agree   |

### 1.3 Big Data Technology Adoption

**Table 6** Descriptive Statistics of Big Data Technology Adoption

| Classification       | Mean   | Standard Deviation | Mean Rank | Meaning |
|----------------------|--------|--------------------|-----------|---------|
| Behavioral Intention | 4.1358 | .88406             | 1         | Agree   |
| Actual Act           | 3.9432 | .90001             | 2         | Agree   |
| Adoption of Big Data | 4.0395 | .83676             | -         | Agree   |

It is evident from Table 6 that Behavioral Intention is more important than Actual Act since the mean of the former, 4.1358, is higher than the latter, 3.9432. In overall, the mean value of Big Data Technology Adoption, 4.0395, is evaluated in the agree level.

## 2. Inferential Statistics

### 2.1 Differences in Demographic Factors Generate Differences in Big Data Technology Adoption

#### 2.1.1 Differences in Gender Generate Differences in Big Data Technology Adoption

$$H_0 : \mu_1 = \mu_2$$

$$H_a : \mu_1 \neq \mu_2$$

Where  $\mu$  is the mean of Big Data Technology Adoption classified by Gender Factor.

**Table 7** The Independent Samples t-test of the Gender Factor

| Factor | Classification | N   | Mean   | Standard Deviation | t-value | p-value |
|--------|----------------|-----|--------|--------------------|---------|---------|
| Gender | Male           | 166 | 4.0924 | .83576             | 1.060   | .290    |
|        | Female         | 239 | 4.0028 | .83724             |         |         |

\*. The mean difference is significant at the 0.05 level.

From Table 7, it can be seen that the p-value of Big Data Technology Adoption with respect to Gender is about 0.290 which is much higher than the critical value of 0.05. Therefore, the null hypothesis ( $H_0$ ) cannot be rejected which implies that differences in Gender generate no differences in Big Data Technology Adoption.

#### 2.1.2 Differences in Age, Educational Level, Monthly Income, Job Position, and Working Experiences Generate Differences in Big Data Technology Adoption

$$H_0 : \mu_i = \mu_j$$

$$H_a: \mu_i \neq \mu_j \text{ at last one Pair where } i \neq j.$$

Where  $\mu$  is the mean of Big Data Technology Adoption classified by Age, Educational Level, Monthly Income, Job Position, and Working Experiences while  $i$  and  $j$  are the components of Age, Educational Level, Monthly Income, Job Position, and Working Experiences

**Table 8** The One-Way ANOVA of Age, Educational Level, Monthly Income, Job Position, and Working Experiences

| Factor              | Classification | SS      | Df  | MS    | F=value | p-value |
|---------------------|----------------|---------|-----|-------|---------|---------|
| Age                 | Between Groups | 1.047   | 3   | .349  | .497    | .685    |
|                     | Within Groups  | 281.821 | 401 | .703  |         |         |
|                     | Total          | 282.868 | 404 |       |         |         |
| Educational Level   | Between Groups | .517    | 3   | .172  | .245    | .865    |
|                     | Within Groups  | 282.351 | 401 | .704  |         |         |
|                     | Total          | 282.868 | 404 |       |         |         |
| Monthly Income      | Between Groups | 8.935   | 4   | 2.234 | 3.262   | .012*   |
|                     | Within Groups  | 273.933 | 400 | .685  |         |         |
|                     | Total          | 282.868 | 404 |       |         |         |
| Job Position        | Between Groups | 4.490   | 2   | 2.245 | 3.242   | .040*   |
|                     | Within Groups  | 278.378 | 402 | .692  |         |         |
|                     | Total          | 282.868 | 404 |       |         |         |
| Working Experiences | Between Groups | 11.809  | 4   | 2.952 | 4.357   | .002*   |
|                     | Within Groups  | 271.059 | 400 | .678  |         |         |
|                     | Total          | 282.868 | 404 |       |         |         |

\*. The mean difference is significant at the 0.05 level.

It is evident from Table 8 that the p-value of Big Data Technology Adoption with respect to Age and Educational Level are approximately .685 and .865, respectively which are much higher than the critical value of 0.05. Therefore, the null hypothesis ( $H_0$ ) of these two aspects cannot be rejected meaning that differences in Age and Educational Level generate no differences in Big Data Technology Adoption. On the contrary, the p-values of Monthly Income, Job Position, and Working Experiences are about .012, .040, and .002, respectively which are much lower than the critical value of 0.05. Therefore, the null hypothesis ( $H_0$ ) of these three aspects are rejected meaning that differences in these three factors generate differences in Big Data Technology Adoption.

## 2.2 The Influence of TOE (Technology, Organization, and Environment) Contexts on Big Data Technology Adoption

The results from the Multiple Linear Regression Analysis of TOE Contexts on Big Data Technology Adoption is presented in terms of predicted value of Y ( $\hat{Y}$ ) in equation (1).

$$\begin{aligned} \hat{Y} = & .392 + .137X_1 + .345X_2 + .427X_3 \\ & (.000) (.003) (.000) (.000) \dots\dots\dots(1) \\ & \text{Adjusted } R^2 = 0.761 \end{aligned}$$

Where Big Data Technology Adoption (Y), Technological Context ( $X_1$ ), Organizational Context ( $X_2$ ), Environmental Context ( $X_3$ )

From equation (1), Environmental Context ( $X_3$ ) is the most important factor influencing on Big Data Adoption (Y) with a coefficient of about .427 following by Organizational Context ( $X_2$ ) and Technological Context ( $X_1$ ) the coefficients of which are .345, and .137, respectively. The Adjust  $R^2$  of this Multiple Linear Regression is approximately .761 which is very high for cross-sectional data meaning that one unit change of these 3 factors, namely, Technological Context ( $X_1$ ), Organizational Context ( $X_2$ ) and Environmental Context ( $X_3$ ) will cause the Big Data Adoption (Y) changes in the same direction of about 0.761 unit.

However, in order to intensively understand the influences of these 3 factors, namely, Technological Context ( $X_1$ ), Organizational Context ( $X_2$ ), and Environmental Context ( $X_3$ ) on Big Data Adoption (Y). It is better to find which component of these 3 factors plays an important role on Big Data Adoption. As far as the Technological Context ( $X_1$ ) is concerned, its components are Comparative Advantage ( $X_{11}$ ), Compatibility ( $X_{12}$ ), Complexity ( $X_{13}$ ), and Perceived Cost ( $X_{14}$ ). With respect to Organizational Context ( $X_2$ ), its components are Manager Support ( $X_{21}$ ), Financial Ability ( $X_{22}$ ), Management Level ( $X_{23}$ ), and Teaching Level ( $X_{24}$ ). Regarding Environmental Context ( $X_3$ ), its components are Government Support ( $X_{31}$ ) and Competitive Pressure ( $X_{32}$ ).

### 2.2.1 The Influence of Technological Context on Big Data Technology Adoption

The results obtained from the Multiple Linear Regression Analysis of Technological Context is presented in terms of predicted value of Y ( $\hat{Y}$ ) in equation (2).

$$\begin{aligned} \hat{Y} = & .806 + .089X_{11} + .326X_{12} + .089X_{13} + .297X_{14} \\ & (.000) (.025) (.000) (.035) (.000) \dots\dots\dots(2) \end{aligned}$$

$$\text{Adjusted } R^2 = 0.600$$

Where Big Data Technology Adoption (Y), Competitive Advantage ( $X_{11}$ ), Compatibility ( $X_{12}$ ), Complexity ( $X_{13}$ ), and Perceived Cost ( $X_{14}$ ).

From equation (2), Compatibility ( $X_{12}$ ) is the most important factor influencing on Big Data Adoption (Y) with a coefficient of about .326 following by Perceived Cost ( $X_{14}$ ), Competitive Advantage ( $X_{11}$ ), and Complexity ( $X_{13}$ ) the coefficients of which are .297, .089, and .089 respectively. The Adjust  $R^2$  of this Multiple Linear Regression is approximately .600 which is quite good for cross-sectional data meaning that one unit change of these 4 factors, namely, Competitive Advantage ( $X_{11}$ ), Compatibility ( $X_{12}$ ), Complexity ( $X_{13}$ ), and Perceived Cost ( $X_{14}$ ) will cause the Big Data Adoption (Y) changes in the same direction of about 0.600 unit.

### 2.2.2 The Influence of Organizational Context on Big Data Technology Adoption

The results obtained from the Multiple Linear Regression Analysis of Organizational Context is presented in terms of predicted value of Y ( $\hat{Y}$ ) in equation (3).

$$\begin{aligned} \hat{Y} = & .833 + .223X_{21} + .092X_{22} + .116X_{23} + .381X_{24} \\ & (.000) (.000) (.069) (.031) (.000) \dots\dots\dots(3) \\ \text{Adjusted } R^2 = & 0.700 \end{aligned}$$

Where Big Data Technology Adoption (Y), Manager Support ( $X_{21}$ ), Financial Ability ( $X_{22}$ ), University Management Level ( $X_{23}$ ), and University Teaching Level ( $X_{24}$ ).

It can be concluded from equation (3) that University Teaching Level ( $X_{24}$ ) is the most important factor influencing on Big Data Adoption (Y) with a coefficient of about .381 following by Manager Support ( $X_{21}$ ), University Management Level ( $X_{23}$ ), and Financial Ability ( $X_{22}$ ) the coefficients of which are about .223, .116, and .092, respectively. However, for Financial Ability ( $X_{22}$ ), it is significant at the critical level of .1 while others are significant at the critical level of .05. The Adjust  $R^2$  of this Multiple Linear Regression is approximately .700 which is very high for cross-sectional data meaning that one unit change of these 4 factors, namely, Manager Support ( $X_{21}$ ), Financial Ability ( $X_{22}$ ), University Management Level ( $X_{23}$ ), and University Teaching Level ( $X_{24}$ ) will cause the Big Data Adoption (Y) changes in the same direction of about 0.700 unit.

### 2.2.3 The Influence of Environmental Context on Big Data Adoption

The results obtained from the Multiple Linear Regression Analysis of Environmental Context is presented in terms of predicted value of  $Y$  ( $\hat{Y}$ ) in equation (4).

$$\hat{Y} = .633 + .391X_{31} + .444X_{32}$$

(.000) (.000) (.000) .....(4)

Adjusted  $R^2 = 0.708$

Where Big Data Technology Adoption ( $Y$ ), Government Support ( $X_{31}$ ), and Competitive Pressure ( $X_{32}$ )

From equation (4), Competitive Pressure ( $X_{32}$ ) is found out to be more important than Government Support ( $X_{31}$ ) when Big Data Adoption ( $Y$ ) is concerned. The coefficient of the former is about .444 compared to .391 of the latter. The Adjust  $R^2$  of this Multiple Linear Regression is approximately .708 which is higher than those of the Technological Context and Organizational Context which are .600 and .700, respectively.

### 2.2.4 Summary Results of Hypothesis Testing

**Table 9** The Summary Results of Hypothesis Testing

| Hypothesis                            | Not Reject $H_0$ | Reject $H_0$ |
|---------------------------------------|------------------|--------------|
| Hypothesis 1                          |                  |              |
| 1.1 Gender                            | .290             |              |
| 1.2 Age                               | .685             |              |
| 1.3 Education Level                   | .865             |              |
| 1.4 Monthly income                    |                  | .012*        |
| 1.5 Job Position                      |                  | .040*        |
| 1.6 Working Experiences               |                  | .002*        |
| Hypothesis 2: TOE Contexts            |                  |              |
| Technological Context                 |                  | .003*        |
| Organizational Context                |                  | .000*        |
| Environmental Context                 |                  | .000*        |
| Hypothesis 2.1: Technological Context |                  |              |
| Comparative Advantage                 |                  | .025*        |

**Table 9** The Summary Results of Hypothesis Testing (Continued)

| Hypothesis                             | Not Reject $H_0$ | Reject $H_0$ |
|----------------------------------------|------------------|--------------|
| Compatibility                          |                  | .000*        |
| Complexity                             |                  | .035*        |
| Perceived Cost                         |                  | .000*        |
| Hypothesis 2.2: Organizational Context |                  |              |
| Manager Support                        |                  | .000*        |
| Financial Ability                      | .069             |              |
| University Management Level            |                  | .031*        |
| University Teaching Level              |                  | .000*        |
| Hypothesis 2.3: Environmental Context  |                  |              |
| Government Support                     |                  | .000*        |
| Competitive Pressure                   |                  | .000*        |

\*Significant at 0.05 critical level.

## Conclusion and Discussion

Environmental Context is found out to be the most essential components of TOE following by Technological Context and Organizational Context. The Comparative Advantage is the most important component of Technological Context while University Teaching and Competitive Pressure are the most significant aspects of Organizational Context and Environmental Context, respectively.

Regarding Inferential Statistics, differences in Monthly Income, Job Position, and Working Experiences generate differences in Big Data Technology Adoption. On the contrary, differences in Gender, Age, and Educational Level generate no differences in Big Data Technology Adoption. These findings are inconsistent with the Pew Research Center in November 2021 which found that gender differences in the overall impact of technology on society and some of the security issues associated with big data applications.

The results obtained from the Multiple Linear Regression Analyses show that there are significant positive impacts of all aspects of Technological Context (Competitive Advantage, Compatibility, Complexity, and Perceived Cost) on Big Data Technology Adoption. These findings

are consistent with the following authors. Abbas et al. (2019) reveal that technology acceptance, its ease of use, and its perceived benefits play a decisive role in students' decisions to use social media which is playing an indispensable role on the learning behavior of university students to achieve sustainable education. Sun et al. (2019) find that the factors relative advantage, technological competence, technology resources, support from top management, competitive pressure, and the regulatory environment all have a significant impact on the organizational adoption of big data. These findings contribute to the development of a better understanding of precisely how the big data diffusion process across industries functions in B2B practice. Zhang et al. (2021) find that big data such as the development of digital technology brings new opportunity to the wisdom campus construction, large data mining will provide the source of data for wisdom campus construction services, and modeling of large data organization, is the key to dig up data values. The organic combination of two aspects can help to campus network management, student life, teaching, and other aspects of efficient integration. Zhang (2022) finds that the accounting informatization construction solutions combined with big data and artificial intelligence can be used in accounting personnel training, accounting platform security hidden danger investigation and college accounting. Internal control and other directions are superior to the traditional accounting informatization construction plan.

Kiong (2022) finds that incorporating electronic resources into their lessons increases student engagement and leads to better outcomes. Technology and internet connectivity, as well as teacher training and support, are essential for the successful integration of technology in rural education. Hicham and Anis (2022) find that the proposed algorithms speed-up and scale-up well with regard to the variation of both data size and the number of nodes in the cluster. Xi and Sonbull (2022) find that the running time of the improved algorithm is obviously shortened, and the time complexity is small. Because the algorithm uses Boolean matrix and stores Boolean values "0" or "1," the space complexity is also small. Therefore, the improved Apriori algorithm I++ is faster and more efficient. Zhao (2019) states that building high-level digital campuses is an inevitable requirement for information management, and in order to achieve this goal, information technology should be emphasized. All departments in universities should participate in the construction of information technology, and managers and functional

departments should scientifically and effectively utilize information technology and bring it into the construction of organizational structures.

Three aspects of Organizational Context, namely, Manager Support, University Management Level, and University Teaching Level are also found out to have positive impacts on Big Data Technology Adoption. These findings are consistent with the following authors. Shabbir and Gardezi (2020) find that the application of big data analytics (ABDA) had a positive and significant impact on organization performance (OP). Also, knowledge management practice (KMP) had partially mediated the relationship between ABDA and OP in SMEs. Bestman and Okparaji (2021) find that the dimensions of big data management (data volume and data variety) significantly correlated positively with the measures of employee resilience, adaptive capacity, and situational awareness. Hong and Chen (2021) find that 55% of college students believe that the current college archives need to be combined with the requirements of the development of the times, and it is necessary to innovate the archive management methods of colleges and universities to improve the quality of archive management services in universities and ensure the real-time storage of network information and maximize the development of archive information. Wu (2023) finds that the informatization of instructional management in universities can optimize the allocation of resources, improve the quality, and efficiency of instructional management, and so on.

As far as Environmental Context is concerned, Government Support and Competitive Pressure are found out to have positive impacts on Big Data Adoption. These findings are consistent with the following authors. Liang et al. (2021) state that their results of big data analysis react on the construction of ubiquitous learning environment, closely integrate the teaching and scientific research innovation, professional personnel training, ubiquitous learning environment construction and big data in colleges and universities, and promote colleges and universities to a new level in big data teaching, scientific research and innovation from a higher starting point. Li and Huang (2023) find that using Big Data may provide substantial economic benefits, such as reduced expenses, higher output, and enhanced brand recognition. In addition, organizations and sectors may benefit from more sustainable practices and strategies thanks to improved forecasting and decision-making made possible by Big Data Analytics (BDA). Businesses and industries have a revolutionary potential to address environmental sustainability issues in

new, data-driven ways thanks to the era of Big Data. By integrating cutting-edge technology and analytics, organizations may embrace sustainable practices, affect positive change, and receive essential insights into their environmental effect. Le and Vu (2024) find that the strategic management of knowledge and engagement with diverse stakeholders are the pivotal factors in enhancing the positive influence of Big Data Analytics (BDA) on environmental performance.

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