JAIIT (Journal of Advances in Information and Industrial Technology)
Vol. 6, No. 1 May 2024, ISSN 2716-1935, E-ISSN 2716-1927

The Impact of Enterprise Systems on User Performance using the IGRACIAS V.1 Application at Telkom University Jakarta

Qilbaaini Effendi Muftikhali[*1)], Yudi Candra Kurniawan[2)] , Dea Wemona Rahma[3)]
[1,3)]Department of Information Systems, Telkom University, Jakarta, Indonesia
[2)]Department of Information Technology, Universitas Indonesia, Depok, Indonesia
[1*]qilbaainieff@telkomuniversity.ac.id, [2]yudi.candra@ui.ac.id, [3]wemona@telkomuniversity.ac.id

ARTICLE INFO

Article history:
Received 3 April 2024
Revised 15 June 2024
Accepted 18 June 2024
Available online 26 June 2024

Keywords:
Higher Education Information
Higher Educational Institutions
IGRACIAS V.1
IT Balanced Scorecard
System

ABSTRACT

Telkom University Jakarta is a new educational institution, previously known as Institut Teknologi Telkom Jakarta. Telkom University Jakarta Campus obtained a legacy system called IGRACIAS V.1 as an education management software. The IGRACIAS V.1 application raised the question of whether legacy applications in new institutions can accelerate the flow of education management in pursuing competitors. This research provided a deeper exploration of the influence of legacy enterprise system applications implemented in new institutions. The impact of legacy applications requires accurate measurement to serve as a reference for further development. The IT Balanced scorecard was chosen to measure whether the implementation of the legacy IGRACIAS V.1 application has had an impact and development direction that is in line with the goals of the new institution. The results show that two domains based on the IT Balanced scorecard need improvement, namely User Orientation and Future Orientation.

1. Introduction

In this modern era, technology is increasingly used in various fields of work to facilitate workflow. Technology development also must be connected to the attention of the world of education as it supports the needs of teachers and students in universities or similar institutions. Universities are required to keep up with developments and adapt to the existence of technology [1], [2]. Previous studies have discussed the difficulties faced when developing an Enterprise System (ES) in education are still experiencing ups and downs. Problems arise from various perspectives and variants of cases in various universities [2], [3].

The implementation of ES cannot be separated from the support of Information and Communication Technology (ICT) [3], [4]. Technology encourages more significant investment in development and implementation in education because technology is developing rapidly [5], [6]. Technology often needs to work better primarily due to the level of expertise possessed by ICT managers [7].

Telkom University Jakarta (TUJ) is a new player in the education world in Jakarta. TUJ was formerly established under Institut Teknologi Telkom Jakarta (ITTJ). TUJ has a parent foundation and primary campus in Bandung, known as Telkom University (Tel-U) [8], [9]. Telkom University developed an educational application called IGRACIAS V.1, released in 2013, to assist in the academic management business process. Thus, ITTJ adopted the IGRACIAS V.1 application as a legacy system from Tel-U.

Therefore, this research aims to explore more deeply the influence of legacy enterprise system applications implemented in new institutions, the impact of education management applications, and the future landscape of application development through an IT Balanced Scorecard [10].

2. Methods

The research methodology is depicted in Figure 1. The research began with an analysis of Telkom University Jakarta's IGRACIAS V.1 application and conducted a literature study on the IT Balanced scorecard framework [10]–[13]. Then, from these results, the author categorized the assessment results, prepared a questionnaire, and distributed it to the users of iGracias, such as lecturers and other related units. All respondents are regular users of the IGRACIAS V.1 application.

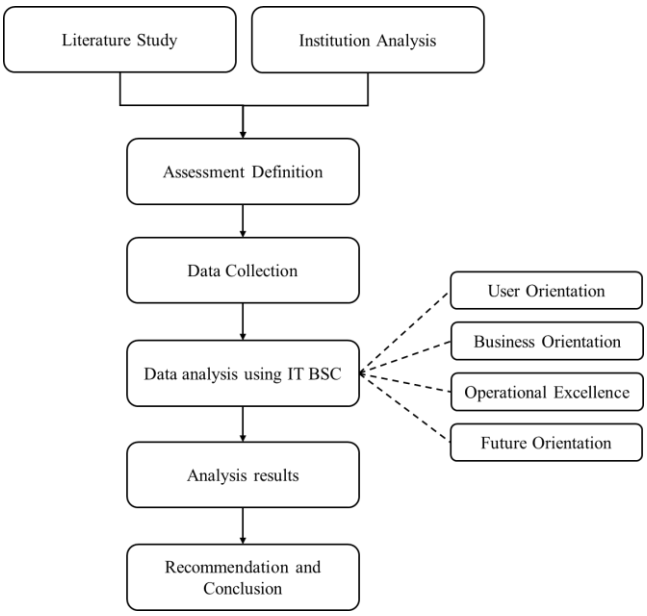

Figure 1. Research Methodology

2.1. Institution Analysis

This research begins by analyzing the IGRACIAS V.1 application. The analysis is obtained from interviews with the Head of the Information Technology Center. From the interview results, the authors mapped the indicator values for assessment and determined the idea of the problem. Furthermore, the authors define the assessment based on the IT Balanced scorecard literature study conducted by Van Grembergen and Van Bruggen.

2.2. Literature Study and Assessment Definition

Balanced Scorecard consists of two words: scorecard and balanced. The word balanced is defined as a performance that can be measured in a balanced manner by looking at both sides: financial and non-financial. The meaning of the word scorecard is a card that can be used as a record of performance results by looking at current conditions and future conditions [11]. The Balanced Scorecard framework is shown in Figure 2.

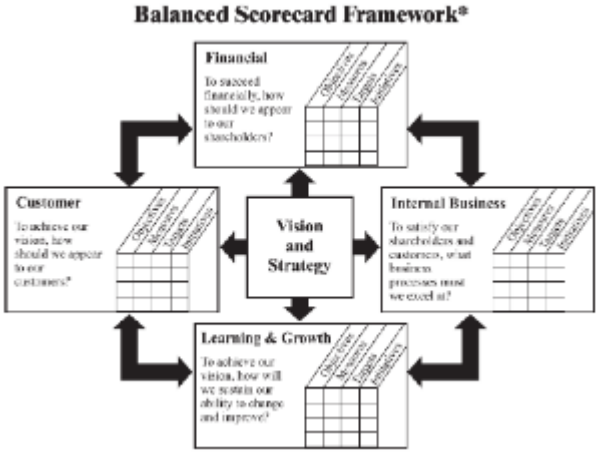

Figure 2. Balanced Scorecard Framework

 DOI: https://doi.org/10.52435/jaiit.v6i1.540

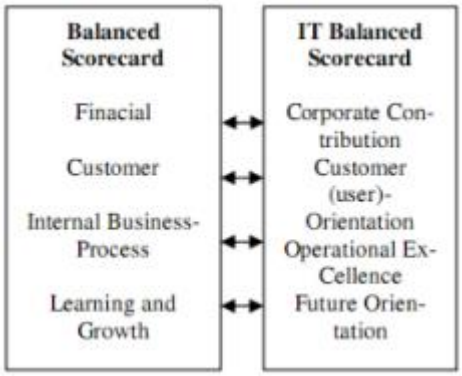

Figure 3. IT BSC Transformation

Research by Grembergen [12] adapted the Balanced Scorecard from Kaplan & Norton model) to be applied in the context of information technology. BSC is broadly utilized to measure businesses' and public service organizations' financial and non-financial performance, including Higher Education Institutions[13], [14]. In the IT BSC, the perspective is that an organization's IT department is an internal service provider. Thus, the four perspectives are adjusted to the changes that occurred. The four perspectives that are adjusted in the IT Balance Score Card (IT BSC) are as follows: (1) Business Orientation (Corporate Contribution), (2) User Orientation, (3) Operational Excellence, and (4) Future Orientation[12]. The indicators are listed in Table 1.

The IT Balanced Scorecard is described in Figure 3 above, according to Van Grembergen and Van Bruggen. The business orientation perspective shows how changes in business value are created from the application of IT systems and investments. The user-oriented perspective represents the user's assessment of the use of IT systems. The operational orientation perspective represents the work of IT processes to create and distribute the applications [15]. The future orientation perspective represents the need by the organization to be compatible with technology and IT systems to help complete work and meet needs in the future.

Table 1. Assessment based on IT BSC Perspectives

User Orientation	**Business Orientation**
How is the user experience of the IT system implementation? **Objectives:** Users feel the benefits and convenience of using the application. **Indicators:** - Users find it easy to use the IT system. - Instructions and assistance in using the application are easily obtained by users. - Users feel faster in completing work.	How significant are the investment opportunities and business changes from the implementation of the application? **Objectives:** Gain a baseline of business contribution from IT system investments. **Indicators:** - Knowing the level of efficiency gained by implementing IT systems. - Provide features that are compatible with the business processes of the organization or company.
Operational Excellence	**Future Orientation**
How effective and efficient the IT system is in helping users get the job done. **Objectives:** Users can use the features in the app to help get the jobs done. **Indicators:** - IT systems are in line with the needs of organizational and company business processes. - Users get education and assistance to make it easier for users to adapt to IT systems.	How IT system development can accommodate future needs. **Objectives:** Development of application features according to the needs and benefits of training to users. **Indicators:** - Application feature development can be as needed and completed according to the timeline. - Training assists users in using the latest features or modules.

In order to determine the assessment of the effectiveness of using the IGRACIAS V.1 application, the analysis results from Telkom University Jakarta are compared with studies of similar research [4], [15], [16]. The results were then compared with the IT Balanced scorecard theory by Van Grembergen and Van Bruggen. The results were then compared with the IT Balanced scorecard theory by Van Grembergen and Van Bruggen. The comparison results assessed the four perspectives, namely Business Contribution, User Orientation, Operational Excellence, and Future Orientation, and the indicators listed in Table 1.

2.3. Data Collection

After the indicators were determined, the author converted the values into a 17-question questionnaire. The questionnaire was then distributed to 23 active lecturers at Institut Teknologi Telkom Jakarta. In addition, the results of interviews conducted with the Head of the IT Department became one of the assessments to determine the value of the Business Contribution perspective.he indicators were determined, the author converted the values into a questionnaire consisting of 17 questions. The questionnaire was then distributed to a group of 23 active lecturers at Institut Teknologi Telkom Jakarta. In addition, the results of interviews conducted with the Head of IT Department became one of the assessments to determine the value of the Business Contribution perspective.

2.4. Population

The questionnaire was addressed to 23 active lecturers at Telkom University Jakarta Campus, and the sample obtained for this assessment amounted to 20 people.

2.5. Likert Scale Rating

The Likert scale is a sequential scale where respondents choose one option that best matches their judgment [17]. The author used a 5-point Likert scale classified as "Strongly Agree" on a scale of 5, "Agree," "Neutral," "Disagree," and "Strongly Disagree" on a scale of 1. The Likert scale is specified in Table 2.

Table 2. The 5-Point Likert Scale

Scale	Score
Strongly Agree	5
Agree	4
Neutral	3
Disagree	2
Strongly Disagree	1

2.6. Data analysis using IT BSC

The distributed questionnaires are then processed based on the literature that has been studied previously. Approximately 87% of the total sample of 100% of respondents was obtained. Each questionnaire was tested for validity using the Pearson method [18] and its reliability using Cronbach's Alpha [19], [20]. Then, the results are mapped into the IT BSC assessment domain, as shown in Table 3.

Table 3. Assessment based on IT BSC perspective

Perspective	Objective	Assessment
Business Orientation	- Business Value of IGRACIAS V.1 functions. - Alignment of IGRACIAS V.1 with the organization's strategy.	- The suitability of the IGRACIAS V.1 application in meeting the needs of the learning management system. - The suitability of the IGRACIAS V.1 application functions with the ITTJ strategy and the new opportunities offered to support the development of the latest learning strategies.

 DOI: https://doi.org/10.52435/jaiit.v6i1.540

Perspective	Objective	Assessment
User Orientation	- User Satisfaction - User interaction with the IT unit. - User Education	- User convenience in using and accessing IGRACIAS V.1. - Availability of education to make it easier for users to adapt to the IGRACIAS V.1 application. - Availability of support from the IT unit.
Operational Excellence	- IT system is in line with the needs of the business process.	- Alignment of IGRACIAS V.1 application functions with the needs of users.
Future Orientation	- Development of the latest features and requirements.	- Availability of updates in the IGRACIAS V.1 application. - User involvement in updating IGRACIAS V.1 functions.

3. Results and Discussions

In this research, the interview process is used to find problems. The interview was conducted with the Head of the IT Division at Telkom University Jakarta (TUJ). Data collection is carried out using quantitative methods, namely questionnaires. The questionnaire distribution received 20 respondents from 23 lecturers at TUJ, or 87% of the population. Each lecturer gets 17 questions covering four IT Balanced scorecard method domains. The results of the assessment by respondents are described in Table 4.

Table 4. Respondent Questionnaire Data

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17
Respondent 1	5	5	5	5	3	5	5	4	2	5	2	4	4	5	4	5	5
Respondent 2	5	4	4	5	5	5	5	5	3	4	2	3	4	2	4	4	1
Respondent 3	3	3	4	5	4	4	4	4	4	3	4	4	4	4	3	4	4
Respondent 4	3	3	3	3	3	3	3	3	3	3	3	3	2	2	3	2	3
Respondent 5	3	3	4	4	4	4	4	3	3	4	4	3	4	4	4	4	4
Respondent 6	3	3	3	4	4	4	4	4	3	4	4	4	3	4	3	4	4
Respondent 7	4	5	3	5	4	4	4	4	4	5	5	4	5	5	4	4	3
Respondent 8	4	4	4	4	4	4	4	4	4	4	4	4	4	4	2	4	2
Respondent 9	4	4	2	3	3	3	4	4	2	3	3	4	2	4	3	4	2
Respondent 10	4	5	4	5	5	5	4	4	4	5	5	5	4	5	5	5	4
Respondent 11	4	4	4	4	4	4	4	4	4	4	4	4	3	4	4	4	4
Respondent 12	4	3	3	4	4	3	3	3	3	4	3	4	3	4	3	4	3
Respondent 13	5	3	3	3	3	3	3	3	3	3	3	4	3	3	3	4	3
Respondent 14	4	4	4	4	4	4	4	4	4	4	4	4	3	4	3	3	3
Respondent 15	4	3	3	4	4	3	4	4	4	3	4	3	3	3	3	4	4
Respondent 16	4	5	3	5	4	4	4	4	2	2	2	5	3	2	4	4	2
Respondent 17	4	3	4	5	4	4	4	4	2	3	2	4	5	2	4	4	3
Respondent 18	4	5	4	5	4	4	5	4	4	4	3	4	4	4	5	5	4
Respondent 19	5	4	4	4	4	5	5	4	3	4	4	4	4	4	5	5	4
Respondent 20	4	4	3	4	3	4	4	3	3	4	2	5	3	2	4	3	2

The questionnaire is then processed to test the validity of each indicator. The validity test was performed using the Pearson Product Moment method and the SPSS application, and the results obtained are listed in Table 6. The validity test calculation begins by determining the Degree of freedom (Df) value with the formula Df = N-2, where N is the number of respondents. The result is 18. According to the r table in Table 5, which uses a significant level of 5%, the N = 18 uses a value of 0.468.

Table 5. The r table Pearson

N	The Level of Significance		N	The Level of Significance	
	5%	1%		5%	1%
3	0.997	0.999	38	0.320	0.413
4	0.950	0.990	39	0.316	0.408
5	0.878	0.959	40	0.312	0.403
6	0.811	0.917	41	0.308	0.398
7	0.754	0.874	42	0.304	0.393
8	0.707	0.834	43	0.301	0.389
9	0.666	0.798	44	0.297	0.384
10	0.632	0.765	45	0.294	0.380
11	0.602	0.735	46	0.291	0.376
12	0.576	0.708	47	0.288	0.372
13	0.553	0.684	48	0.284	0.368
14	0.532	0.661	49	0.281	0.364
15	0.514	0.641	50	0.279	0.361
16	0.497	0.623	55	0.266	0.345
17	0.482	0.606	60	0.254	0.330
18	0.468	0.590	65	0.244	0.317
19	0.456	0.575	70	0.235	0.306
20	0.444	0.561	75	0.227	0.296

Table 6. Initial Data Pearson Correlation Value

Item	Item																	Total Score
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
1	1.00	0.40	0.24	0.11	0.00	0.36	0.40	0.31	-0.21	0.21	-0.33	0.13	0.20	0.00	0.30	0.45*	-0.16	0.29
2	0.40	1.00	0.25	0.52*	0.17	0.55*	0.55*	0.42	0.05	0.43	0.00	0.52*	0.27	0.35	0.55*	0.45*	-0.03	0.63**
3	0.24	0.25	1.00	0.56**	0.35	0.73**	0.56**	0.32	0.18	0.46*	0.01	-0.06	0.60**	0.29	0.36	0.42	0.44	0.67**
4	0.11	0.52*	0.56**	1.00	0.59**	0.67**	0.58**	0.56**	0.10	0.30	-0.06	0.27	0.76**	0.16	0.52*	0.51*	0.15	0.70**
5	0.00	0.17	0.35	0.59**	1.00	0.50*	0.32	0.58**	0.42	0.26	0.37	-0.02	0.49*	0.14	0.33	0.37	-0.04	0.56*
6	0.36	0.55*	0.73**	0.67**	0.50*	1.00	0.77**	0.56*	0.02	0.56*	0.03	0.25	0.60**	0.26	0.63**	0.53*	0.17	0.79**
7	0.40	0.55*	0.56**	0.58**	0.32	0.77**	1.00	0.70**	-0.02	0.36	-0.12	0.01	0.47*	0.20	0.57**	0.60**	0.16	0.67**
8	0.31	0.42	0.32	0.56**	0.58**	0.56*	0.70**	1.00	0.11	0.13	0.04	-0.03	0.37	0.12	0.20	0.42	-0.12	0.51*
9	-0.21	0.05	0.18	0.10	0.42	0.02	-0.02	0.11	1.00	0.35	0.73**	-0.09	0.17	0.38	-0.05	0.00	0.22	0.38
10	0.21	0.43	0.46*	0.30	0.26	0.56*	0.36	0.13	0.35	1.00	0.39	0.08	0.44*	0.68**	0.35	0.37	0.33	0.71**
11	-0.33	0.00	0.01	-0.06	0.37	0.03	-0.12	0.04	0.73**	0.39	1.00	-0.06	0.16	0.67**	-0.04	0.15	0.40	0.41
12	0.13	0.52*	-0.06	0.27	-0.02	0.25	0.01	-0.03	-0.09	0.08	-0.06	1.00	0.05	0.13	0.28	0.24	-0.07	0.25
13	0.20	0.27	0.60**	0.75**	0.49*	0.60**	0.47*	0.37	0.17	0.44*	0.16	0.05	1.00	0.27	0.43	0.53*	0.19	0.70**
14	0.00	0.35	0.29	0.16	0.14	0.26	0.20	0.12	0.38	0.68**	0.67**	0.13	0.27	1.00	0.11	0.55*	0.59**	0.67**
15	0.30	0.55*	0.36	0.52*	0.33	0.63**	0.57**	0.20	-0.05	0.35	-0.04	0.28	0.43	0.11	1.00	0.54*	0.28	0.63**
16	0.45*	0.45*	0.42	0.51*	0.37	0.53*	0.60**	0.42	0.00	0.37	0.15	0.24	0.54*	0.55*	0.54*	1.00	0.43	0.76**
17	-0.16	-0.03	0.44	0.15	-0.04	0.17	0.16	-0.12	0.22	0.33	0.40	-0.07	0.19	0.59**	0.28	0.43	1.00	0.47*
Skor Total	0.29	0.63**	0.67**	0.70**	0.56**	0.79**	0.67**	0.51*	0.38	0.71**	0.41	0.25	0.70**	0.67**	0.63**	0.76**	0.47*	1.00

Sig. values for the items * Correlation is significant at 0.05 level (2-tailed) and ** Correlation is significant at the 0.01 level (2-tailed) with N = 20

A reliability test using Cronbach's Alpha takes statement data from the validity test, which amounts to 13 valid statements. Reliability calculations are carried out per domain in the IT Balanced scorecard, as many as four in Tables 7, 8, and 9.

 DOI: https://doi.org/10.52435/jaiit.v6i1.540

Table 7. Reliability Test Result

		N	%
Cases	**Valid**	20	100.0
	Excluded	0	0.0
	Total	20	100.0

Table 8. Reliability Statistic

Cronbach's Alpha	N of Items
.887	13

Table 9. Item Total Statistic

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected item-Total Correlation	Cronbach's Alpha if Item Deleted
2	45.10	36.621	0.538	0.881
3	45.40	36.568	0.667	0.875
4	44.70	36.011	0.704	0.873
5	45.10	38.832	0.465	0.884
6	45.00	35.579	0.797	0.869
7	44.90	37.042	0.702	0.875
8	45.15	39.187	0.476	0.884
10	45.20	36.168	0.612	0.877
13	45.45	35.418	0.658	0.875
14	45.40	35.411	0.485	0.888
15	45.30	36.116	0.594	0.878
16	44.95	35.743	0.728	0.872
17	45.75	37.355	0.343	0.895

The determination of validity or invalidity from the Pearson Correlation results is shown in Table 10. Indicators 1, 9, 11, and 12 were removed from the questionnaire data because they produced invalid information based on the Pearson Product Moment method, namely having a Rxy value < R-table and a Sig. value (2-tailed) > α.

Table 10. Indicators or Statement Validity Test Results

Statement	Rxy	Rtable (0.05)	Sig. (2-tailed)	α = 0.05	Validity
1	0.294	0.468	0.200	0.05	NV
2	0.63	0.468	0.003	0.05	V
3	0.671	0.468	0.001	0.05	V
4	0.699	0.468	0.000	0.05	V
5	0.559	0.468	0.010	0.05	V
6	0.788	0.468	0.000	0.05	V
7	0.673	0.468	0.010	0.05	V
8	0.511	0.468	0.210	0.05	V
9	0.380	0.468	0.990	0.05	NV
10	0.713	0.468	0.000	0.05	V
11	0.414	0.468	0.069	0.05	NV
12	0.251	0.468	0.286	0.05	NV
13	0.697	0.468	0.000	0.05	V
14	0.668	0.468	0.001	0.05	V
15	0.628	0.468	0.003	0.05	V
16	0.761	0.468	0.000	0.05	V
17	0.473	0.468	0.035	0.05	V

The explanation of Cronbach's Alpha process is divided into 3 parts as follows:

a. Case Processing Summary: All respondents filled out the questionnaire, which is 100%.
b. Reliability Statistics is the overall value of 13 indicators. The Cronbach's Alpha results show a value of 0.887, which indicates that this research questionnaire is reliable as the value is above the minimum threshold of 0.6.
c. Item-Total Statistics is table 9 containing the value of Cronbach's Alpha per indicator. If we compare the values in column 4, from item_2 to item_17, all of which have a value above 0.6, we can conclude that all indicators are reliable.

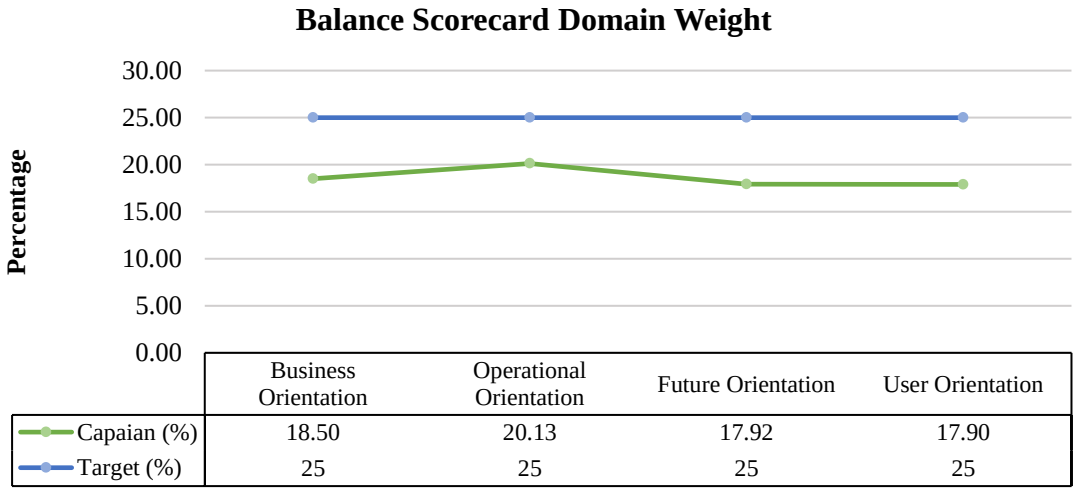

Figure 4. Balanced scorecard IT Domain Weight Chart

Based on Figure 4, each IT-Balanced scorecard domain has an influence of 25%. The results of the graph are translated into Table 10.

Table 11. Percentage Gap per Domain

	Outcomes (%)	Target (%)	Gap (%)
Business Orientation	18.50	25	6.50
Operational Orientation	20.13	25	4.88
Future Orientation	17.92	25	7.08
User Orientation	17.90	25	7.10

Referring to Table 11, it can be concluded that the biggest gap is in User Orientation by 7.1% followed by Future Orientation by 7.08%. Both of these can be the basis for developing applications so that users and the future of the application can be used more optimally.

4. Conclusion

Based on the results of the questionnaire calculation, respondents indicated that the assessment conducted using the four domains of the IT Balanced scorecard (Business Orientation, User Orientation, Operational Orientation, and Future Orientation) indicated that the development of the IGRACIAS V.1 application needs to be improved in the User Orientation and Future Orientation domains. This conclusion answers the researcher's question that the new institution is in line with premature application development even though the IGRACIAS V.1 application was previously developed first. This is because business factors and the vision of the institution can be different. The application of research methods using the IT Balanced scorecard is able to explore and assess the current condition of the institution, especially with a similar case, namely the IT department.

 DOI: https://doi.org/10.52435/jaiit.v6i1.540

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 DOI: https://doi.org/10.52435/jaiit.v6i1.540