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Indicators for Management in Universities a comparative study of indicators in Korean and Brazilian universities

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Abstract

The purpose of this study was an analysis of indicators that can be considered in management at private universities. For this, we base it on a study by Kim and KIM (2018) that points out indicators for performance evaluation in private universities. In this article, we use Spearman's correlation test to analyze and describe which indicators are used in the university teaching management process for decision making at the strategic, tactical, and operational levels. This research is quantitative in nature, a figure of 44 indicators classified into four balanced scorecard (BSC) perspectives. The results indicate that for institutions to develop and maintain good quality, they need to be evaluated periodically. The most used indicators in the Balanced Scorecard Map relate to the occupancy rate of classrooms, customer satisfaction, adequate infrastructure, evaluation processes for facilities and safety and employee training.

Keywords: Universities; Balanced Scorecard; indicators.

Introduction

The university sector has experienced significant growth in terms of enrollment numbers as well as the way they are offered, largely through the distance learning mode. This has also brought challenges to the management of these organizations, many of which have gone public, requiring the presentation of a set of information in line with transparency criteria. Much of this growth has been driven by the expansion of student financing.

After this period of growth and with the reduction in financing, a process of mergers and acquisitions occurred in the market, which imposed the need for particularly small universities to have a systematic and integrated management of all indicators in order to make more informed decisions and become more competitive.

The indicators, as well as the Controller's Office, serve the interests of both internal and external users of the organization, which is embedded in a business-oriented environment comparable to nature (PADOVEZE, 2008). In this context, the question arises: What performance indicators are used in university management?

This study analyzes the indicators used by private university institutions through the application of the Spearman correlation test in the construction of the Balanced Scorecard (BSC) Map. Therefore, the article becomes relevant as it unveils the indicators that contribute to a management approach that promotes the growth of university institutions.

The general objective of the article is to analyze the performance indicators used in the decision-making process in private universities. The specific objective is to describe and identify the indicators used by organizations at the strategic, tactical, and operational levels.

Methodology

The methodology is based on a quantitative approach and has an exploratory nature. The Spearman correlation test was used for the analysis of performance indicators, which allows for the construction of a strategic map using the Balanced Scorecard.

To conduct the test, a questionnaire was developed based on the study by Kim and Kim (2018), which identified 44 indicators used in Korean universities based on the Balanced

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Scorecard. Few studies have been found with such a detailed scope and field of investigation.

The indicators were grouped into the four perspectives of the Balanced Scorecard: Financial, Customer, Learning, and Internal Processes. The Spearman correlation test was then used to construct the Balanced Scorecard map.

Spearman's correlation was chosen to create the strategic map, given the categorical variable measured on the Likert scale. The correlation between two variables determines the interrelationships among the variables (PONTES, 2010). To rank both the x and y variables, the formula described by Pontes is used. (2010, p. 4)

$$(k + k + 1) / 2 = (2k + 1) / 2 = k + 1/2$$

The coefficient is given by:

$$r_s = 1 - \frac{6 \times \sum_{i=1}^n d_i^2}{n^3 - n}$$

on what $d_i = r_{xi} - r_{yi}$, with r_{xi} and r_{yi} , vary from 1 to n. The maximum value is given by ($r_s=1$), and the closer it is to 1, the stronger the interrelationship between the variables.

Fig. 1: Distribution of indicators by perspective.

Variable	Group	Indicators
Finance	Fin9	Maintenance costs of the building
Finance	Fin10	Utility costs
Finance	Fin11	Operating costs
Finance	Fin12	Custodial and janitorial costs
Finance	Fin13	Deferred maintenance and deferred maintenance backlog
Finance	Fin14	Capital costs
Finance	Fin15	Capital renewal costs
Finance	Fin16	Facility condition assessment costs
Finance	Fin17	Occupancy costs
Finance	Fin18	churn costs
Customer	Cu19	Adequacy of space assignment
Customer	Cu20	Adequacy of facility security
Customer	Cu21	Customer satisfaction assessment
Customer	Cu22	Available hours
Customer	Cu 23	Survey result release
Learning and Growth	Lag24	Securement and management of workforce
Learning and Growth	Lag25	Training programs for worker enhancement
Learning and Growth	Lag26	Employee satisfaction assessment
Learning and Growth	Lag27	Communication among staff
Learning and Growth	Lag28	Adequacy of work space
Learning and Growth	Lag29	Task record
Learning and Growth	Lag30	Performance evaluation and report
Internal Process	Inp31	Resource consumption-Energy
Internal Process	Inp32	Security management
Internal Process	Inp33	Space utilization
Internal Process	Inp34	Resource consumption - Water
Internal Process	Inp35	Safety management
Internal Process	Inp36	Space management regulations
Internal Process	Inp37	Establishment of space timetable and reservation system
Internal Process	Inp38	Management plan arrangement
Internal Process	Inp39	Computerized facility management system
Internal Process	Inp40	O&M plan for each facility
Internal Process	Inp41	Furniture and equipment
Internal Process	Inp42	Waste disposal
Internal Process	Inp43	Defining O&M work
Internal Process	Inp44	Assessment of space efficiency
Internal Process	Inp45	Indoor Environmental Quality (IEQ)
Internal Process	Inp46	Accessibility
Internal Process	Inp47	Work efficiency assessment
Internal Process	Inp48	Reflection of trend requisition
Internal Process	Inp49	Management plan establishment
Internal Process	Inp50	Required performance level
Internal Process	Inp51	Equipment and tool condition assessment
Internal Process	Inp52	Establishment of facility performance indicator

Strategic Map.

To create the strategic map, indicating the linkage of measures, the Spearman correlation coefficient was used, which is suitable for non-parametric tests (ZAR, 2005).

According to Hair (2005), the closer the correlation coefficient is to 1, the stronger the correlation between variables. Indicators above 0.9 represent almost perfect correlation.

Table 1 presents the correlations for the financial and customer perspectives.

Table 1: Spearman Correlation for the financial and Customer Perspectives.

	Fin10	Fin11	Fin12	Fin15	Fin16	Fin17	Cu19	Cu20	Cu21	Cu22	Cu23
Fin10	1,000	0,618	0,661	0,612	0,707	0,769	0,716	0,735	0,700	0,526	0,482
Fin11	0,618	1,000	0,726	0,603	0,559	0,570	0,387	0,632	0,695	0,262	0,280
Fin12	0,661	0,726	1,000	0,558	0,466	0,569	0,578	0,516	0,455	0,195	0,236
Fin15	0,612	0,603	0,558	1,000	0,564	0,513	0,629	0,721	0,550	0,256	0,460
Fin16	0,707	0,559	0,466	0,564	1,000	0,892	0,581	0,803	0,702	0,432	0,419
Fin17	0,769	0,570	0,569	0,513	0,892	1,000	0,642	0,815	0,745	0,626	0,524
Cu19	0,716	0,387	0,578	0,629	0,581	0,642	1,000	0,820	0,684	0,533	0,695
Cu20	0,735	0,632	0,516	0,721	0,803	0,815	0,820	1,000	0,788	0,562	0,710
Cu21	0,700	0,695	0,455	0,550	0,702	0,745	0,684	0,788	1,000	0,650	0,651
Cu22	0,526	0,262	0,195	0,256	0,432	0,626	0,533	0,562	0,650	1,000	0,885
Cu23	0,482	0,280	0,236	0,460	0,419	0,524	0,695	0,710	0,651	0,885	1,000
Lag24	0,697	0,658	0,434	0,677	0,778	0,705	0,785	0,879	0,927	0,539	0,661
Lag25	0,565	0,548	0,243	0,399	0,502	0,555	0,555	0,646	0,834	0,415	0,404
Lag26	0,475	0,416	0,165	0,454	0,539	0,478	0,574	0,672	0,799	0,754	0,860
Lag27	0,469	0,117	0,019	0,308	0,217	0,141	0,451	0,371	0,505	0,453	0,569
Lag28	0,583	0,374	0,318	0,549	0,514	0,603	0,785	0,790	0,663	0,539	0,661
Lag29	0,338	0,526	0,251	0,477	0,419	0,338	0,437	0,542	0,676	0,622	0,746
Lag30	0,483	0,450	0,187	0,463	0,520	0,458	0,567	0,666	0,793	0,747	0,855
Inp31	0,509	0,544	0,268	0,348	0,538	0,575	0,368	0,628	0,774	0,707	0,697
Inp32	0,585	0,764	0,822	0,425	0,617	0,649	0,460	0,556	0,617	0,217	0,199
Inp33	0,303	0,214	0,551	0,286	0,217	0,355	0,576	0,397	0,294	0,580	0,669
Inp34	0,509	0,385	0,268	0,208	0,691	0,719	0,237	0,481	0,621	0,707	0,535
Inp35	0,367	0,602	0,479	0,195	0,268	0,303	0,240	0,364	0,516	0,443	0,429
Inp36	0,489	0,311	0,268	0,468	0,383	0,498	0,687	0,696	0,627	0,877	0,993
Inp37	0,526	0,120	0,400	0,380	0,200	0,272	0,729	0,464	0,418	0,641	0,789
Inp38	0,492	0,349	0,075	0,192	0,538	0,575	0,368	0,481	0,770	0,850	0,693
Inp39	0,688	0,599	0,550	0,667	0,868	0,812	0,764	0,834	0,868	0,486	0,577
Inp41	0,603	0,619	0,341	0,428	0,617	0,649	0,460	0,703	0,770	0,364	0,361
Inp42	0,390	0,312	0,253	0,093	0,431	0,499	0,380	0,463	0,420	0,263	0,205
Inp45	0,655	0,582	0,353	0,643	0,778	0,705	0,785	0,879	0,910	0,523	0,643
Inp46	0,551	0,456	0,203	0,522	0,624	0,557	0,672	0,753	0,780	0,369	0,481
Inp47	0,481	0,451	0,187	0,464	0,521	0,459	0,567	0,666	0,789	0,744	0,851
Inp49	0,481	0,451	0,187	0,464	0,521	0,459	0,567	0,666	0,789	0,744	0,851
Inp50	0,693	0,536	0,441	0,679	0,710	0,753	0,892	0,933	0,852	0,694	0,826
Inp52	0,707	0,707	0,608	0,564	0,859	0,892	0,581	0,803	0,843	0,432	0,419

Source: Own Elaboration, 2022.

Table 2: indicates the correlations for the learning perspective.

Table 2: Correlations for the learning perspective.

	Lag24	Lag25	Lag26	Lag27	Lag28	Lag29	Lag30
Fin 10	0,697	0,565	0,475	0,469	0,583	0,338	0,483
Fin 11	0,658	0,548	0,416	0,117	0,374	0,526	0,450
Fin 12	0,434	0,243	0,165	0,019	0,318	0,251	0,187
Fin 15	0,677	0,399	0,454	0,308	0,549	0,477	0,463
Fin 16	0,778	0,502	0,539	0,217	0,514	0,419	0,520
Fin 17	0,705	0,555	0,478	0,141	0,603	0,338	0,458
Cu19	0,785	0,555	0,574	0,451	0,785	0,437	0,567
Cu20	0,879	0,646	0,672	0,371	0,790	0,542	0,666
Cu21	0,927	0,834	0,799	0,505	0,663	0,676	0,793
Cu22	0,539	0,415	0,754	0,453	0,539	0,622	0,747
Cu23	0,661	0,404	0,860	0,569	0,661	0,746	0,855
Lag24	1,000	0,783	0,798	0,528	0,754	0,687	0,794
Lag25	0,783	1,000	0,529	0,550	0,783	0,404	0,510
Lag26	0,798	0,529	1,000	0,690	0,515	0,891	0,996
Lag27	0,528	0,550	0,690	1,000	0,528	0,569	0,671
Lag28	0,754	0,783	0,515	0,528	1,000	0,392	0,494
Lag29	0,687	0,404	0,891	0,569	0,392	1,000	0,895
Lag30	0,794	0,510	0,996	0,671	0,494	0,895	1,000
Inp31	0,636	0,527	0,849	0,538	0,357	0,724	0,843
Inp32	0,553	0,411	0,299	-0,004	0,290	0,234	0,318
Inp33	0,305	-0,057	0,433	0,086	0,305	0,387	0,455
Inp34	0,475	0,311	0,660	0,320	0,196	0,535	0,640
Inp35	0,387	0,258	0,562	0,253	0,090	0,498	0,599
Inp36	0,640	0,368	0,836	0,532	0,640	0,733	0,840
Inp37	0,449	0,175	0,651	0,647	0,449	0,538	0,657
Inp38	0,632	0,543	0,845	0,550	0,368	0,713	0,834
Inp39	0,925	0,653	0,680	0,379	0,677	0,577	0,662
Inp41	0,715	0,908	0,488	0,500	0,715	0,353	0,465
Inp42	0,428	0,603	0,161	0,175	0,616	0,004	0,148
Inp45	0,983	0,783	0,784	0,509	0,737	0,661	0,771
Inp46	0,867	0,920	0,597	0,611	0,867	0,472	0,571
Inp47	0,791	0,492	0,994	0,647	0,472	0,894	0,999
Inp49	0,791	0,492	0,994	0,647	0,472	0,894	0,999
Inp50	0,924	0,676	0,775	0,460	0,830	0,651	0,768
Inp52	0,778	0,651	0,539	0,217	0,514	0,419	0,520

Source: Own Elaboration, 2022.

In Table 3, the correlations for the internal processes perspective are presented. The regions highlighted in pink indicate that the indicators are significant and have a correlation coefficient greater than 0.7, as determined in the research to indicate the strength of the correlation.

Table 3: Spearman Correlation for the Internal Processes Perspective.

	Inp31	Inp32	Inp33	Inp34	Inp35	Inp36	Inp37	Inp38	Inp39	Inp41	Inp42	Inp45	Inp46	Inp47	Inp49	Inp50	Inp52
Fin10	0,509	0,585	0,303	0,509	0,367	0,489	0,526	0,492	0,688	0,603	0,390	0,655	0,551	0,481	0,481	0,693	0,707
Fin11	0,544	0,764	0,214	0,385	0,602	0,311	0,120	0,349	0,599	0,619	0,312	0,582	0,456	0,451	0,451	0,536	0,707
Fin12	0,268	0,822	0,551	0,268	0,479	0,268	0,400	0,075	0,550	0,341	0,253	0,353	0,203	0,187	0,187	0,441	0,608
Fin15	0,348	0,425	0,286	0,208	0,195	0,468	0,380	0,192	0,667	0,428	0,093	0,643	0,522	0,464	0,464	0,679	0,564
Fin16	0,538	0,617	0,217	0,691	0,268	0,383	0,200	0,538	0,868	0,617	0,431	0,778	0,624	0,521	0,521	0,710	0,859
Fin17	0,575	0,649	0,355	0,719	0,303	0,498	0,272	0,575	0,812	0,649	0,499	0,705	0,557	0,459	0,459	0,753	0,892
Cu19	0,368	0,460	0,576	0,237	0,240	0,687	0,729	0,368	0,764	0,460	0,380	0,785	0,672	0,567	0,567	0,892	0,581
Cu20	0,628	0,556	0,397	0,481	0,364	0,696	0,464	0,481	0,834	0,703	0,463	0,879	0,753	0,666	0,666	0,933	0,803
Cu21	0,774	0,617	0,294	0,621	0,516	0,627	0,418	0,770	0,868	0,770	0,420	0,910	0,780	0,789	0,789	0,852	0,843
Cu22	0,707	0,217	0,580	0,707	0,443	0,877	0,641	0,850	0,486	0,364	0,263	0,523	0,369	0,744	0,744	0,694	0,432
Cu23	0,697	0,199	0,669	0,535	0,429	0,993	0,789	0,693	0,577	0,361	0,205	0,643	0,481	0,851	0,851	0,826	0,419
Lag24	0,636	0,553	0,305	0,475	0,387	0,640	0,449	0,632	0,925	0,715	0,428	0,983	0,867	0,791	0,791	0,924	0,778
Lag25	0,527	0,411	-0,057	0,311	0,258	0,368	0,175	0,543	0,653	0,908	0,603	0,783	0,920	0,492	0,492	0,676	0,651
Lag26	0,849	0,299	0,433	0,660	0,562	0,836	0,651	0,845	0,680	0,488	0,161	0,784	0,597	0,994	0,994	0,775	0,539
Lag27	0,538	-0,004	0,086	0,320	0,253	0,532	0,647	0,550	0,379	0,500	0,175	0,509	0,611	0,647	0,647	0,460	0,217
Lag28	0,357	0,290	0,305	0,196	0,090	0,640	0,449	0,368	0,677	0,715	0,616	0,737	0,867	0,472	0,472	0,830	0,514
Lag29	0,724	0,234	0,387	0,535	0,498	0,733	0,538	0,713	0,577	0,353	0,004	0,661	0,472	0,894	0,894	0,651	0,419
Lag30	0,843	0,318	0,455	0,640	0,599	0,840	0,657	0,834	0,662	0,465	0,148	0,771	0,571	0,999	0,999	0,768	0,520
Inp31	1,000	0,478	0,313	0,834	0,742	0,671	0,458	0,831	0,557	0,644	0,222	0,624	0,453	0,841	0,841	0,598	0,691
Inp32	0,478	1,000	0,464	0,478	0,702	0,216	0,217	0,276	0,642	0,551	0,445	0,471	0,330	0,315	0,315	0,444	0,770
Inp33	0,313	0,464	1,000	0,313	0,539	0,707	0,748	0,275	0,368	-0,049	0,129	0,225	-0,001	0,455	0,455	0,487	0,217
Inp34	0,834	0,478	0,313	1,000	0,563	0,497	0,311	0,831	0,557	0,478	0,222	0,462	0,264	0,637	0,637	0,444	0,691
Inp35	0,742	0,702	0,539	0,563	1,000	0,463	0,443	0,523	0,292	0,384	0,211	0,299	0,127	0,598	0,598	0,309	0,434
Inp36	0,671	0,216	0,707	0,497	0,463	1,000	0,800	0,660	0,543	0,321	0,192	0,609	0,436	0,838	0,838	0,812	0,383
Inp37	0,458	0,217	0,748	0,311	0,443	0,800	1,000	0,443	0,396	0,121	0,058	0,410	0,259	0,654	0,654	0,592	0,200
Inp38	0,831	0,276	0,275	0,831	0,523	0,660	0,443	1,000	0,552	0,492	0,226	0,632	0,474	0,832	0,832	0,598	0,538
Inp39	0,557	0,642	0,368	0,557	0,292	0,543	0,396	0,552	1,000	0,642	0,404	0,906	0,756	0,658	0,658	0,864	0,868
Inp41	0,644	0,551	-0,049	0,478	0,384	0,321	0,121	0,492	0,642	1,000	0,646	0,702	0,841	0,443	0,443	0,598	0,770
Inp42	0,222	0,445	0,129	0,222	0,211	0,192	0,058	0,226	0,404	0,646	1,000	0,393	0,577	0,125	0,125	0,397	0,431
Inp45	0,624	0,471	0,225	0,462	0,299	0,609	0,410	0,632	0,906	0,702	0,393	1,000	0,877	0,772	0,772	0,924	0,778
Inp46	0,453	0,330	-0,001	0,264	0,127	0,436	0,259	0,474	0,756	0,841	0,577	0,877	1,000	0,552	0,552	0,774	0,624
Inp47	0,841	0,315	0,455	0,637	0,598	0,838	0,654	0,832	0,658	0,443	0,125	0,772	0,552	1,000	1,000	0,769	0,521
Inp49	0,841	0,315	0,455	0,637	0,598	0,838	0,654	0,832	0,658	0,443	0,125	0,772	0,552	1,000	1,000	0,769	0,521
Inp50	0,598	0,444	0,487	0,444	0,309	0,812	0,592	0,598	0,864	0,598	0,397	0,924	0,774	0,769	0,769	1,000	0,710
Inp52	0,691	0,770	0,217	0,691	0,434	0,383	0,200	0,538	0,868	0,770	0,431	0,778	0,624	0,521	0,521	0,710	1,000

Source: Own Elaboration, 2022.

Table 4: Balanced Scorecard map – relationships.

	Fin16	Fin17	Cu20	Cu21	Lag24	Inp39	Inp45	Inp50	Inp52
Fin16	1,000	0,892	0,803	0,702	0,778	0,868	0,778	0,710	0,859
Fin17	0,892	1,000	0,815	0,745	0,705	0,812	0,705	0,753	0,892
Cu20	0,803	0,815	1,000	0,788	0,879	0,834	0,879	0,933	0,803
Cu21	0,702	0,745	0,788	1,000	0,927	0,868	0,910	0,852	0,843
Lag24	0,778	0,705	0,879	0,927	1,000	0,925	0,983	0,924	0,778
Inp39	0,868	0,812	0,834	0,868	0,925	1,000	0,906	0,864	0,868
Inp45	0,778	0,705	0,879	0,910	0,983	0,906	1,000	0,924	0,778
Inp50	0,710	0,753	0,933	0,852	0,924	0,864	0,924	1,000	0,710
Inp52	0,859	0,892	0,803	0,843	0,778	0,868	0,778	0,710	1,000

Source: Own Elaboration, 2022.

Results

To create the strategic map, indicators should be correlated with at least one other indicator within each perspective. Some indicators were isolated, and based on the assumption of the map's linkage as presented by Aleixo et al. (2006), it is observed that the learning indicators that support the entire Balanced Scorecard relate to workforce safety and management, which aligns with the computerized facility management system, indoor

environmental quality, required performance level, and facility indicator. The processes are related to facility adequacy and customer satisfaction, ultimately contributing to the achievement of facility evaluation indicators and occupancy costs. Table 7 presents the Strategic Map of the Balanced Scorecard.

Table 5: Strategic Map of the Balanced Scorecard.

Finance		16- Facility condition assessment costs		17 - Occupancy costs		
Customer			20 - Adequacy of facility security		21 - Customer satisfaction assessment	
Internal Process	39 - Computerized facility management system		45 - Indoor Environmental Quality (IEQ)		50 - Required performance level	52 - Establishment of facility performance indicator
Learning and Growth				24 - Securement and management of workforce		

Source: Own Elaboration, 2022.

There is a focus on financial aspects in the occupation of an educational institution with a capacity of 1,000 students, but currently only has 500 students. From this perspective, it is assumed that there is a 50% vacancy rate, which may be related to student dissatisfaction due to issues with infrastructure, quality, and the institution's low performance. The map indicates that these elements should be addressed within the strategic plan in order to increase occupancy and consequently reduce the costs associated with vacancy.

It is important to note that the service sector has a special characteristic. Excess vacancy in one period cannot be recovered in another. In other words, an empty seat today represents lost revenue and an increase in the cost of occupancy for this institution.

In the comparison of the results obtained by Kim and Kim (2018), who used the Delphi technique, with the findings of this study, we identified that the indicators were the same: infrastructure, facility security, and workforce management. The facility security indicator is also related to risk, as people are frequenting these spaces, and it is expected that they be safe for the users. According to Duarte, Gargiulo, and Moreno (2011), infrastructure strongly influences student motivation.

The results in Brazil indicate that workforce adequacy, coupled with maintenance and management processes, increase customer satisfaction and classroom occupancy. This occupancy rate is related to the student-to-teacher ratio, that is, how many students per teacher. The standard in public institutions is 20. Therefore, if an institution has 20 teachers, it should have a minimum of 400 students; an institution with 70 teachers should have 1,400 students.

Taking care of the training and development of the workforce and facilities is essential for an educational institution to achieve financial success.

Conclusion

One of the assumptions of the Balanced Scorecard (BSC) is that an organization cannot achieve financial indicators without considering other frameworks, such as how organizational learning supports process improvement that impacts customers and generates results.

In this context, we conducted a research study with the purpose of identifying key performance indicators for management in Brazilian universities. We conducted a

study on indicators in Korean universities conducted by Kim Kim (2018) and applied the Spearman correlation coefficient test to analyze the relationship between these indicators.

In this study, the hypothesis was formulated regarding which indicators are used by organizations at the strategic, tactical, and operational levels. After conducting the Balanced Scorecard Map, it was identified that the learning indicator linked to safety and workforce management supports internal processes, computerized systems, quality of the internal environment, level of institutional performance, and facility performance indicator.

These processes, in turn, are interconnected with customers through facility adequacy and safety, as well as customer satisfaction, resulting in financial outcomes through occupancy and facility evaluation. These indicators can be summarized in two points: employee training, ensuring facility adequacy, and increasing classroom occupancy rates.

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