KEY PERFORMANCE INDICATORS: A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT

Performance management based on Key Performance Indicator (KPIs) implemented in any organisation. This study aims to identify key performance indicators (KPIs) and categorise them based on performance measurement to improve a holistic performant management organisation. The Method is using literature review 50 journals based on performance management weighing Key Performance Indicator (KPIs) in the Asian region between 2003-2020. The result KPIs can be implemented in many of industrial sector or other, as shown to improve the satisfaction, better service, educations, product, SCM, business process, maintenance, a decrease of the case's in environment problem, used to identify the critical point in banking, financial audit, control targets, increase productivity, safety indicator and even a prototype for best organisational performance.

Key Words: Performance Management, KPIs.

INTRODUCTION

Key Performance Indicators (KPIs) help define and measures the organizational goals, which is fundamental to any ongoing organization and the success/ sustainability of any company. KPIs are important for companies that aim to implementing a performance management system based on measurable aspects of organizational functions. Such systems can have many names but the most commonly used system is called balanced scorecard. Many other organizational management systems such as Six Sigma, Lean and the kin make extensive use of KPIs. While KPIs help organizations evade ordinary mistakes and hazards, usually KPIs measure with numerous, randomly assembled, and overly complex, essentially rendering the whole measurement process ineffectual, or counterproductive.

KPIs can change behaviors and deliver a broad range to outcomes to improve business results, drive improvement in operational performance. KPIs also help in continuity to implement performance measures, thus a better way of managing the organization.

According to Parmenter (2015) there are three major benefits of ascertaining an organization's critical success factors and the associated performance measures: (1) A clarity of purpose, from aligning the daily staff actions to the organization's critical success factors, (2) Improving performance through having few and more meaningful measures, and (3) Creating wider ownership, empowerment, and fulfilment at all levels of the organization.

Implementing Key Performance Indicators (KPI) driving force behind a social system, economies, and organizations, can reach normative effects, which can modify organizational behavior and influence key decisions. To establish long term objectives, rules, and behaviors to achieve the planned results, stakeholders KPIs (such as vendors) are integrated in performance management systems. A dynamic performance measurement system requires a multidisciplinary approach that integrates knowledge from process areas, information technologies, people, and appropriate scientific methods to ensure that the KPIs fit organizational goals.

Performance measurement can be identified as a system by which a company monitors its routine operations and evaluates whether it is achieving its objectives (Lebas, 1995). A series of indicators that properly reflect company performance should be set up to fully utilize the function of performance measurement. These indicators can be quantifiable or unquantifiable. For example, an indicator such as lead time is understood as a quantifiable (or financial) measure whereas the degree of customer satisfaction is categorized as an unquantifiable (or nonfinancial) measure.

KPIs represent a quantitative index that reveals the key success factors of an organization. Therefore, the selection of KPIs should be based on the context of an organization, and each KPI should be fitted to the organizational goals and should be quantified. KPIs clarify major responsibilities and serve as a base to identify the performance measurement indicators of different departments in a company. Therefor performance evaluation can be established on a quantitative base. To establish clear and achievable KPIs is the key to effective performance management. To sum up the above literature, KPIs should be created according to organizational goals. KPIs not only help to identify and analyze the performance indicators that need emphasis during business operations, but also provide direction, data, and real conditions for evaluation.

In this study, a literature review was carried out in an attempt to determine KPIs used in variable manufacturing. The most commonly used KPIs evaluation criteria are used. This paper proposes a set of Key Performance Indicators (KPIs) for evaluating the implementation of KPIs that are appropriate to many industrial sectors and develop the KPIs evaluation model of manufacturing setups to get the best performance organization or production. It is believed that the proposed KPIs and the evaluation model will enable and assist the various industry in an effort to increase their performance.

RESEARCH METHODOLOGY

A systematic literature review is adopted in this research because researchers believe that it is important to conduct a systematic review in any scope, to understand the level of previous research that has been undertaken and to know about the weakness and the areas that need more research in the next future.

The systematic literature review covers all international journals covering KPIs in Asian region from various companies from 2003 to 2020. It covers and explores the most common ideas published in the field of KPIs and explores the gaps in each theme.

Validity and reliability of the research were established initially through expert opinions (Face Validity), with led to significant changes in the measurement scales and tools. Later the reliability was triangulated through test-retest and cronbach's alpha statistic of a 10 sample pilot study (0.76).

RESULTS & DISCUSSION

In this section, the results from the literature review and content analysis are presented to answer the research questions as shown in Table 1.

Paper ID	Industry	Result
Vanany 2003	Manufacturing , ANP	Financial (0.3636) greater than Process Perspective (0.2726), Learning & Growth Perspective (0.1819), and Consumer Perspective (0.1818)
Vanany & Tanukhidah, 2004	Hotel	Current performance indicator achieved 50.75% growth
S. Chen et al., 2009	Education	The rate of university enrolment reached improved 92 percent in the past three years since the method was first implemented in 2005, The satisfaction of customer reached above 87.3 percent including student and faculty satisfaction
C. L. Yang & Huang, 2011	Online shop	The dimensions that most affect the performance of a seller on an online auction site are "internet environment" (46.2%) and "customer" (20.3%).
Tey et al., 2011	Construction Research	Key barriers of coordination in construction project
Huang et al., 2011	Waste management	The AI established by the CW method is more practicable than the one generated by the DEA method.

Paper ID	Industry	Result
Sungkar et al., 2011	Hospital	Prototype performance dashboard
Masron et al., 2012	Education Survey	A significant positive association between KPI and KIP with analysis Pearson 0.111, Kendall's tau_b 0.129, Spearman's rho 0.157
Abdullah & Sofian, 2012	Survey	123 companies which are 85.4% of the respondents adopt Key Performance Indicator (KPI) to measure the department's performance
Montoneri et al., 2012	Education	Dmus decreases from 5 for the base case to 1, 3, 4, or 2 for the cases withdrawing indicators I1, I2, O1, or O2, respectively. The average relative efficiency decreases from the base case's 0.986 to even 0.879 in the case i2e01e02 (withdrawing evaluated indicator I1)
Wu, 2012	Banking	The threshold was set to 0.7667 for the four BSC perspectives and 0.5058 for the total relationships among the KPIs. DEMATEL analysis, the influential directions, and strengths among the KPIs can be used to identify critical KPIs
Tsai & Cheng, 2012	Survey E-commerce	The mean of a KPI reached 7, a quartile deviation of 0.6
Andika et al., 2013	Supply chain management	Score Vendor performance Indicator PT. A achieved 79.6%, PT. B 92.3%, PT.C 80%, PT.D 74.9%
W. Yang & Deng, 2013	Community	There are 15 KPIs could be traced by building vertical control targets out of 22 quantitative KPIs
Zhu et al., 2014	Manufacturing	Case A produces high purity product preferred by the market and low unit energy consumption cost, but low production rate leads to less total benefit, Case C produces more low purity product with abundant heating steam and cooling water, and also receives a little total benefit, Case B falls in between Case A and Case C
Meiliana et al., 2014	Research IT	Web Application based on PHP
Ngan et al., 2014	Hospital	The DDR portable x-ray system reduced with efficiency improvement of 47%, and the radiographers' productivity was raised by 96%
Authoni & Suryani, 2014	Education	Prototype performance dashboard

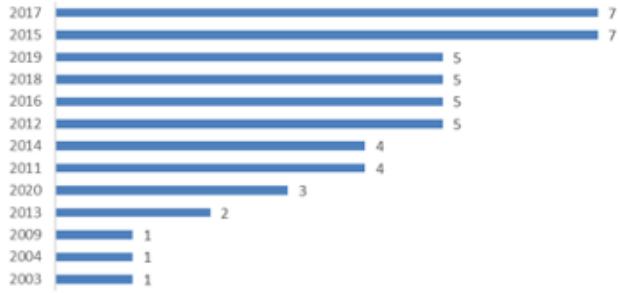
Paper ID	Industry	Result
Amrina & Vilsi, 2015	Manufacturing	The overall score of plants-1 is 6.930, plant-2 is 7.365, plant-3 is 8.069
Prakash et al., 2015	Manufacturing mining	Several parameters have influenced the production (t/h), diesel, and pick consumption per 1000 t, the three KPI of the surface miner.
Rattanavijit et al., 2015	Research Hospital supply chain	The business process and the link between the two can yield the key performance indicator for the considered process.
Sari, 2015	Manufacturing	Financial audits (0,051), the number of customer complaints (0,067), the level of healthy employees (0,071), and the time of payment to the supplier (0,046).
Ni Luh ayu, et al, 2015	Hotel	Performance value is 3.866 on a Likert scale of 5
Rislisa & Himam, 2015	Manufacturing	There was no significant effect of participation in setting Key Performance Indicator (KPI) on work goals commitment. (F = 0.425; p>.05).
Asgher & Romero, 2015	Education	The total cumulative KPIs score is 100
Park et al., 2016	Environmental	The KPI values from the model tests are smaller than the ideal value (1.0)
Majumder et al., 2016	Electricity	Average Panel Performance Factor of the panels is 0.95 which is satisfactory considering the losses due to dust and temperature.
Bai et al., 2016	Environment	National average carbon emission intensity 0.51 tc/10^4 yuan. Energy-intensive industry proportion 0.36%.
Ayub et al., 2016	Research construction	The key project criteria identified by PMI [7] are synonyms to the top 5 pis identified i.e. On time completion, cost of the overall job, stakeholder satisfaction, quality and safety indicating.
Xiang et al., 2016	Energy-absorbing	The energy absorption performances of the both SP and HP packaged circular honeycombs are better than single circular tubes within a certain range of solidity ratio.
Omar et al., 2017	Research maintenance	Significant with the mean value of 4.28, 4.27, and 4.25 respectively.

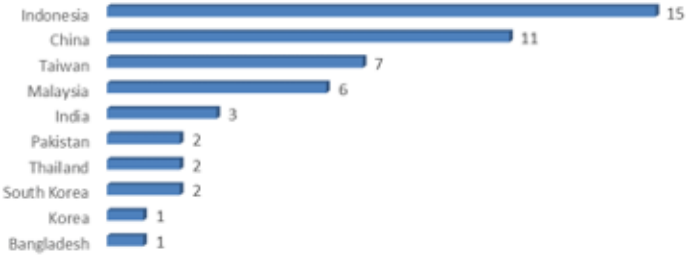
Paper ID	Industry	Result
Wibisono et al., 2017	Education	Prototyping developing EIS.
Sangwan, 2017	Research reverse logistic	The KPIs and decision variables are provided for all the major activities involved in reverse logistics
Liu et al., 2017	Flow process	A simulation study new performance indicator to reflect material flow efficiency of a production system
Khotimah et al., 2017	Telecom	Drive Test does not use repeaters revealed CSSR 100%, CSR 80% and the CDR of 20%, whereas when using a repeater obtained CSSR 100%, CSR 97%, and CDR 3%.
Rokhim, 2017	Manufacturing	The KPI performance useful Performance Management tool for the manager to give the yearly appraisal.
P.-S. Chen et al., 2017	Logistic	Eight KPIs for warehouse companies.
Lan et al., 2018	Research	KPI relevant and irrelevant variations, respectively. In contrast to its counterparts.
An et al., 2018	Benchmarking energy	Large variations in the total cooling energy consumption among all households in the same district with the same climate conditions and envelope performance, with the highest amounting to 140 kwh/ m 2, which is 13.5 times the median level.
Akkawuttiwanich & Yenradee, 2018	SCM	Production assets lead to a cost reduction from 81% to 79%.
Hermansyah & Herliani, 2018	Government	Dashboard monitoring government procurement goods.
Tang et al., 2018	Research - Oil and Gas	Safety indicators into 14 major safety factors, employing a scoring system of the safety factors enable performance.
Amrina et al., 2019	Manufacturing	Lighting and ventilation (0.151) is indicated as the most important indicator of sustainable maintenance evaluation.
Bang et al., 2019	Research - energy efficiency	The assembly-based manufacturing firms and industries had higher cost efficiencies than the process-based ones.

Paper ID	Industry	Result
Dev et al., 2019	Big Data research	Discrete event simulation, fuzzy-ANP (FANP), and TOPSIS under the premise of big data analytics environment help companies finding significant KPIs across the entire supply chain in a systematic real-time manner.
Ghadimi et al., 2019	Research environmental	Coal to energy SC under investigation, the CCEP environmental performance has been determined as "medium performance" with an indicator score of 39.15%.
Kim et al., 2019	Benchmarking	Benchmarks for the indicators are made based on the datasets of 4,336 public buildings and a benchmarking database is constructed.
Ma et al., 2020	Industrial process	The proposed methods function well for real-time detection and accurate propagation pathway identification of quality and safety-oriented faults in Tennessee Eastman process, which will help operators to take corrective actions and recover the process quickly.
Jiang et al., 2020	Hospital	The effectiveness and usefulness of the proposed large group linguistic Z- DEMATEL approach.
Torabizadeh et al., 2020	Survey warehouse management system	Cronbach's alpha where the value achieved is 0.95, and the AVE achieved is more than 0.84. A comprehensive set of KPIs that covers three aspects of the TBL approach in SWMS is lacking.

In summary, the use of KPIs have been reported as associated with superior performance in various sectors. For example, hotel management 50,75% (Vanany & Tanukhidah, 2004), and Anggawati & Werastuti, 2015, online shops through the internet environment (46.2%) and customer (20.3%) (C. L. Yang & Huang, 2011), the X-ray performance in hospital efficiency improvement of 47%, and the radiographers' productivity was raised by 96% (Ngan et al., 2014), (Abdullah & Sofian, 2012). Supply chain management vendor performance 74.9 to 94.3% (Andika et al., 2013), education customer satisfactions 87.3% (S. Chen et al., 2009) and 100% (Asgher & Romero, 2015), output of prototype (Sungkar et al., 2011), (Authoni & Suryani, 2014),(Wibisono et al., 2017), output a web application (Meiliana et al., 2014), dashboard monitoring (Hermansyah & Herliani, 2018), production cost reduction from 81% to 79% (Akkawuttiwanich & Yenradee, 2018), and environmental performance 39,15% (Ghadimi et al., 2019).

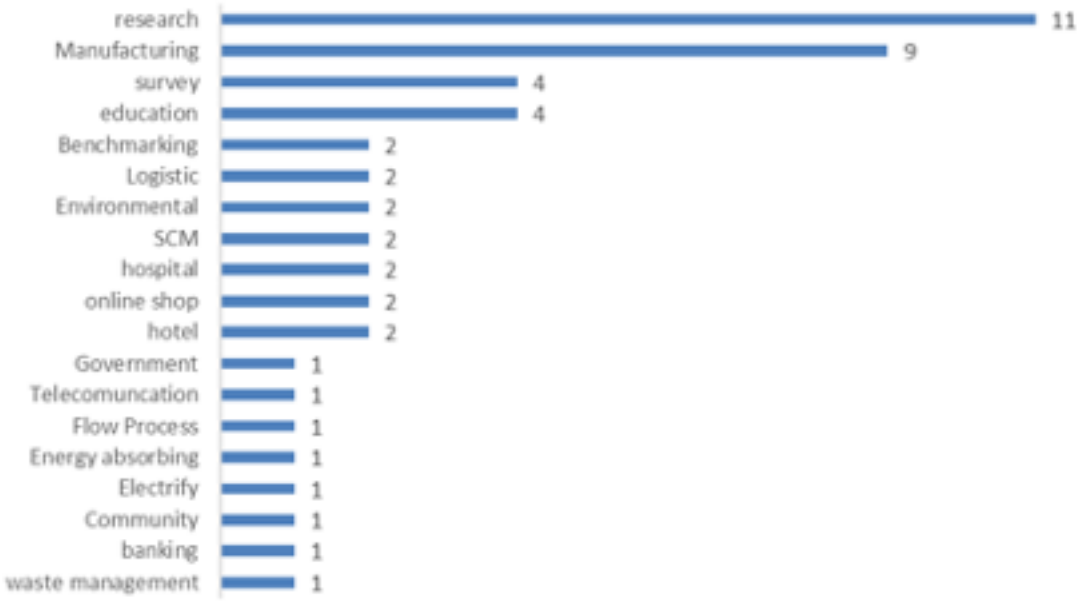
Figures below distribution of analysed papers by years of publication and country of the authors/ data origin.





Analysing the distribution of method of KPIs for Asian industries has resulted the most methods is "other" which included linking KPIs by Regression Analysis questionnaire by Frequency Analysis, Pearson Correlation, Vendor Performance Indicator and Analytical Hierarchy Process (AHP), decomposition of KPIs, Multiple Key Performance Indicators, Scrum for Web KPI, DDR portable x-ray system and conventional-CR combo with Statistical Analysis, artificial neural network analysis and correlation coefficients analysis, ANOVA analysis, quasi-experimental empirical study, dynamic positioning system (DPS), production-based method (IPCC model), literature review and methodology of Gündüz, Nielsen, descriptive analysis in SPSS., Model Executive Information System (EIS), work in processes (WIPs), critical success factors (CSFs), PLS algorithm, KPIs and Clustering analysis, safety performance and Statistical Analysis, Supply Chain Operations Reference (SCOR) KPIs and fuzzy QFD, life cycle assessment (LCA) combined with fuzzy set theory, Benchmarking scales, KPI oriented process monitoring and fault diagnosis (PMFD), Sustainable Warehouse Management System (SWMS). The second ranked is DEMATEL and KPI's with 4 papers, Dashboard and DEA with 3 papers, PRISM, FANP, AHP, ANP and BSC with 2 papers as shown in Figure below.

Figure below shows distribution of papers by industry/ themes.



CONCLUSION

The results show that the complexity of the information tends to influence the number and types of the performance indicators. Various information aspects such as data, cost, waste, satisfaction, web applications, supply chain improvement, etc. often result in varying metrics. Studies relating to performance metrics vary in terms of research objectives and emphasis; hence, outcomes may differ as well, resulting in various types of performance indicators. Literature in this paper shows that studies focus on KPIs to improve the satisfaction, better service, educations, product, SCM, business process, maintenance, a decrease of the case's in environment problem, identification of critical point in banking, financial audit, control targets, increase productivity, safety indicator and even a prototype for best organisations performance.

Future researchers can improve the framework used in in this paper by added by measurement methods and evaluation tools. More industries, particularly the service industries can be included.

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