QUALITY
Access to Success

Journal of Management Systems, 6 issues per year

Publisher:
Romanian Society for Quality Assurance, Bucharest, Romania
President: **Dan Grigore Stoichițoiu**

Indexed in: **WEB OF SCIENCE – ESCI, SCOPUS, EBSCO, PROQUEST** and listed in **CABELL'S Whitelist**

Publisher and Journal address:
Str. Theodor Burada, No. 6, Sector 1, 010215 - Bucharest, Romania

Information:
Tel: 021.313.63.35; 0731.300.120
Fax: 021.313.23.80
E-mail: **tudor.maruntelu@srac.ro**
Website: **www.calitatea.srac.ro**

Print:
S.C. Interbrand Impex S.R.L.

p-ISSN 1582-2559; e-ISSN 2668-4861; ISSN-L 2668-4861

CONTENTS

Vol. 20, No. 173 - December 2019

Ranking of Priority Key Performance Indicators Internal Business Processes Cocoa Industry of SMEs Scale in South Sulawesi

LAMATINULU [1*], Muhammad DAHLAN [1], RAMLAWATI [2]

[1] Department of Industrial Engineering, Faculty of Industrial Technology, Universitas Muslim Indonesia, Makassar, Jalan Urip Sumoharjo Km 05, Makassar 90231, Indonesia

[2] Department of Management, Faculty of Economic, Universitas Muslim Indonesia, Makassar, Jalan Urip Sumoharjo Km 05, Makassar 90231, Indonesia

* Corresponding author; E-mail: lamatinulu@gmail.com

Abstract

The Performance of SME Processing Industry in South Sulawesi scale is still not measured, making it difficult to conduct the process of measuring and improving performance. Pursuant to that matter hence research aim to identify and set priority Key Performance Indicators (KPIs) on internal business process aspect at cocoa processing industry of SMEs scale. This research method is a combination of descriptive statistics and the Analytical Hierarchy Process (AHP). The findings of this study were to establish 15 Key Performance Indicators (KPIs) required in the measurement and improvement of performance on the aspects of Internal Business Process (IBP). KPIs that are the top priority at three levels are the realization of products that meet the quality standard with the weight of 0.144, the second priority is the percentage of defective products with the weight of 0.125, the third priority is the percentage improvement of resource utilization efficiency with the weight of 0.107. The impact of priority KPIs weighting values can be the basis of performance appraisal on internal business process aspects.

Keywords: *key performance; cocoa; industry; SMEs.*

1. Introduction

Based on data from the Central Bureau of Statistics of the Republic of Indonesia, one of the largest cocoa producing regions in Indonesia is South Sulawesi (BPS, 2014). Cocoa as a plantation commodity is one of the factors driving cocoa industry development. Most of the cocoa produced in South Sulawesi is sold in the form of cocoa beans for export needs. This is a factor causing the added value of cocoa is very low. This fact prompted the development of cocoa processing industry of Small and Medium Scale Enterprises (SMEs) in cocoa-producing regions in South Sulawesi. The focus of attention on the SME's cocoa processing industry is the internal business process aspect. This is very important for achieving the business objectives of the small-scale cocoa processing industry, as it relates to quality improvement, operational improvement, efficiency improvement and new product development (Turuduoglu, et al., 2014). The internal business process perspective is one of the factors to fulfill customer desires and can play an important role in creating business performance excellence (Alzoubi and Khafajy, 2015).

One of the problems cocoa industry of SMEs scale in South Sulawesi is product quality, product innovation, efficiency, technology adoption, and operational sustainability. These issues are related to internal business process aspects. Based on the existing problems then required the existence of performance measurement instruments to measure the internal aspects of the process. In this regard, the approach used is the Balanced Scorecard concept (BSC) which examines performance based on four perspectives including internal business process perspective (Kaplan and Norton, 1992). This study specifically identifies and establishes the priority weight required key performance indicators for measuring the performance of the industry from the perspective of Internal Business Processes (IBP) at SME scale cocoa processing industry. The rationale uses the AHP method approach and the BSC concept approach as it can help the process of performance measurement analysis (Gomes and Lirio, 2014; Lamatinulu and Dahlan, 2016).

2. Materials and methods

The location of this research is Palopo and Masamba city of South Sulawesi. The research instrument used two types of questionnaires. Approach method of analysis used in this research is descriptive statistic method and Analytical Hierarchy Process / AHP (Saaty, 1993). The location of this research is Palopo and Masamba city of South Sulawesi. The research instrument used two types of questionnaires. Approach method of analysis used in this research is descriptive statistic method and Analytical Hierarchy Process / AHP (Saaty, 1993). Descriptive statistical methods (Thompson, 2009) were used to identify key performance indicators (KPIs) on the internal business process perspective, while the AHP method was used to analyze the priority weight of KPIs required for measuring internal business perspective performance in the SMEs cocoa processing industry. The AHP method can be applied in determining the priority weighting of key performance indicators with a BSC perspective approach (Lamatinulu, et al., 2018). In this study involved expert respondents who understand the cocoa processing industry.

The summary of research stages can be described as follows:

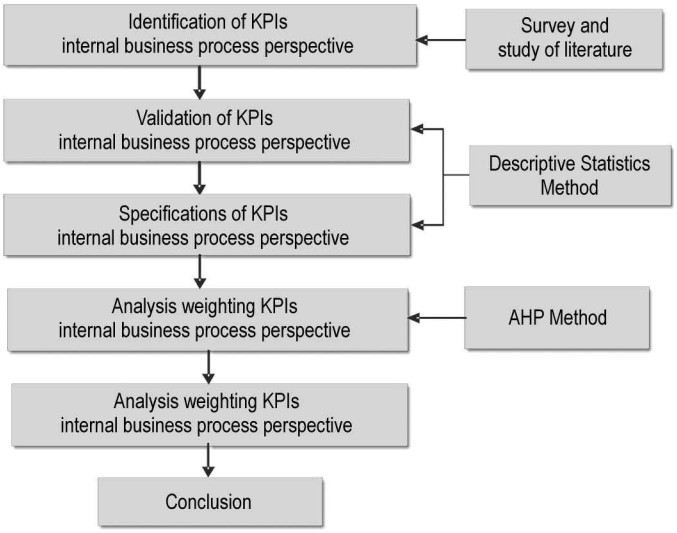

Figure 1. Research stages

3. Results and discussion

Internal business process perspective is an important factor in the improvement of industry performance because this aspect includes product innovation, operational continuation and after-sales service (Kaplan and Norton, 1992). Based on these considerations, it is necessary to identify the KPIs needed to assess the performance of the Internal Business Process (IBP) aspect of the SMEs scale cocoa industry.

IBP includes innovation which is a very important aspect of industry performance because innovation is a key factor in the success of industrial organizations (Tohidi and Jabbari, 2012). Aspects of IBP also play an important role as a real activity step to meet customer desires and satisfaction. To optimize the performance of the SME processing industry, need to establish the needs of KPIs in the IBP perspective as a basis for measuring and improving performance. The results of the survey and data analysis determined some of the proposed needs of KPIs for performance measurement on the IBP aspects of cocoa processing industry of SMEs scale as shown in Table 1.

The proposal needs KPIs on internal business process perspective	Code
Percentage of product defect or not according to the quality standard	KPI_{P1}
Realization of production capacity	KPI_{P2}
Percentage of product demand that is not met	KPI_{P3}
The Frequency of maintenance of machinery and equipment	KPI_{P4}
Percentage of machine and equipment damage	KPI_{P5}
Comparison of productive and non-productive time of machinery and equipment	KPI_{P6}
The Accuracy of diversification and specification of processed cocoa products	KPI_{P7}
The selling price of production that can compete	KPI_{P8}
Percentage increase in resource utilization efficiency	KPI_{P9}
Number of new technology adoption	KPI_{P10}
Availability of database related to type, specification and product quality	KPI_{P11}
The unique taste of cocoa processed products	KPI_{P12}
Realization of products that meet quality standards	KPI_{P13}
The uniqueness of brand design and packaging of processed cocoa products	KPI_{P14}
Level of availability of raw material of fermented cocoa beans	KPI_{P15}

Table 1. Description of KPI
on Internal Business Process perspective (IBP)

Based on the validation of KPIs requirement from the IBP perspective, it is determined that all KPIs in Table 1 are acceptable because based on the results of the expert respondents' assessment using questionnaires with the score of 1-5, it is found that the average assessment of the needs of KPIs > 4 (Figure 1). This shows the meaning that all the identification of KPIs are needed and can serve as an indicator of the performance of the SME cocoa processing industry in the perspective of IBP.

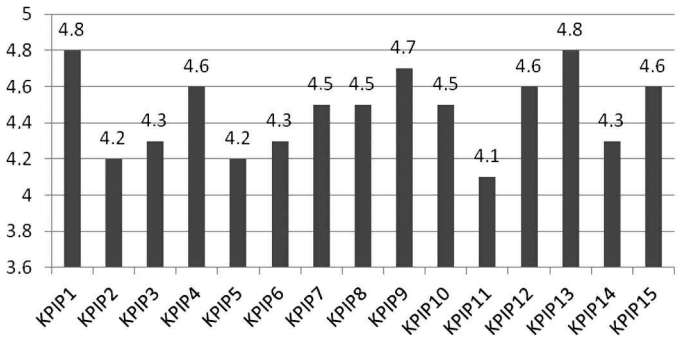

Figure 2. The average level of needs assessment KPIs of IBP perspective

The results in Tables 1 and Figure 2, followed by an analysis of the priority weighting of key performance indicators on the IBP aspect. The results of the assessment of expert respondents through paired comparison questionnaires then compiled the matrix values used as the basis for performing the AHP analysis as shown in Table 2.

Referring to the value of the matrix element in Table 2, then proceed with the normalization analysis of the values of the matrix elements used as the basis for determining the value of the vector eigen weight or priority matrix (Table 3). Indicators acceptance criteria pairwise comparison matrix assessment results received based on the value of Consistency Index (CI) and the Consistency Ratio (CR). The value of the eigenvalue (λmax) becomes the basis of the CI value. The value of CI obtained is 0.029. In the first analysis set, the value of Random Index (RI) is equal to 1.59. CR value of 0.018 was obtained through comparison of CI value with RI. The result of determining the priority weight of KPIs on the IBP aspect with the AHP method in Table 3 is all acceptable because of the CR value <0.1 (Saaty, 1993).

Table 3 shows that KPIs that have the highest priority weighted value is the realization of processed cocoa products that meet the quality standard (KPI_{P13}) with a weight of 0.144. The results of this analysis indicate that the product quality is the key factor in improving the performance of SMEs scale cocoa industry. This is particularly important because the quality of food industry products is a key factor in improving customer satisfaction as a key to success in improving performance and competitiveness (Suchanek, et al., 2017; Lamatinulu, et al., 2017). Achieving quality of processed cocoa products is closely related to the application of production process stages involving human resources, raw materials, machinery, methods and good equipment. The availability of adequate resources can encourage the steps of product innovation based on quality standards on an ongoing basis. This matter becomes the focus of attention so that the performance of IBP aspects can be improved.

Second priority KPIs are the percentage of defective products (KPI_{P1}). Defective product factors are important to get attention because they are related to product safety. Defective product means the product that is not in accordance with product standardization that should be produced. The increasing number of defective products is a form of waste that can have an impact on performance and productivity (ElMekkawy, et al., 2006). Therefore defective products should be eliminated as this is at the heart of obligations, product responsibility and related to product safety (Xiulia, et al., 2012). Minimization of defective products is an important factor for improving quality, reducing production costs and processing cycle time so as to increase productivity (ElMekkawy, et al., 2006; Uddin and Rahman, 2014).

	KPI_{P1}	KPI_{P2}	KPI_{P3}	KPI_{P4}	KPI_{P5}	KPI_{P6}	KPI_{P7}	KPI_{P8}	KPI_{P9}	KPI_{P10}	KPI_{P11}	KPI_{P12}	KPI_{P13}	KPI_{P14}	KPI_{P15}
KPI_{P1}	1	3	3	2	3	3	2	2	2	2	4	2	1	3	2
KPI_{P2}	0.333	1	0.5	0.3	1	0.5	0.5	0.5	0.333	0.5	2	0.333	0.25	0.5	0.333
KPI_{P3}	0.333	2	1	0.3	2	1	0.5	0.5	0.333	0.5	2	0.333	0.25	1	0.333
KPI_{P4}	0.5	3	3	1	3	3	2	2	0.5	2	3	1	0.5	2	1
KPI_{P5}	0.333	1	0.5	0.333	1	0.5	0.5	0.5	0.333	0.5	2	0.333	0.25	0.5	0.333
KPI_{P6}	0.333	2	1	0.333	2	1	0.5	0.5	0.333	0.5	2	0.333	0.25	1	0.333
KPI_{P7}	0.5	2	2	0.5	2	2	1	1	0.5	1	3	0.5	0.3	2	0.5
KPI_{P8}	0.5	2	2	0.5	2	2	1	1	0.5	1	3	0.5	0.3	2	0.5
KPI_{P9}	0.5	3	3	2	3	3	2	2	1	2	3	2	0.5	3	2
KPI_{P10}	0.5	2	2	0.5	2	2	1	1	0.5	1	3	0.5	0.3	2	0.5
KPI_{P11}	0.25	0.5	0.5	0.333	0.5	0.5	0.33	0.333	0.333	0.333	1	0.333	0.25	0.5	0.333
KPI_{P12}	0.5	3	3	1	3	3	2	2	0.5	2	3	1	0.5	2	1
KPI_{P13}	1	4	4	2	4	4	3	3	2	3	4	2	1	3	2
KPI_{P14}	0.333	2	1	0.5	2	1	0.5	0.5	0.333	0.5	2	0.5	0.333	1	0.333
KPI_{P15}	0.5	3	3	1	3	3	2	2	0.5	2	3	1	0.5	3	1

Table 2.
Value of matrix elements based on pair wise questionnaires

No	KPIs	Priority weight	Ranking
1	KPI_{P1}	0.125	2
2	KPI_{P2}	0.029	9
3	KPI_{P3}	0.037	8
4	KPI_{P4}	0.086	5
5	KPI_{P5}	0.029	9
6	KPI_{P6}	0.037	8
7	KPI_{P7}	0.057	6
8	KPI_{P8}	0.057	6
9	KPI_{P9}	0.107	3
10	KPI_{P10}	0.057	6
11	KPI_{P11}	0.023	10
12	KPI_{P12}	0.086	4
13	KPI_{P13}	0.144	1
14	KPI_{P14}	0.039	7
15	KPI_{P15}	0.088	4

Table 3.
Weight and priority ranking KPIs internal business process perspective

The third priority KPIs are the efficiency of resource utilization in the SME cocoa processing industry. Resource efficiency is an important effort to reduce waste and internal business process costs. Resource efficiency is a limited and sustainable effort to utilize resources to minimize adverse impacts or a ratio between the resource benefits of a processor system (Sfez, et al., 2017). To improve the performance of the cocoa industry in the IBP perspective, technological innovation is needed to realize the efficiency of resources. This is critical because resource efficiency can serve as a core strategy for an industry in performance improvement (Delmas and Pekovic, 2015).

The fourth priority KPIs is the unique taste of cocoa processing products (KPI_{P12}) and the availability of fermented cocoa beans (KPI_{P15}). The unique factor of the taste of cocoa processed products is one of the factors of consumer attractiveness because the sensation of the uniqueness of taste towards food products is the preference of consumer tastes (Baharuddin and Sharifudin, 2015). The taste factor for cocoa processing products in the SME scale industry needs to get attention in order to create customer attraction. Once the importance of taste factor then there is some research that discusses the importance of the unique taste of food products related to taste and consumer health (Enax, et al., 2015; Luomala, et al., 2015; Kwon, 2017). Related to the realization of processed cocoa products that have a unique taste then it must be supported by the availability of quality raw materials. The criteria of standard cocoa raw materials are fermented cocoa beans, because cocoa processing products in the form of cocoa powder, cocoa paste, and cocoa powder processed from fermented cocoa beans can meet the quality standard requirements (Towaha, 2012). Based on this to improve performance on the IBP aspect in the cocoa industry must be supported by the raw material supply of fermented cocoa beans.

The next priority sequences of KPIs for measuring the performance of IBP perspectives on the SME-scale cocoa industry include: machine and equipment maintenance (KPI_{P4}) at the fifth priority, the precise diversification of cocoa processing products (KPI_{P7}) and cost of production (KPI_{P8}) at sixth priority, brand design and packaging product (KPI_{P14}) on priority 7, percentage of unmet product demand of KPI_{P3} and comparison of productive and non-productive time of KPI_{P6} machines and equipment on the eighth priority, Production capacity (KPI_{P2}) realization in the ninth priority and availability of data based on type, specification and product quality (KPI_{P11}). Priority ranking sequence based on the weighted value of KPIs is a determinant factor for the contribution of KPIs to the performance of the SME cocoa processing industry on the perspective of IBP. This indicates that the KPIs that are the focus of attention for performance improvement are those that have the greatest weight value.

4. Conclusion

The priority weighted value of KPIs in the perspective of Internal Business Process (IBP) is the determinant of the magnitude of the contribution of KPIs to the performance value achieved by the SME processing cocoa industry. Results of the analysis indicate that KPIs which become the main priority is KPI_{P13} with weight value 0.144. This suggests that performance improvements should prioritize product realization factors that meet quality standards. The quality factor of cocoa processed products that meet the quality standard can improve customer satisfaction and become the main factor of improvement of cocoa industry performance and competitiveness. KPIs which are second priority supporters for performance improvement on the IBP perspective are related to efforts to minimize defective products and resource usage efficiency with a weighted value of 0.125.

References

[1] Alzoubi, M.H., and Khafajy (2015). The Impact Of Business Process Management On Business Performance Superiority. *International Journal of Business and Management Review*, 3(2):17-34.

[2] Badan Pusat Statistik (Central Bureau of Statistics) – BPS (2014). The area and production of people's plantation cocoa plant. Area of People's Crops by Type of Plants. Available https:// bps.go.id/linkTabelStatis/view/id htm [accessed Jun. 27, 2016].

[3] Baharuddin, A.R., and Sharifudin, M.S. (2015). The impact of geographical location on taste sensitivity and preference. *International Food Research Journal*, 22(2): 731-738.

[4] Delmas, A.M., Pekovic, S. (2015). Resource Efficiency Strategies and Market Conditions, *Long Range Planning*, 48:80-94.
[5] ElMekkawy, T.Y., Hachkowski, P.A., Strong, D. and Mann, D.D. (2006). Defect analysis for quality and productivity improvements in a manufacturing system. *Canadian Biosystems Engineering*, 48: 7.9 -7.12.
[6] Enax, L., Weber, B., Ahlers, M., Kaiser, U., Diethelm, K., Holtkamp, D., Faupel, U., Holzmüller, H.H., and Kersting, M. (2015). Food packaging cues influence taste perception and increase effort provision for a recommended snack product in children. *Front. Psychol*. 6:882. doi:10.3389/fpsyg.2015.00882.
[7] Gomes, R. C., & Lírio, V. S. (2014). Strategic Planning in Brazilian Small-Scale Municipalities: Is the Balanced Scorecard a Feasible Tool? *Revista de Administração da UFSM*, 7(1): 8-21.
[8] Kaplan, R. S., and Norton, D. P. (1992). The Balanced Scorecard – Measure That Drive Performance. *Harvard Business Review*, 70(1), 71-79.
[9] Kwon, Y.D. (2017). Ethnic foods and their taste: salt and sugar. *Journal of Ethnic Foods*, 4: 133-134.
[10] Lamatinulu, Pratikto, Santoso, P.B., and Sugiono (2017). Design of Strategy to Increase the Added Value and Competitiveness of Products Mini Cocoa Processing Industry Based OVOP with using Interpretive Structural Modeling(ISM). *Journal of Engineering Science and Technology Review*, 10 (5): 98-103.
[11] Lamatinulu, Dahlan, M., and Ramlawati (2018). Identification and Determination of The Priority of Key Performance Indicators Perspective of Customers on Cocoa Processing Industry Of Smes Scale in South Sulawesi. *International Journal of Engineering Sciences & Research Technology*, 7(7): 41-47.
[12] Lamatinulu and M. Dahlan, (2016). Determination of Key Performance Indicators Priorities aspects of Teaching - Learning Process and Atmosphere Academic Study Programs in Private Higher Education. *Research Journal of Applied Sciences*, 11(12): 1495-1500.
[13] Luomala H., Jokitalo, M., Karhu, H., Luoma, H.L.H., Hopia, H., Hietamaki, S. (2015). Perceived health and taste ambivalence in food consumption. *Journal of Consumer Marketing*, 32(4): 290-301.
[14] Saaty, T. L. (1993). *Decision Making for Leader: The Analytical Hierarchy Process for Decisions in Complex World*, University of Pittsburgh. Pittsburgh.
[15] Suchanek, P., Richter, J., and Kralova, M. (2017). Customer Satisfaction with Quality of Products of Food Business. *Prague Economic Papers*, 26(1): 19-35.
[16] Thompson, B.C. (2009). Descriptive Data Analysis. *Air Medical Journal*, 28(2): 56-59.
[17] Tohidi, H. and Jabbari, M.M. (2012). The important of Innovation and its Crucial Role in Growth, Survival and Success of Organizations. *Procedia Technology*, 1: 535-538. doi: 10.1016/j.protcy.2012.02.116.
[18] Towaha, J., Anggraini A.D. and Rubiyo (2012). Keragaan mutu biji kakao dan produk turunannya pada berbagai tingkat fermentasi: Studi kasus di Tabanan, Bali (Performance of cocoa bean quality and its derivate products under some fermentation levels: a case study in Tabanan, Bali). *Pelita Perkebunan*, 28(3): 166-183.
[19] Sfez, S., Dewulf, J., Soete, D.W., Schaubroeck, T., Mathieux, F., Kralisch, D., and Meester, S.D. (2017). Toward a Framework for Resource Efficiency Evaluation in Industry: Recommendations for Research and Innovation Projects. *Resources*, (6)5:1-23.
[20] Turuduoglu, F., Suner, N., and Yildirim, G. (2014). Determination of Goals under Four Perspectives of Balanced Scorecards and Linkages between the Perspectives: A Survey on Luxury Summer Hotels in Turkey. *Procedia - Social and Behavioral Sciences*, 164: 372-377.
[21] Uddin S.M. and Rahman C.M.L. (2014).Minimization of Defects in the Sewing Section of a Garment Factory through DMAIC Methodology of Six Sigma. *Research Journal of Engineering Sciences*, 3(9): 21-26.
[22] Xiulia, L., Baozhia, C., and Hanqing X. (2012). Study on Principle of Product Defect Identification. *Procedia Engineering*, 43:393-398.