 ISSN 2338-3925

# AGGLOMERATION FOR SMALL AND MEDIUM FOOD ENTERPRISES PERFORMANCE MEASUREMENT

**Agustina Eunike**[1]
[1]Faculty of Engineering, Industrial Engineering Department, Universitas Brawijaya

***ABSTRACT*** *Geographic proximity to similar enterprises has become one of SMEs strategy in order to enhance their market. The proximity is usually called agglomeration or cluster industry. Hence, the aim of this paper is to measure performance of SMEs agglomeration. Performance measurement framework is designed using BSC with four perspective of measurement, thus are social, environment, financial, and internalbusiness processes. The assessment is executed using AHP which is presented based on the designed BSC framework. The measure is applied to an area in Malang city named Sanan which consist of SMEs produce and sell product relate to Keripik Tempe. The study reveals that agglomeration is success to increase all the cluster performance. The cluster performance is good with 75,70% achievement of their key performance indicator. Based on each perspective, the best performance achieve by social aspect that is 78,07% of the target, and the lowest one is economic aspect with 70,42% achievement.*

***Keywords****: Agglomeration, Small and Medium Enterprises, Performance Measurement, Balance Scorecard, AHP*

## 1. INTRODUCTION

Small and Medium Enterprises (SMEs) contribute 24,95% of the Gross Domestic Product (GDP) and absorb 57,72% of total employment [1].Based on the type of product, SMEs dominate food industry in Indonesia [2]. It shows potential growth for SME in this industry. The appropriate strategy will increase the support of SMEs on community economic development. Agglomeration is a strategy proceeds by some SMEs to enhance their competitive advantage. This strategy is done by build firm close to other similar firms. The geographic proximity is one of important characteristic in agglomeration which in some point will bring many advantages but at other point will cause some negative effects.

There are some common reasons why SMEs tend to be agglomerate. Agglomeration generates competitive advantage for elements within in three ways [3]. The first, agglomeration increases the productivity through access to specialist inputs, labor, knowledge, and technology. The second, agglomeration promotes innovation, by making all elements aware more quickly of new opportunities, as well as enhancing the capacity for rapid and flexible responses to new opportunities.Third, agglomeration promotes new business formation in related sectors, through distinctive access to necessary labor, skills, knowledge, technology, and capital.The increased competitiveness of firms within the agglomeration exerts an attraction for new firms and resulting in a gradual accumulation around the firms of specialized resources of skills, facilities and other resources [4]. Moreover, greater specialization of inputs and outputs, improved efficiency, and greater speed to market are results of spatial proximity [5, 6, 7].

Many studies have conducted on the behavior of firms to group with similar or other firms which mostly known as agglomeration or cluster industry. However the proximity will not always give agglomeration competitiveness. A narrower set of determinants of competitiveness become source of uncompetitive agglomeration. Random events or government influences, on the other hand, played an important role in uncompetitive agglomeration, but were the least important determinants in competitive clusters [8]. For instance, instead of external challenges the problem in agglomeration come from internal challenges.

Due to the purpose of being agglomerate is to gain competitiveness; an agglomeration area needs to be aware of their performance status to know its effectiveness. Traditionally, performance measurement relied on financial indicators. However, complexity of agglomeration with multivariate nature, and judging performance merely based on a

* Corresponding author: Agustina Eunike
Email : agustina.eunike@ub.ac.id
Published online at http://Jemis.ub.ac.id

financial diagnosis resulted in a limited assessment. This implies that agglomeration needs to implement systematic methods of performance evaluation which considering financial and nonfinancial indicators. The measurement is conducted by comparing the goal and achievement of agglomeration.

Sanan Malang is acknowledged as area produce famous Tempe in East Java. Since 2001, it is well-known for its Keripik Tempe product. Keripik Tempe is crispy chips made from Tempe which now improve with variance of flavors. Nowadays, this area becomes one of tourist destination in Malang. Number of SMEs member in Sanan increase in recent years. Therefore performance measurement is carried out to know its position and achievement. Its position and achievement will be used to explore its potential growth. Furthermore performance measurement result is used to formulate technical actions to improve this agglomeration competitiveness.

The objective of this paper is to measure performance of SMEs agglomeration in Sanan Malang. The methodology proposed involves three major steps. First, we defined the goal of SMEs agglomerate. Second, we formulated the performance measurement framework which combines Balance Scorecard (BSC) and Analytical Hierarchy Process (AHP). Four perspectives in BSC are used to generate the indicators. The indicators are weighted using AHP. The achievement of agglomeration is gain from total weighted comparison between each indicators expectation and perception. Third, we analyzed the strengths, weaknesses, and areas of potential improvement for agglomeration in each competitive positioning, by comparing their performance with the goal.

The remainder of the paper is structured as follows. The next section provides a description of conceptual framework in agglomeration performance measurement using BSC and AHP. This leads to a section in which we present our results and its analysis. In the final section we conclude the implications for agglomeration improvement and future research.

## 2. METHODS

This section presents methodological procedures used in performance measurement of SMEs agglomeration. These methodological procedures have been developed to identify factors and framework in performance measurement, justify goals of agglomeration, identification detail factors affect agglomeration performance, and assess performance level associated to goals achievement.

### 2.1 Performance Measurement Framework

Performance measurement is defined as the process of quantifying the efficiency and effectiveness of actions [9]. Development and implementation system of performance measurement system is first condition to improve and ultimately to achieve business excellence. There are various popular methods for assessment performance which evolve along with advances in technology and growing market demands [10]. The tools for agglomeration measurement should offer some predictive qualities concerning future performance. Among all the performance assessment indicators, the balanced scorecard approach proposed by [11] can best translate strategies into tangible goals and measurements [12]. It consists of strategic management tools related to both financial and non-financial indicators. This study examined performance of small medium enterprises agglomeration in food industry which produce similar product. There are many factors that impact the performance of agglomeration industries. These factors can be summarized and classified into different constructs and then condensed into a smaller number. The lists of factors can be classified into four perspective of the BSC with modification. This paper proposes that any agglomeration industry should look upon a framework made of the following four perspectives: (1) social; (2) environment; (3) economic; (4) internal business process. Consequently, the objectives and measures of the agglomeration industry can be clustered in the following perspective:

- Social perspective is the ability to enforce communities and society in the cluster industry area to involve in the industry activities. It focuses on empowerment people in the area into positive and productive actions.
- Environment perspective emphasizes a heightened environmental consciousness, public policy, and the law. It concentrates on achieving an environmentally caring agglomeration industry that meets the regulations while maintaining efficiency.
- Economic perspective is based upon

achievement economic success while providing value to stakeholders as well as increasing business profitability and revenue by reducing costs and expenditures.

- Internal business process perspective concentrates on bringing efficiency in the operating domain of industry. It is obtained through continuous improvement of the infrastructure via innovation and learning to achieve agglomeration objectives. The processes help to create and deliver the value proportion to stakeholders, therefore, enhancing the agglomeration performance.

In the agglomeration industry measurement needs not only know which factors affect performance, but also understand the degree of influence of each factor, and which sub-factors affect these factors. The goal is to establish a more comprehensive performance measurement framework for agglomeration industry. Therefore, the balanced scorecard approach is adopted with Multiple Criteria Decision Making (MCDM) employed for the performance measurement. The sub-factors for the four perspectives are adopted from Partiwi [13] and validating it by collecting and analyzing data.

The Analytic Hierarchy Process (AHP) technique is then used to measure the mutual importance of each factor and sub-factors. The AHP is an approach for facilitating decision-making by organizing perceptions, feelings, judgments and memories into multi-level hierarchic structure that exhibits the forces that influence a decision [14]. AHP is about breaking a problem down and then aggregating the solutions of all the sub problems into a conclusion. In this phase, AHP is used to evaluate the agglomeration industry performance level against its goal. AHP can give a clear view on performance levels of the cluster with respect to each individual factor of the agglomeration [18]. The hierarchy is constructed in such way that overall decision goal is at the top level, decision factors (and sub-factors if any) are in the middle level(s), and measurement result at the bottom, as shown in Fig.1. The weights are applied to all the factors inter and intra hierarchy. The AHP method provides a structured framework for setting priorities on each level of the hierarchy using pairwise comparisons that are quantified using 1-9 scales [15]. Leung, Lam, and Cao [16] have illustrated the example of formulation of BSC as AHP model.

### 2.2 Goals of Agglomeration

Successful performance results from goal achievement and project implementation [17]. Determining the goal of agglomeration is an important stage on performance measurement. Goal achievement becomes standard of its performance. According to Partiwi [13], some goals are listed as reasons of SMEs choses to be agglomerated with other SMEs: (1) to gain comparative and competitive advantages, (2) to achieve faster industrial growth, (3) enhancing innovation capability, (4) increasing profit of SMEs in the cluster, and (5) build strong supply chain. Each cluster has different priority of goals for being agglomerated, based on characteristics of industry. Goals of Sanan as a cluster are justified by interviewing the experts who has been involving and observing the development of Sanan cluster. The respondents represent the entrepreneurs in Sanan and government. The justification of goals priority is obtained from pairwise comparison among goals listed previously. Finally, the relative weights are synthesized to obtain priorities of the goals.

### 2.3 Factors and Sub-Factors Identification

There are many factors that impact the performance of SMEs agglomeration. In this study, the balanced scorecard approach, which has been widely adopted as a performance indicator, is applied to measure the performance of SMEs agglomeration. The aim is to not only know which factors affect performance, but also understand the degree of influence of each factor, and which sub-factors affect these factors. The sub-factors for the four perspectives in BSC are adopted from Partiwi [13] and validated from observation of the object and brainstorming process with the experts. In order to make the performance measurement framework manageable, considering the complexity of cluster, the number of actors and its dynamics, the sub-factors is structured into two levels of sub-factors. The sub-sub-factorsdescribe more specific in represent the performance factor. Table 1 shows all the factors, sub-factors, and sub-sub-factors.

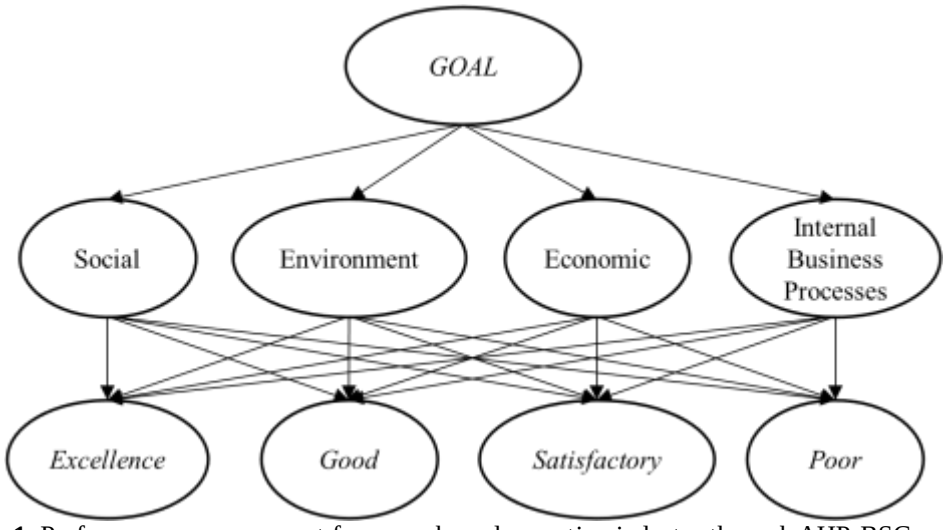


**Figure 1**. Performance measurement framework agglomeration industry through AHP-BSC approach

**Table 1.** Factors, sub-factors, and sub-sub-factors

| Factor | Sub-factor | Sub-sub-factor |
|---|---|---|
| Social | Workforce | Employment Absorption |
| | | Manpower Quality |
| | | Availability of Human Resouces Training |
| | Society Acceptance | Society Involvement in Community Program Organized by Industrial Cluster |
| | Industrial Cluster Organization | Representation of Core Industries |
| Environ-ment | Community Acceptance | Society Involvement in Community Program Organized by Industrial Cluster |
| | | Availability ofCommunity Program Organized by Industrial Cluster |
| | | Society Complaints Related to Environment Issues |
| | Environment Technical Factors | Green Production |
| | | Green Area |
| Economy | Workforce | Manpaower Quality |
| | | Employment Absorption |
| | Cluster Organization | Representative of all cluster components |
| | | Functional Effectiveness |
| | Financial | Monitoring and Evaluation Process |
| | | Industrial Cluster Sales |
| | Economic Growth | Industrial Cluster Growth |
| Internal Business Process | Raw Material Procurement | Raw Material Procurement |
| | Raw Material Handling | Raw Material Handling |
| | Raw Material Processing | Raw Material Processing |
| | Product Distribution | Product Distribution |

### 2.4 Performance Measurement

As discussed in the earlier section, the agglomeration performance measurement is a systematic process carried out to know agglomeration achievement to a certain goal. Two steps are used in this study to obtain performance index of SMEs agglomeration. The first stage is Analytic Hierarchy Process (AHP) based performance measurement, which reveals the selected agglomeration strengths and weaknesses when judge contribution of factors to goal achievement. The second step is gap measurement between perception and expectation of each sub-sub-factor achievement in the cluster. The total weighted gaps, which are resulted from first and second step, represent the overall performance level.

In the first phase, AHP technique is used to measure the agglomeration performance level of the cluster. A complex problem in AHP is first decomposed into factors and sub-factors.

In this stage of AHP, agglomeration performance measurement is broken down into four factors (level 2), sub-factors (level 3), and sub-sub-factors (level 4) as listed in the Table 1. Afterwards, a pairwise comparison among factors within the same level, among sub-factors within the same level, and among sub-sub-factors within the same level is carried out to obtain their relative weights. The pairwise comparisons between the m decision factors can be conducted on scale (1-9) by asking questions to expert, which criterion is more important with regard to the decision goal. The answers to these questions form an *m x m* pairwise matrix. If the pairwise comparison matrix $A = (a_{ij})_{m \times m}$ satisfies $a_{ij} = a_{ik}a_{kj}$ for any *i, j, k = 1, ..., m*, then *A* is said to be perfectly consistent; otherwise it is said to be inconsistent. From the pairwise matrix *A*, the weight vector *W* can be determined by solving the following characteristic equation:

$$\boldsymbol{AW = \lambda_{max} W} \quad \text{(eq.1)}$$

where $\lambda_{max}$is the maximum eigenvalue of *A*. Such a method for determining the weight vector of a pairwise comparison matrix is referred to as the principal right eigenvector method [15]. The pairwise comparison matrix *A* should have an acceptable consistency, which can be checked by the following consistency ratio (CR):

$$\boldsymbol{CR = \frac{(\lambda_{max} - n)/(n-1)}{RI}} \quad \text{(eq.2)}$$

If the CR ≤ 0.1, the pairwise comparison matrix is considered to have an acceptable consistency; otherwise, it required to be revised [15].

The next step is to enter the rating on each detailed level factors (sub-sub-factors) using scale (1-5) to assess the expectation and the perception of each sub-sub-factors achievement. Scales 1 to 5 represent the lowest to the highest expectation and perception of sub-sub-factor achievement. Afterwards, the rating of expectation is subtracted by rating of perception to get gap value of each sub-sub-factor. Positive gap value means the expectation is not fulfill yet by the recent achievement of the cluster. Negative gap value shows the recent achievement of the cluster exceed the expectation. And zero gap value indicates equal rating between expectation and perception. Subsequently, each expectation and perception value is multiplied with the weight from pairwise comparison matrix to obtain weighted exception value and weighted perception value. The weighted exception value and weighted perception value represent exception and perception achievement value of sub-sub-factor with regard to the decision goal. Performance score of each sub-sub-factor is measured by dividing the weighted exception value with weighted perception value. Performance score, which less than 100% shows the perception achievement less than its expectation, and score value is more than 100% means perception achievement exceed the expectation achievement. Finally, the overall performance level of agglomeration with respect to the decision goal is obtained as [13]:

$$\boldsymbol{C_k = c_s S_k + c_l L_k + c_e E_k + c_i I_k} \quad \text{(eq.3)}$$

where $C_k$ is comprehensive score of agglomeration performance, $S_k$ is social factor performance score, $L_k$ is environment factor performance score, $E_k$ is economic factor performance score, $I_k$ is internal business process factor performance score, $c_s$ is contribution weight of social factor, $c_l$ is contribution weight of environment factor, $c_e$ is contribution weight of economic factor, $c_i$ is contribution weight of internal business process factor. Performance level in this research categorizes into three level, Good, Satisfactory, and Poor. Good category is performance level with standard score ≥75%. Standard score for satisfactory category is 75%>skor≥50%. Poor category is performance level with standard score <50%.

## 3. RESULT AND DISCUSSION

In this section, the result of performance measurement of SMEs agglomeration in Sanan is presented. The pairwise comparison was conducted to obtain priority of goal, and weight of factors, sub-factors, and sub-sub-factors. All CRs were found to be acceptable, that is, less than 0.1. The questionnaires had been confirmed to be valid and reliable.

The result of pairwise comparison to obtain goals priorityof SMEs to agglomerate in Sanan were 29.4% to gain comparative and competitive advantages, 14,5% to achieve faster industrial growth, 13.5%to enhance innovation capability, 21.3%to increase profit of SMEs in the cluster, and 21.2%to build strong supply chain. The highest priority was to gain comparative and competitive advantages. This result showed that new SMEs were motivated

to join in Sanan because of itsgood reputation for product of Tempe.The lowest priority was to enhance innovation. This result corresponded to the characteristics of Tempe which not require high innovation both in production process and product development.

The contribution of factors to goal achievement were 39,1% from social factor, 18,2% from environment factor, 23,5% from economic factor, and 19,1% from internal business process. Social factor was the highest factor contributed to goal achievement. Social factor in this research is perspective that focuses on empowerment people in the cluster into positive and productive actions. It can be interpreted that the involvement of communities and societies in Sanan area was very important in agglomeration process.

Workforce had 50.5% contribution to the goal achievement, and the highest sub-factor in the social perspective. The highest contribution of environment factor was 75% by community acceptance. Financialand workforce, the sub-factors of economic perspective, had 34.2% and 31.8% contribution, respectively, to the goal achievement. On the contrary, the cluster organization sub-factor had the lowest contribution, that is only 6.9%, in economic aspect. In the internal business process, sub-factors related to raw material was dominated (88.6%) the goal achievement contribution in this cluster. According to the weight of sub-factors, it indicated that the attractiveness Sanan was the name not the system. The agglomeration of Sanan was not managed by organized and well plan system.

The overall agglomeration performance will be determined together with the achievement of each factor. Percentage achievement was obtained by dividing the weighted perception achievement with the weighted expectation achievement. Percentage achievements of social, environment, economic, and internal business factor, respectively, were 78.1%, 77.4%, 70.4%, and 76.1%. The social factor reached the highest realization of expectation of SMEs to be agglomerated in Sanan, followed by environment and internal business process. And the percentage achievement of economic factor was the lowest one.

The result of performance measurement of Sanan agglomeration as defined earlier was obtained by multiply the weight contribution of each factor with its achievement percentage.The overall performance index of Sanan agglomeration was 75.7%. The index labels into good category because the value is more than 75%. The performance index was decrease because of the economic achievement score, which only 70.4%, but it has high contribution to goal achievement (23.5%). It indicated the positive gaps between perception and expectation in many detailed economic factors and urgently required improvement. However, the other three factors also need to be improved to achieve higher performance index.

## 4. CONCLUSION

Small and Medium Enterprises (SMEs) have major contribution to Indonesian economics. Geographic proximity to similar enterprises has become one of SMEs strategy in order to enhance their market. This proximity is usually called as agglomeration or cluster industry. However, effectiveness of agglomeration as a strategy to strengthen competitive advantage is still debatable.

The contributions of this research include the definition and characteristics of SMEs agglomeration, model and frameworkof agglomeration performance measurement, and comprehensive factors and the detailed of each factor to describe performance in relation to goal of agglomeration.In this paper a framework for performance measurement and achievement assessment of SMEs agglomeration was presented. A systematic process to measure dynamic and complex agglomeration performance was proposed including the factors and the detailed factors. Three levels of factors were identified to capture all important performance indicators.

With this model and the proposed framework, agglomeration of SMEs can have better understanding of their performancein Sanan. This could help them to focus on process to improve, on new strategies or goals, and resources optimization to increment the profit and advantageous of being agglomerated.

Future work will be carried out along three main directions. First, a more detailed evaluation of performance will be prepared in the Sanan cluster by identifying measurable key performance indicators. Second, based on measurable key performance indicators evaluation, the strategies and technical guidance to improve performance of SMEs agglomeration will be formulated. Finally, the third line for future work will be carried out to

have a deeper verification and a comparison of the SMEs agglomeration of different product, to show the variety of instances and diversity of operations.

## 5. ACKNOWLEDGMENT

This research was supported by DIPA from Engineering Faculty of Universitas Brawijaya. The author would like to thank to *Dinas Koperasi dan UKM* Malang, and *Paguyuban UKM* Malang as respondents in this research.

## REFERENCES

[1.] Ministry of Industry of Republic Indonesia. 2009,*Laporan Pengembangan Sektor Industri Departemen Perindustrian Tahun 2004-2009 (Report of Development of Industrial Sector of Ministry of Industry 2004 – 2009)*,Departemen Perindustrian, Jakarta.

[2.] Ministry of Cooperative and Small Medium Enterprises of Republic Indonesia. 2005.*Peran Usaha Mikro, Kecil dan Menengah dalam Pembangunan Ekonomi Nasional (Role of Small Medium Enterprises in National Economic)*, Kementerian Negara Koperasi dan Usaha Kecil dan Menengah Republik Indonesia, Surabaya.

[3.] Flew, T. 2002. "Beyond ad hocery: Defining Creative Industry, Cultural Sites, Cultural Theory, Cultural Policy", The Second International Conference on Cultural Policy Research, Wellington, New Zealand.

[4.] Porter, M. E. 1990."The competitive advantage of nations", *Harvard Business Review*, March-April, pp. 73-91.

[5.] Feldman, M. P. 2000. *Location and innovation: the new economic geography of innovation, spillovers, and agglomeration*. In: Clark, G.L., Feldman, M.P., Gertler, M.S. (Eds.), The Oxford Handbook of Economic Geography, pp. 373-394, Oxford University Press, Oxford, UK.

[6.] Herrigel, G. 1993.*Large firms, small firms, and the governance of flexible specialization: the case of Baden Württemberg and socialized risk*, In: Kogut, B. (Ed), pp. 15-35, Country Competitiveness, Macmillan, London, UK.

[7.] Storper, M.1997,*The Regional World: Territorial Development in a Global Economy*, Guildford Press, New York.

[8.] Van der Linde, C. 2003, *The Demograhy of Clusters – Findings from the Cluster Meta-Study*, In: BrÖcker, J.D., Dohse and R. Scotwedel (Eds.), Innovation Clusters and Interregional Competition, pp. 130-149, Berlin, Heidelberg, New York: Springer,-Verlag, Berlin, Heidenberg, New York.

[9.] Neely, A.2002.*Business Performance Measurement,* Cambridge University Press, Cambridge, MA.

[10.] Shaik, M. N., Abdul-Kader, W.2014."Comprehensive performance measurement and causal-effect decision making model for reverse logistics enterprise", *Computers & Industrial Engineering,* 68, pp. 87-103.

[11.] Kaplan, R., Norton, D.2004.*Strategy Map: Converting Intangible Assets into Tangible Outcomes,* Harvard Business School Press, Boston, MA.

[12.] Chen, F.-H., Hsu, T.,-S., Tzeng, G.-H. 2011. "A balanced scorecard approach to establish a performance evaluation and relationship model for hot spring hotels based on a hybrid MCDM model combining DEMATEL dan ANP", *International Journal of Hospitality Management,* 30 (4), pp. 908-932.

[13.] Partiwi, S.G.2007.*Perancangan Model Pengukuran Kinerja Komprehensif Pada Sistem Klaster Agroindustri Hasil Laut*. Disertasi, Sekolah Pascasarjana Institut Pertanian Bogor, Bogor.

[14.] Saaty, T.L.1994."How to make a decision: The analytic hierarchy process", *Interfaces,* 24, pp. 19-43.

[15.] Saaty, T.L.1980.*The analytic hierarchy process*, McGraw-Hill, New York.

[16.] Leung, L.C., Lam, K.C., Cao,

D.2006."Implementing the balanced scorecard using the analytic hierarchy process & the analytic network process", *Journal of The Operational Research Society,*57, pp. 682-691.

[17.] Wu, S.I., Hung, J.M. 2008."A performance evaluation model fo CRM on non-profit organization", *Total Quality Management & Business Excellence,* 19 (4), pp. 321-342.

[18.] Joshi, R., Banwet, D.K., Shankar, R. .2011. "A Delphi-AHP-TOPSIS based benchmarking framework for performance improvement of a cold chain", *Expert Systems with Applications*, 38, pp. 10170-10182.