Determining the Key Factors of Michinoeki in Yamaguchi Area

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Abstract

It is considered as the most urgent issues for Michinoeki to find the key determinants and to measure its efficiency. This paper proposed a new approach with two steps: to calculate the efficiency using DEA model after determining the relevant factors using regression model. The data are collected from Yamaguchi area, because Yamaguchi is the birthplace of Michinoeki in Japan. The contribution of this paper are: 1) identified the key factors of Michinoeki in Yamaguchi area, and 2) calculated the efficiencies of the Michinoeki, and 3) proposed a four cell matrix model to make judge of the position of Michinoeki for their further development. Based on the findings, the managerial implications are discussed, the study limitations are identified and directions for further research are suggested.

Keywords: DEA model, Four cell matrix model, Michinoeki, Efficiency.

1. Introduction

A plethora of studies of Michinoeki from the viewpoints of break function, information dispatch function, regional cooperation function, and disaster prevention function have been published in the past decades. Based on our investigation, the studies associated with efficiency calculation to improve their management quality are still

sparse. This paper proposes a new approach with two steps: to calculate the efficiency using DEA model after determining the relevant factors using multivariate regression model. The data are collected from the Michinoeki in Yamaguchi area, because Yamaguchi area is the exact birthplace of Michinoeki in Japan. The contribution of this paper are: 1) identified the key factors of Michinoeki in Yamaguchi area, and 2) calculated the efficiencies of the Michinoeki, and 3) proposed a four cell matrix model to make judge of the position of Michinoeki for their further development. Based on the findings, the managerial implications are discussed, the study limitations are identified and directions for future research are suggested.

This paper is structured as follows: Section 2 introduces the background of this research. In section 3, the paper explicates data collection and the models of multivariate regression model and DEA model to identify the key factors and efficiency of Michinoeki using selected variables. Section 4 shows the results and discusses our findings. The conclusions and directions for future research and managerial implications are proffered in the final section.

2. Background

Michinoeki is well-known for its four-function model. Today Michinoeki plays important roles in regional economic revitalization in Japan. Recently many studies of Michinoeki have been published. Regional economic revitalization is main part of Abenomics [1]. Mitsuhashi analyzed the economic background of Michinoeki [2]. Ogata et al. explained the relationship between Michinoeki and regional revitalization based on the viewpoint of business model [3]. Hiraoka et al. discussed the relationship between the number of customers and information associated with agriculture, forestry, and fisheries of Michinoeki [4]. Furthermore, Kumano et al. discovered successful determinants of Michinoeki in Chugoku area using regression model [5]. All of these researches show that it is becoming an important issue to calculate efficiency to improve the quality of Michinoeki. Thus to find the key determinants and to measure its efficiency are considered as the most urgent tasks for Michinoeki. This paper will focus on the discovering the determinants, and calculating the efficiency of Michinoeki in Yamaguchi area. The number of

Michinoeki reached 23 as of July 21, 2017. They are shown in Table 1.

Table 1 Michinoeki List in Yamaguchi Area.

1	Abu Town	13	Niho no Sato
2	Hagi Okan	14	Hagi Seamart
3	Asahi	15	Ganjoju Onsen
4	Aio	16	Uribo no Sato Katamata
5	Yutori Park Tamagawa	17	Hotaru Kaido Nishi no Ichi
6	Sazanseto Towa	18	Kirara Ajisu
7	Kikugawa	19	Hagi Sansan Sammi
8	Happiness Fukue	20	Kitaura Kaido Hohoku
9	Chomonkyo	21	Solene Shunan
10	Pure Line Nishiki	22	Kaminoseki Kaikyo
11	Ofuku	23	Shiosai Ichiba Houfu
12	Mitou	24	Senzakitchen*

*Semzakitchen has been opened in 2018 fiscal year.

The geographic distribution map of Michinoeki in Yamaguchi area is shown as in Figure 1.

Fig. 1 Geographic distribution map of Michinoeki.

3. Data Collection and Models

The data in 2015 used in this paper are collected from the database of the headquarter of Michinoeki to calculate the efficiency of Michinoeki in Yamaguchi area. Under the advices from the experts of Michinoeki, twelve variables are selected as the determinants of the Michinoeki in this paper. They are: square meters of land space (SMLS), weekdays' traffic near the station (WTNS), holidays' traffic near the station (HTNS), operating cost (OC), total parking number (TPN), total number of the restroom (TNR), square meters of free rest place (SMFRP), number of the selling items (NSI), number of local products items (NLPI), number of the

registered farmers (NRF), square meters of facilities space (SMFS) and population of the city located (PCL). The SMLS and OC could be considered as the determinants of variables of information dispatch function, the WTNS, HTNS, NSI, NLPI, PCL, and NRF are designed as the indexes of regional cooperation function, the TPN, TNR, SMFRP and SMFS will play important role in break function and disaster prevention function. Sales revenue and number of purchasers are selected as the performance of Michinoeki. Thus, this leads to the formation of the following regression equation:

$$y = a_1 SMLS + a_2 WTNS + a_3 HTNS + a_4 OC + a_5 TPN + a_6 TNR + a_7 SMFRP + a_8 NSI + a_9 NLPI + a_{10} NRF + a_{11} SMFS + a_{12} PCL + \varepsilon \quad (1)$$

After determining the key factors of the Michinoeki, the efficiency will be calculated using the following DEA model [6-7].

$$\max \quad \theta = \frac{\sum_r^s u_r y_{rj}}{\sum_{i=1}^m v_i x_{ij}} \ (j = 1, 2, \ldots, n) \quad (2)$$

Subject to

$$\frac{\sum_r^s u_r y_{rj}}{\sum_{i=1}^m v_i x_{ij}} \leq 1 \ (j = 1, 2, \ldots, n) \quad (3)$$

$$u_r \geq 0 \ (r = 1, 2, \ldots, s) \quad (4)$$

$$v_i \geq 0 \ (i = 1, 2, \ldots, m) \quad (5)$$

4. Calculation and Discussions

The relationship between the twelve variables and sales revenue and the number of purchasers are calculated respectively. The key factors are finally determined using backward delamination method. The results are shown as in Table 2.

Table 2 Results of the regression models of sales and number of the purchasers.

	Models			
	Sales Revenue		Number of the Purchasers	
	Standardized coefficient	Probability	Standardized coefficient	Probability
SMLS	-	-	-	-
WTNS	-	-	-	-
OC	-	-	-0.3402	0.0436
TPN	0.6486	0	0.7271	0.0004
TNR	-	-	-	-
SMFRP	0.2412	0.0128	-	-
NSI	-	-	-1.2853	0.0107
NLPI	-	-	1.4318	0.0059
NRF	-	-	-	-
SMFS	0.4165	0.0128	0.7997	0

PCL	0.548	0.0002	0.1327	0.0506
Intercept	0	0.0011	0	0.0006
R^2		0.94610		0.97644
multiple R^2		0.97268		0.0.98815
Adjusted R^2		0.90969		0.96604
AIC		445.97		207.33
DW Ratio		2.2853		2.6311

The determinants of those two models are different. The adjusted R square of sales revenue and number of purchases are 0.9069 and 0.96604 respectively. Four variables and six variables are significant statistically. The four variables in the model of sales revenue are: TPN, SMSRP, SMFS, and PCL, and the six variables of number of purchasers are: OC, NSI, NPLI, SMFS, and PCL. Accordingly, regional cooperation function, break function, and disaster function are becoming much important rather than information dispatch function because Yamaguchi is the birthplace of Michinoeki with long history.

The efficiency of the 23 Michinoeki in Yamaguchi area are calculated using DEA model based on our results. The efficiency of Yutori Park Tamagawa, Chomonkyo, Kitaura Kaido Hohoku, and Shiosai Ichiba Houfu can not be calculated because of lack of data. It is illustrated as Fig. 2.

Fig. 2. Efficiency of the 23 Michinoeki.

The correlation coefficient of sales revenue and number of purchasers is 0.318, not significant statistically. Thus, no significant statistically correlation between those tow results exits. In order to find the future direction of these Michinoeki, a four cell matrix is proposed based on the efficiency of sales revenue and number of purchasers in this paper. It is reported in Fig. 3.

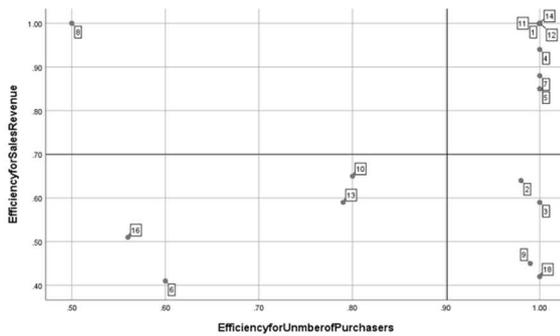*Minoru Kumano, Tsutomu Ito, Takao Ito, Toru Hiraoka, Hirofumi Nonaka*

Fig. 3 The positions of the Michinoeki.

The Michinoeki located in the 4th quadrant could be excellent because they have high efficiency of sales revenue and the number of purchases both. The Michinoeki located in the 2nd quadrant could be considered as sales oriented one because they have high efficiency of sales revenue even with low efficiency of number of purchase. The Michinoeki located in the 3rd quadrant could be poor because there are still rooms to improve. The Michinoeki located in the 4th quadrant could be called visitors oriented because the efficiency of the number of purchasers are lower. Accordingly, Abu Town, Hagi Seamart, Ganjoju Onsen, Hotaru Kaido Nishi no Ichi, Kirara Ajisu, Solene Shunan, and Sazanseto, Pure Line Nishiki, and Kikugawa are considered as excellent Michinoeki while Niho no Sato, Uribo no Sato Katamata, Hagi Sansan Sammi, and Hapiness could be the poor Michinoeki. Ofuku could be sales revenue oriented Michinoeki while Hagi Okan, Asahi, Mitou, and Kaminoseki Kaikyo could be visitors oriented Michinoeki.

5. Conclusion

The relationship between twelve variables and sales revenue and number of purchasers are calculated and discussed. Only four and six variables are significant statistically for model of sales revenue and number of purchasers, respectively. The 18 Michinoeki could be divided into four groups, Abu Town and other 8 Michinoeki are excellent, and Niho no Sato and other 3 could be poor. Ofuku needs to improve its efficiency of number of purchaser while Hai Okan and other 3Michinoeki need to improve their efficiency of sales revenue. More qualitative support for these conclusions

is required. Furthermore, only one-year Data set is not sufficient. Much more data set and investigation is required.

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