E ISSN : (2776-7345)
P ISSN : (2776-7353)

Bina Bangsa International Journal of Business and Management (BBIJBM)
Vol. 1(3), page 190-201, December 2021

The Layout Planning At Sehati Dua Minimarket, Ciawigebang, Kuningan (*Market Basket Analysis and Activity Relationship Chart Approach*)

Edwin Ramdhani[1*], Robi Awaluddin[2], Dadang Suhardi[3]
[1,2,3] Department of Management, Universitas Kuningan, Indonesia
Corresponding email: edwinramdhani877@gmail.com

Article History

Received: Oct 20, 2021
Revised: Nov 3, 2021
Accepted: Dec 27, 2021

Abstract

The layout is one of the factors that affect visitor satisfaction. Where a good design will be the face of the company itself. There is a layout problem in the Sehati minimarket location where the product arrangement displayed has not been neatly arranged. The display of goods is placed directly on the floor without using any shelves. One way to optimize the relationship between product group proximity and use of space or layout. This research uses Market Basket Analysis and Activity Relationship Chart method by measuring three kinds of quantitative measures, namely support (factor domination level), confidence (factor level) and the ratio of improvement (viability factor proximity) and relationship product proximity qualitatively. Results of data processing and analysis with the method of MBA and Tolls ARC approach there are several alternatives to the new layout improvement then selected on of the best choice by the management company with a value of 40, and some changes from the previous layout the product – the product that must be moved among product with value the smallest, and development with an enormous support value,(1) namely The Gelas products.

Keywords: Layout, Market Basket Analysis, Activity Relationship Chart.
JEL Classification: L00, M00
Type of paper: Research Paper/.

DOI:
https://doi.org/10.46306/bbijbm.v1i3.23

Web:
http://bbijbm.lppmbinabangsa.id/index.php/home/article/view/23

Citation:
Ramdhani, E., Awaluddin, R., & Suhardi, D. (2021) The Layout Planning At Sehati Dua Minimarket, Ciawigebang, Kuningan (Market Basket Analysis and Activity Relationship Chart Approach). *Bina Bangsa International Journal of Business and Management (BBIJBM)*, 1(3), 190-201. DOI: https://doi.org/10.46306/bbijbm.v1i3.23

I. Introduction

Retail growth in Indonesia is very rapid, with a population of ±252 million people, of whom 50% are of productive age, and is the most potential market in Southeast Asia with Indonesia's GDP per capita of US$ 3,500, which surpasses competitors in ASEAN such as the Philippines and Vietnam. This is inseparable from the increasingly rapid growth of the middle and upper-middle class. According to BPS data in 2016, it is estimated that there are as many as 74 million middles and upper-middle-class people, it is estimated to be 141 million people by 2020, and every year it is estimated that between 8 million and 9 million new people will join this class. Around 60 million low-income residents are projected to join them to drive more robust consumer demand. Based on the annual budget, it is estimated that US$ 5,000 – US$ 15,000 will expand from 36% in 2016 and 2020 will increase to 58%. (Source: article Dian Alamsyah 2016).

Sehati Minimarket is a retail business located in the Ciputat Village market, Ciawigebang District, which offers a variety of primary raw materials for daily needs. It can be said that the layout or layout of the Sehati minimarket is not neat. Several products are supposed to be on the same shelf but are far apart. Sehati Dua Minimarket needs to carry out a market basket analysis because it can improve the layout of its store on a more regular basis.

Table 1. Top Sales

No	Products Name	Qty / Box
1	Teh Gelas	154
2	Kapal Api Mix	131
3	Tea Jus Gula Batu	112
4	Good Day Mochacino	102
5	Aqua Botol	97
6	Masako Ayam	92
7	Slai Olai Strawberry	89
8	Torpedo	81
9	Royco Ayam	78
10	Granita Cup	67

Source: Sehati Dua Mini Market

Table 2. Top Sales

No	Products Name	Qty / Box
1	Taro Potato Bbq 36g	15
2	Piatos Keju 11g	15
3	Guinness Zero Abv	11
4	Fiesta Wht Leci 450m	11
5	Mie Telur 3 Ayam Hijau	10
6	Nivea Men Wht Oc Ff	8
7	Pokka Lemon Tea	7
8	Happy Coco Biskuit	5
9	Soba Ayam Bakar	4
10	Lem Fox Kaleng	1

Source: Sehati Dua Mini Market

The initial step in calculating the market basket analysis technique lies in the number of transactions because from the results of the transaction it can project information about which products are selling well and purchased by consumers and will affect other products that are often purchased by consumers so that consumers will make purchases without planning. The following is an image of the layout of the Sehati Minimarket:

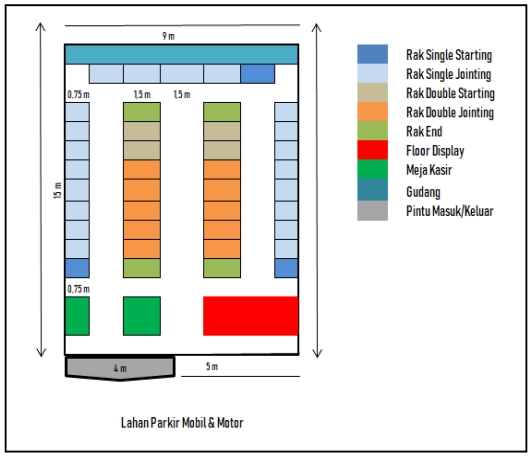

Figure 1. The layout of Sehati Mini Market
Source: Sehati Mini Market
Note: The red sign is one of the problems at the Sehati Minimarket

In the observations that the author made on October 22, 2019, at 10.30 - 12.00 WIB, the author found a problem with the layout of the Sehati minimarket. In management, the layout of the products on display is not neat, and there are also products displayed directly on the floor without using any shelves. We often encounter floor displays in minimarkets because they have a less spacious area so that the production of goods on the floor is quite disturbing the flow of goods/consumers.

Merchandise layout management is a way to get visitors interested in buying. In addition, product layout also serves to create the desired image and maintain a retail company's position. To develop a suitable product layout, several criteria must be met. (Widayanti, 2013). In his research journal, the market basket analysis (MBA) method is a form of cluster analysis that classifies data based on association rules by looking for three types of measures, namely support (factor dominance level), confidence (proximity level factor) and increase. . ratio (validation of proximity factor). Market basket analysis (MBA) is a mathematical technique that marketing uses to reveal similarities between individual products or product groups to determine what products consumers usually buy together. In addition, the application of the MBA method can make it easier for visitors to shop because the products that are typically purchased at the same time are located close together. (Andari et al., 2013). Based on the phenomena that have been described in the background of the problem, the formulation of the problem can be made as follows:

1. Can applying the market basket analysis (MBA) method optimize the layout at Sehati Minimarket?
2. Can the application of the activity relationship shop chart (ARC) method helps determine the close relationship between product groups in Sehati Minimarket?

3. How can applying the MBA and ARC methods optimize the relationship between product groups and provide new alternatives for layout planning at the Sehati Minimarket?

II. Literature Review

2.1. Layout

According to Heizer and Render (2015), spatial planning is one and the significant decisions that determine the long-term efficiency of an operation. Spatial planning has strategic implications as it creates competing priorities concerning work capacity, customer contact and image.

2.2. Market Basket Analysis

According to Ajeng Agestyana (2016), Market Basket Analysis is a mathematical technique that marketing professionals can use to express similarities between individual products or product groups. Market Basket Analysis deals with business problems related to knowing the point of sale from transaction data.

2.3. Activity Relationship Chart

Ajeng Agestyana (2016) Activity Relationship Chart (ARC) can be used as a layout analysis based on qualitative considerations. Activity Relationship Chart (ARC) facilitates the creation of layouts in manufacturing companies that describe activities between departments or machines.

III. Methodology

The research was conducted at the Sehati Dua Minimarket, located at Jln. Siliwangi No.92 Ciputat-Ciawigebang Kab. Brass. The time of the study was carried out from January to June 2020. There were 2540 transactions. From this number, 346 transaction samples were taken using a geometric algorithm. The data processing carried out in the research is as follows:

1. Product grouping.
2. Find the value of supporting factors
3. Find the value of the trust
4. Find the repair ratio value
5. Activity Relationship Chart (ARC).

After the data processing stage, analysis and discussion were carried out on factor dominance, factor proximity, factor validation and adjustment with quantitative and qualitative methods. Then a suitable latest layout recommendation is made.

In this study, the population used is data from product sales in February 2020. The data obtained from transactions in the Sehati Dua Minimarket product department is 2,540 products. From that information, then find the sample value using the Slovin formula. The error tolerance (d) is 5%. The results obtained were 346 data collection using a random table with a geometric distribution.

IV. Results and Discussion

This stage will contain data processing and a discussion of the data processing results. At this stage, there will also be suggestions for improving the layout based on data processing results.

4.1. Product Grouping

The first step is product grouping which is part of the data processing process. in this phase, the products or goods sold in the store are grouped based on several considerations, which can be seen in table 3:

Table 3. Product Grouping

No	Product Name	No	Product Name
1	Teh Gelas Cup 180ml	36	Taro Potato Bbq 36g
2	Kapal Api SPC Mix B5	37	Piatos Keju 11g
3	Telur Ayam	38	Sonice Ayam Bbq 18g
4	Good Day Mochacino 25g	39	Fiesta Wht Leci 450ml
5	Aqua Botol 600ml	40	Guiness Zero 330ml
6	Masako Ayam 13g	41	Peache Eye Shadow
7	Slai Olai Strawberry 24g	42	Indomilk Uht 190ml
8	Torpedo Kuning 175ml	43	Kiyora Matcha Latte 330ml
9	Royco Ayam 10g	44	Fruita Max Strbry 200ml
10	Granita Cup 120ml	45	Mie Telur 3 Ayam Hijau 140g
11	Rokok Gudang Baru 12	46	Kado Harvs pdk
12	Teh Pucuk 350ml	47	Mie Telur 3 Ayam Merah 140g
13	Indomie Goreng 85g	48	Fiesta Wht Peach 450ml
14	Luwak White Cofee 20g	49	Nivea Men Wht 100ml
15	Gery Chocholatos 9g	50	Taronet Curly 40g
16	Bango Kecap Manis 20ml	51	Pokka Lemon Tea
17	Abc Susu 31g	52	Pokka Leci Black Tea 350ml
18	Rokok Gudang Garam Filter 12	53	Fiesta Black Tea Jasmine 350ml
19	Top Ice Capucino 6g	54	Happy Coco Biscuit 12g
20	Indocafee Cofeemix 25g	55	Abc Kecap Rasa Mantap 30ml
21	Indomie Ayam Bawang 85g	56	Soba Balado 11g
22	Sukong Chese Snake	57	Soba Ayam Bakar 11g

No	Product Name	No	Product Name
23	Rokok Djarum Coklat	58	Abc Squash Cocopandan 525ml
24	Slai Olai Nanas 24g	59	Chocolatos Hazelnut 16g
25	Aqua Gelas 240ml	60	Abc Sari Kacang Hi Fit 250ml
26	Rokok Gudang Baru 16	61	Frozen Mineral 1500ml
27	Milkita Hanger B'12	62	Neurobion Ct 105
28	Sakura Mie Goreng 60gr	63	Penggaris Lipat 8910
29	Rolls Keju 8g	64	Primerose Sip 618
30	Tea Jus Apel 8g	65	Mamy Love Baby Pants L8
31	Ale-ale Jambu 200ml	66	Cil Shoap Classic 75g
32	Taro Seaweed 9g	67	Neapolitan 850ml
33	Kuaci Rebo 8g	68	Rani Kone 91 Blck
34	Royco Sapi 10g	69	Me So Fierche Shower 2in1
35	Indomie Soto 70g	70	Lem Fox Kaleng Biru

Source: Processed data, 2020

4.2. Calculation of Support Factor Value

It was based on the support factor calculation formula by adding up all transactions on products purchased by consumers in February 2020.

$$S = \frac{\mathrm{n}}{\mathrm{N}}$$

$$S = \frac{154}{346}$$

$$S = 0{,}445086705 = 0{,}4450$$

= 0,4450 x 100

= 44,50 %

From the results of the calculation of the group of Tea Glass products purchased by consumers at the time of shopping, it is 44.50% to determine the value of the product group support factor.

Table 4. Product Grouping Support Factor Value

No	Product Name	Total	Support Factor	Support %
1	Teh Gelas Cup 180ml	154	0,445	44,50%
2	Kapal Api SPC Mix B5	130	0,3757	37,57%
3	Telur Ayam	112	0,3237	32,37%
4	Good Day Mochacino 25g	102	0,2947	29,47%
5	Aqua Botol 600ml	97	0,2803	28,03%
6	Masako Ayam 13g	92	0,2658	26,58%
7	Slai Olai Strawberry 24g	89	0,2572	25,72%
8	Torpedo Kuning 175ml	81	0,2341	23,41%
9	Royco Ayam 10g	78	0,2254	22,54%
10	Granita Cup 120ml	67	0,1936	19,36%
11	Rokok Gudang Baru 12	65	0,1879	18,79%

No	Product Name	Total	Support Factor	Support %
12	Teh Pucuk 350ml	65	0,1879	18,79%
13	Indomie Goreng 85g	65	0,1879	18,79%
14	Luwak White Cofee 20g	60	0,1734	17,34%
15	Gery Chocholatos 9g	60	0,1734	17,34%
16	Bango Kecap Manis 20ml	60	0,1734	17,34%
17	Abc Susu 31g	57	0,1647	16,47%
18	Rokok Gudang Garam Filter 12	57	0,1647	16,47%
19	Top Ice Capucino 6g	55	0,1589	15,89%
20	Indocafee Cofeemix 25g	55	0,1589	15,89%
21	Indomie Ayam Bawang 85g	55	0,1589	15,89%
22	Sukong Chese Snake	55	0,1589	15,89%
23	Rokok Djarum Coklat	52	0,1503	15,03%
24	Slai Olai Nanas 24g	50	0,1445	14,45%
25	Aqua Gelas 240ml	50	0,1445	14,45%
26	Rokok Gudang Baru 16	50	0,1445	14,45%
27	Milkita Hanger B'12	50	0,1445	14,45%
28	Sakura Mie Goreng 60gr	50	0,1445	14,45%
29	Rolls Keju 8g	48	0,1387	13,87%
30	Tea Jus Apel 8g	48	0,1387	13,87%
31	Ale-ale Jambu 200ml	48	0,1387	13,87%
32	Taro Seaweed 9g	45	0,1301	13,01%
33	Kuaci Rebo 8g	40	0,1156	11,56%
34	Royco Sapi 10g	40	0,1156	11,56%
35	Indomie Soto 70g	40	0,1156	11,56%
36	Taro Potato Bbq 36g	15	0,0433	4,33%
37	Piatos Keju 11g	15	0,0433	4,33%
38	Sonice Ayam Bbq 18g	11	0,0318	3,18%
39	Fiesta Wht Leci 450ml	11	0,0318	3,18%
40	Guiness Zero 330ml	11	0,0318	3,18%
41	Peache Eye Shadow	11	0,0318	3,18%
42	Indomilk Uht 190ml	10	0,0289	2,89%
43	Kiyora Matcha Latte 330ml	10	0,0289	2,89%
44	Fruita Max Strbry 200ml	10	0,0289	2,89%
45	Mie Telur 3 Ayam Hijau 140g	10	0,0289	2,89%
46	Kado Harvs pdk	9	0,026	2,60%
47	Mie Telur 3 Ayam Merah 140g	8	0,0231	2,31%
48	Fiesta Wht Peach 450ml	8	0,0231	2,31%
49	Nivea Men Wht 100ml	8	0,0231	2,31%
50	Taronet Curly 40g	7	0,0202	2,02%

No	Product Name	Total	Support Factor	Support %
51	Pokka Lemon Tea	7	0,0202	2,02%
52	Pokka Leci Black Tea 350ml	5	0,0145	1,45%
53	Fiesta Black Tea Jasmine 350ml	5	0,0145	1,45%
54	Happy Coco Biscuit 12g	5	0,0145	1,45%
55	Abc Kecap Rasa Mantap 30ml	5	0,0145	1,45%
56	Soba Balado 11g	5	0,0145	1,45%
57	Soba Ayam Bakar 11g	4	0,0116	1,16%
58	Abc Squash Cocopandan 525ml	4	0,0116	1,16%
59	Chocolatos Hazelnut 16g	4	0,0116	1,16%
60	Abc Sari Kacang Hi Fit 250ml	4	0,0116	1,16%
61	Frozen Mineral 1500ml	4	0,0116	1,16%
62	Neurobion Ct 105	2	0,0058	0,58%
63	Penggaris Lipat 8910	2	0,0058	0,58%
64	Primerose Sip 618	2	0,0058	0,58%
65	Mamy Love Baby Pants L8	1	0,0029	0,29%
66	Cil Shoap Classic 75g	1	0,0029	0,29%
67	Neapolitan 850ml	1	0,0029	0,29%
68	Rani Kone 91 Blck	1	0,0029	0,29%
69	Me So Fierche Shower 2in1	1	0,0029	0,29%
70	Lem Fox Kaleng Biru	1	0,0029	0,29%

Source: Processed data, 2020

4.3. Confidence

Products with a support value of just over 3% are included in the confidence calculation. This product is then searched for the strength of its relationship with other products. Because the products screened at this stage were 41 products, there were 1640 product pairs to find the confidence value of each product pair. The product pair then looks for the value of support and trust. An example of calculating the confidence value is as follows:

$S_{a\rightarrow b} = \frac{n}{N}$

$S_{1\rightarrow 7} = \frac{72}{346}$

= 0,208092485

= 0,2181 x 100 = 21,81 %

$C_{a\rightarrow b} = \frac{S}{s}$

$C_{1\rightarrow 7} = \frac{21,81}{44,50}$

= 0,467640449

= 0,4676 x 100

= 46,76%

4.4. Improvement Ratio or Lift

After knowing the value of confidence, the next step in the MBA is finding the value of the improvement ratio. The improvement ratio shows whether a product affects other products. The increase rate indicates the strength of the association rule during random events between the affected product and the affected product by looking at the support. The improvement ratio provides information about the change in the probability of an outcome being affected by a previous event.

The improvement ratio value is the ratio between the combined support value (product A and product B) and the support value for product A multiplied by the support value for product B. An example of calculating the repair ratio value is as follows:

$$I_{a\rightarrow b} = \frac{s}{sa \times sb}$$

$$I_{1\rightarrow 7} = \frac{20,81}{44,50 \times 25,72}$$

= 1,818187703

= 1,82

Table 5. Nilai *Support, Confidence,* dan *Improvement*

No	No Nota	Transaction	S (3%)	C (30%)	I (>1)
1	1 > 7	72	20,81%	46,76%	1,82
2	1 > 13	69	19,94%	44,81%	2,38
3	1 > 5	66	19,07%	42,86%	1,51
4	2 > 11	65	18,79%	50,01%	2,66
5	2 > 18	63	18,21%	48,46%	2,94
6	3 > 21	65	18,79%	58,03%	3,65
7	3 > 29	64	18,50%	57,14%	4,17
8	4 > 7	66	19,07%	64,69%	2,51
9	4 > 23	59	17,05%	57,84%	3,85
10	4 > 28	53	15,32%	51,96%	3,6
11	5 > 15	56	16,18%	57,74%	3,33
12	5 > 19	51	14,74%	52,59%	3,25
13	8 > 18	49	14,16%	60,49%	3,67
14	10> 22	48	13,87%	71,66%	4,51

No	No Nota	Transaction	S (3%)	C (30%)	I (>1)
15	12 > 33	44	12,72%	67,68%	5,86
16	13 > 22	51	14,74%	78,49%	4,94
17	13 > 3	59	17,05%	90,80%	2,8
18	13 > 9	40	11,56%	61,56%	2,73
19	13 > 31	38	10,98%	58,48%	4,71
20	14 > 18	32	9,25%	53,34%	3,23
21	14 > 27	30	8,67%	50%	3,46
22	15 > 24	25	7,22%	41,67%	2,88
23	15 > 28	21	6,07%	35%	2,42
24	16 > 13	22	6,36%	36,67%	1,95
25	17 > 23	20	5,78%	35,09%	2,34
26	19 > 26	21	6,07%	38,20%	2,64
27	20 > 30	20	5,78%	36,37%	2,62
28	22 > 31	17	4,91%	31%	2,23
29	24 > 19	18	5,20%	36%	2,26
30	26 > 25	17	4,91%	33,98%	4,51
31	29 > 12	18	5,20%	37,50%	1,99
32	32> 22	16	4,62%	35,54%	2,09
33	34 > 29	15	4,33%	37,50%	2,7
34	36 >25	9	2,60%	60,07%	4,15
35	40 > 34	8	2,31%	72,70%	6,28

Source: Processed data, 2020

4.5. Activity Relationship Chart

ARC was created to determine the qualitative reasons why 2 products should be brought closer or farther away. The reasons for consideration are the chemical nature of the product, the uniformity of the species, and the similarity of the product. Differences in the chemical properties of the product can affect the quality. This is common between food & non-food products with strong chemical properties such as soap. So that these two types of products cannot be combined. Meanwhile, similar products are products that have close product functions.

4.6. Layout Alternative

Making an alternative layout shows how many products are usually displayed in the store. Products traditionally displayed on two large shelves will still be displayed based on the number of available products. If there is a shift in the product's position from the large shelf to the small frame or vice versa, the number of products will be adjusted to the length of the rack.

Table 6. Layout alternative assessment results

Criteria	Layout Alternative

	I	II
Product Proximity (Confidence)	7	9
Product efficiency with great support	6	7
The proximity of similar products	6	7
Uniform product proximity	7	8
Relations between departments	8	9
Total Value	34	40

Source: Processed data, 2020

So from the assessment results, the alternative layout that has the most value given by the company, the design is chosen, is in the second alternative layout with a total of 40. Then the structure is determined to be a recommendation for layout improvement in the Sehati Dua Minimarket product department.

V. Conclusion and Recommendation

5.1. Conclusion

Based on the results of data processing and discussion that has been explained in the previous chapters, the authors formulate the following conclusions:

1. Applying the Market Basket Analysis method can optimize an effective layout application system in the product department at the Sehati Dua Minimarket by determining which products are often purchased by consumers simultaneously by calculating the value of support, confidence, and improvement ratio.
2. The application of the Activity Relationship Chart method can assist in determining the relationship between product groups within the Sehati Dua product department by analyzing inter-departmental activities and the relationship between the proximity of one product to another.
3. The results of the research conducted by the author on the layout of the Sehati Dua minimarket using the MBA method and ARC tools can provide several new alternatives to layout changes based on the application of the MBA method and ARC tools. The largest and the second alternative, namely layout changes based on the proximity of similar products and uniform products and other changes located in the product department of the two choices, given an assessment of layout improvement by the company management by testing several assessment criteria based on product proximity (confidence), product efficiency with considerable support value, the closeness of similar products, the intimacy of uniform products, and inter-departmental relationships. From the assessment results given by the company's management, the layout chosen is the second alternative with a value of 40 from this value, the recommendation for layout improvement can be used by the company.

5.2. Recommendation

Based on these conclusions, allow the authors to submit some suggestions as follows:

1. To make visitors crowded and comfortable while in the minimarket, the layout should be rearranged by looking at the products often purchased by consumers so that consumers can easily find them when making purchases at the Sehati Dua Mini marker.
2. Some products that should be approached by the MBA method but affect interdepartmental pathways according to the ARC method should be eliminated.
3. To increase the value of the company's profit, the company should replace and add new products on the shelves between departments, so that impulse buying or unplanned purchases increase.

References

Agestyana, Ajeng. (2016). Perbaikan Tata Letak Produk Di Assalaam Hypermarket Dengan Tetode Market Basket Analysis. Diss. Universitas Muhammadiyah Surakarta.

Andari, Susi Novi, Nasir Widha Setyanto, and Remba yang Widha Setyanto, dan Remba Yanuar Efranto. (2013) "Alternatif Letak Toko Persada Swalayan melalui Pendekatan Perilaku konsumen dengan Metode Market Basket Analysis." *Jurnal Rekayasa dan Manajemen Sistem Industri* 1.3: 2441-453

Dian Alamsyah," industry ritel modern & tradisional, market Indonesia". Dalam like in, tertanggal 18 oktober 2016 diaskes tanggal 30 november 2019. https://www.linkedin.com/pulse/industri-ritel-modern-dan-tradisional-market-dian-alamsyah/

Farkhan. (2008), "Desain Ulang Tata Letak di Toko Buku Ramadhan Agency Melalui Pendekatan Perilaku Konsumen Dengan Metode Market Basket Analysis", Jurnal Ilmiah Indonesia, 5 (1), hlm 14-29, Surakarta.

Render, Barry dan Heizer, jay. (2015). Manajemen Operasi: Manajemen Berkelangsungan dan Rantai Pasokan jakarta: Salemba Empat. Edisi : 11. 2006. Manajemen Operasi Jakarta: Salemba Empat. Edisi : 7

Widayanti, Dina Ari. (2013). "Pengaruh penataan produk (product display) terhadap pembelian tidak terencanakan (impulse buying) pada Indomaret." Universitas Muhammadiyah Malang.