

The Cost Control Analysis and Countermeasure Research of Haier Based on the Multiple Regression Analysis

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Abstract. This paper analyzes the total operating cost of Haier Electric by adopting the SPSS software and multiple regression analysis, and tries to find out the most significant factors that affect the cost control of Haier Electric. It also adopts the trend analysis method to analyze the financial indicators of Haier Electric on the significant factors in recent years. The results show that Haier Electric has a poor cost control on these factors. Finally, combined with the data and the company's characteristics, we try to put forward some suggestions on how to improve the cost control strategy and methods of Haier Electric.

1 Introduction

Established in 1984, the head office of Haier Electric is located in Qinghai, China. With 37 years of entrepreneurship and innovation, Haier Electric has gradually developed from a small collective factory, which is insolvent and is on the verge of bankruptcy, to an international group with a brand of white goods. In 2020, the global operating revenue of Haier was 209.7 billion Yuan, and its net profit was 113.2 billion Yuan. Compared with the previous two years, Haier's operating revenue was growing, while its profit was decreasing. Therefore, it suggests that Haier Electric should also pay attention to reducing the cost when developing. The aspects to control the costs in the model are shown as follows.

2 Cost control analysis of Haier electric

2.1 Design analysis model

In order to analyze the main factors affecting the cost control of Haier Electric, the total operating cost and its components from 2015 to 2020 are obtained from the income statement. Changes in these components will change the total operating cost.

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Table 1. Total Operating Cost of Haier Electric and Its Components

Unit: yuan					
	Total Operating Cost	Operating Cost	Business Taxes and Surcharges	Selling Expenses	Administrative Expenses
2015	84,526,081,76 2.99	64,658,463,207.53	397,251,039.85	13,101,282,436. 95	6,549,193,839.44
2016	113,723,647,8 27.22	82,166,530,321.02	687,907,686.34	21,254,103,195. 32	8,404,150,036.49
2017	152,156,542,0 51.80	109,889,621,609.45	808,890,988.25	28,276,014,979. 78	11,133,225,318.88
2018	174,687,709,6 71.51	130,455,086,874.95	868,087,131.66	28,923,144,934. 04	8,405,151,809.85
2019	192,625,787,4 59.73	140,868,398,722.26	802,045,039.88	33,682,126,291. 31	10,113,263,329.25
2020	199,886,424,0 33.65	147,475,181,245.03	660,506,917.33	33,641,711,147. 72	10,052,645,415.72

Let the explained variable (dependent variable) total operating cost be Y, and the explanatory variable (independent variable) operating cost, business taxes and surcharges, selling expenses and administrative expenses be X₁, X₂, X₃ and X₄ respectively. And set the multiple regression model as:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + u_i$$

Input to the SPSS system, and the output results are shown in Table 2, Table 3 and Table 4:

Table 2. Output Regression Statistics Table

Model	R	R ²	Adjusted R ²	Error in Standard Estimation
1	1.000 ^a	1.000	1.000	1162591.235

a. Predictor variables: (constant), administrative expenses (yuan), business taxes and surcharges (yuan), operating costs (yuan), selling expenses (yuan)

Table 3. Output Variance Analysis Table ANOVA^a

Model	Sum of Squares	Degree of Freedom	Mean Square	F	Significance
1 Regression	1.047E+22	4	2.618E+21	1936732384	.000 ^b
Residual	1.352E+12	1	1.352E+12		
Total	1.047E+22	5			

a. Dependent Variable;

b. Predictor Variables: (constant), administrative expenses (yuan), business taxes and surcharges (yuan), operating costs (yuan), selling expenses (yuan)

Table 4. Estimates and Test Table Coefficients of Output Model Parameters ^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Significance
	B	Standard Error	Beta		
1 (Constant)	334006295.9	6452835.306		51.761	.012
Operating Cost (yuan)	1.032	.000	.753	7769.843	.000
Business Tax and Surcharges (yuan)	-3.455	.006	-.013	-606.560	.001
Selling Expenses (yuan)	1.530	.001	.267	2047.407	.000
Administrative Expenses (yuan)	-.189	.001	-.007	-182.071	.003

a. Dependent variable: total operating cost (yuan)

From the above table, the estimated regression equation can be expressed as:

$$Y_1=334006295.9+1.032X_1-3.455X_2+1.530X_3-0.189X_4$$

2.2 Model Economic Significance Test

The estimated results of the model suggest that under the assumption that other independent variables remain unchanged, the total operating cost will increase by 1.03 yuan on average with each increase of 1 yuan in operating cost; Assuming that other independent variables remain unchanged, the average total operating cost will decrease by 3.46 yuan with each increase of 1 yuan in business taxes and surcharges; Assuming that the other independent variables remain unchanged, the average total operating cost will increase by 1.53 yuan with each increase of 1yuan in the selling expenses; Assuming that the other independent variables remain unchanged, the average total operating cost will decrease by 0.19 yuan.with each increase of 1 yuan in administrative expenses.

2.3 Model Significance Test

After the estimated regression equation is obtained, the equation is tested from the following three aspects.

(1) Goodness of Fit Test

As shown in Table 2, R2 =1.000, and the adjusted R2=1.000, which suggests that the linear equation is well fitted and the effect of multiple regression is very convincing.

(2) Significance Test of Regression Equation

As shown in Table 3, F=1936732384, the significance level is $\alpha= 0.000$, while the given level $\alpha= 0.05$ is significant, that is, $0.000<0.05$, indicating that the overall regression equation has a significant relationship. That is, the linear relationship between Haier's operating costs, business taxes and surcharges, selling expenses and administrative expenses and its total operating costs is significant.

(3) Significance Test of Explanatory Variables

As shown in Table 4, the significance levels of t statistics corresponding to $\beta_1, \beta_2, \beta_3$ and β_4 are 0.000, 0.001, 0.000 and 0.003, respectively, while the given level $\alpha= 0.05$ is significant. Among the four explanatory variables, $\beta_1, \beta_2, \beta_3$ and β_4 are less than 0.05, and the linear relationship between each independent variable and dependent variable is significant.

3 Analysis on Haier's current cost

As shown in Table 1, the four explanatory variables have an impact on the total operating cost, so there are many aspects to be analyzed. This paper focuses on the cost status of factors related to the operating cost. Generally, the operating cost is composed of other business costs and cost of goods sold rate, which will be adopted to show the data and analyze the current situation in the following.

3.1 Overall analysis of cost of goods sold

As shown in Table 3.5, the cost of goods sold rate = total operating cost/total operating revenue, which is an indicator reflecting the proportion of total operating cost in total operating revenue.

Table 5. Haier's Cost of Goods Sold Rate

Year	Total Operating Cost (yuan)	Total Operating Revenue (yuan)	Cost of Goods Sold Rate
2016	113,723,647,827.22	119,132,261,662.60	95.46%
2017	152,156,542,051.80	159,254,466,909.46	95.54%
2018	174,687,709,671.51	184,108,481,959.27	94.88%
2019	192,625,787,459.73	200,761,983,256.57	95.95%
2020	199,886,424,033.65	209,725,821,099.44	95.31%

From 2016 to 2020, the cost of goods sold of Haier Electric shown in the figure above are 95.46%, 95.54%, 94.88%, 95.95% and 95.31%, respectively.

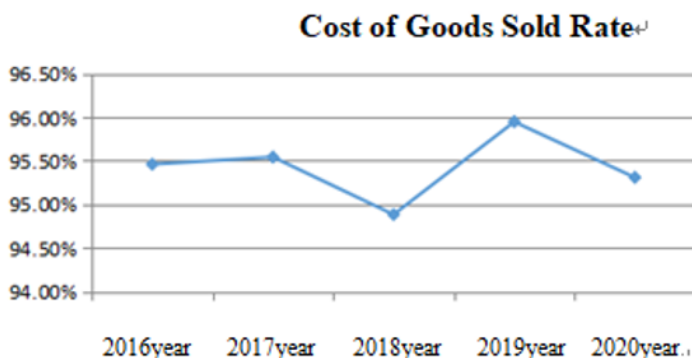


Fig. 1. Cost of Goods Sold Rate

As shown in Figure 1, although the cost of goods sold rate of Haier Electric was at a high level from 2016 to 2020 after the continuous expansion of the enterprise, it remained relatively stable, which suggests that the enterprise's control over operating costs was stable.

Then, taking 2016 as the basis year, the total operating cost and its composition of Haier Electric were analyzed by a fixed base dynamic ratio. The month on month analysis on the

data of the past five years shows whether the development is in a good trend.

Table 6. Fixed Base Dynamic Ratio of Total Operating Cost

Year	Operating Cost	Business Taxes and Surcharges	Selling Expenses	Administrative Expenses
2016	137.62%	160.03%	220.73%	161.96%
2017	184.06%	188.17%	293.66%	214.55%
2018	218.50%	201.94%	300.38%	161.98%
2019	235.95%	186.58%	349.81%	194.90%
2020	247.01%	153.65%	349.39%	193.73%

As shown in Table 6, the operating costs have increased significantly in the past five years; the selling expenses have also increased greatly in the last five years. It indicates that Haier Electric's profits mainly depend on small profits but quick turnover, and it gains competitive advantage by taking up a large market share. However, once other companies catch up, or more companies enter the electrical industry, it will lose a part of the market share, and the company's revenue will decline with the shrinking market share. What's worse, it may cause an accelerated decline in market share. Finally, the operating costs and selling expenses vary greatly, as shown in the table.

3.2 Analysis of factors related to cost of goods sold rate

3.2.1 Labor cost analysis

The proportion of cash paid to employees in cash outflow from operating activities is an indicator reflecting the proportion of cash paid to all employees in cash outflow from operating activities in a fiscal year.

Table 7. Cash Flow from Haier Electric's Operating Activities

Year	Cash Paid to and for Employees (yuan)	Cash Outflow from Operating Activities (yuan)	Proportion of Cash Paid to Employees in Cash Outflow from Operating Activities
2016	12,171,909,848.22	130,638,837,175.01	9.32%
2017	16,328,642,238.15	149,393,404,784.50	10.93%
2018	19,659,188,254.77	173,064,333,388.10	11.36%
2019	22,281,126,153.50	192,102,544,500.27	11.60%
2020	22,084,658,004.57	192,901,508,993.09	11.45%

In recent years, the rapid increase of labor costs has become a common phenomenon in China's economic development. From 2016 to 2020, the cash paid by Haier Electric to employees was 12.172 billion yuan, 16.329 billion yuan, 19.659 billion yuan, 22.281 billion yuan and 22.085 billion yuan, respectively.

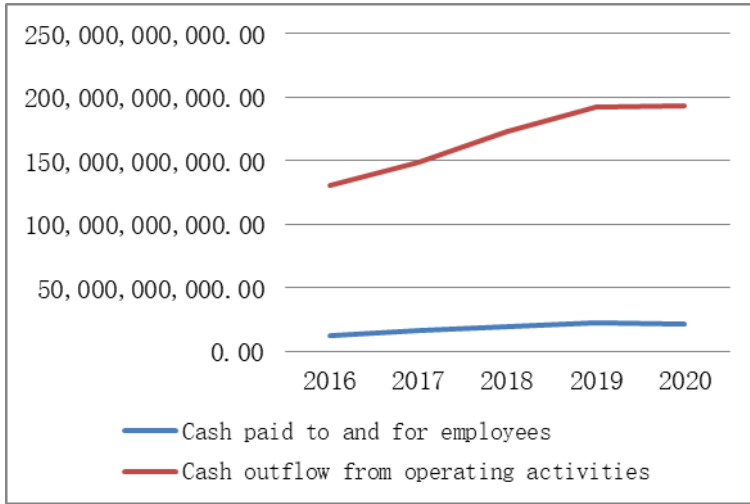


Fig. 2. Cash Paid to and for Employees

From 2016 to 2020, the cash paid to and for employees of Haier Electrical has been on the rise, especially the dramatic increase from 2016 to 2019, which greatly increases the cost of the enterprise, and the proportion of cash paid to employees in the cash outflow of operating activities has also soared in the past four years. Therefore, one of the main starting points of Haier Electrical’s cost control can pay more attention to the control of labor costs.

(2) Material Cost Analysis

Table 8. Raw materials of Haier electrical

Year	Raw Material (yuan)
2016	2,086,658,637.93
2017	3,459,878,187.81
2018	2,530,152,656.33
2019	3,068,331,798.61
2020	2,785,611,125.08

The inventory of Haier Electric is classified as: raw materials, products in process and products in stock. From 2016 to 2020, the Company's expenses on raw materials were 2.087 billion yuan, 3.460 billion yuan, 2.530 billion yuan, 3.068 billion yuan and 2.785 billion yuan respectively, which suggests that the raw materials of Haier Electric have fluctuated in recent years, but on the whole, they are on the rise and at a high level. Excessive raw materials also bring greater pressure to the cost control of the enterprise.

3.2.2 Inventory analysis

General definition: $\text{inventory turnover} = \text{operating cost} / \text{average inventory balance}$, which

reflects whether the liquidity of inventory and the amount of inventory funds used are within a reasonable range.

Table 9. Inventory and Inventory Turnover

Year	Inventory (yuan)	Inventory Turnover
2016	15,779,217,922.43	6.6659
2017	22,234,213,979.30	5.7745
2018	23,246,333,038.75	5.6035
2019	29,196,779,666.29	5.3678
2020	30,736,047,309.59	4.9213

As Haier Electric's business scale expands, its production capacity is increasing. However, the inventory management is falling behind and becoming worse and worse. From 2016 to 2020, the Company's inventories are 15.779 billion yuan, 22.234 billion yuan, 23.246 billion yuan, 29.197 billion yuan and 30.736 billion yuan, respectively.

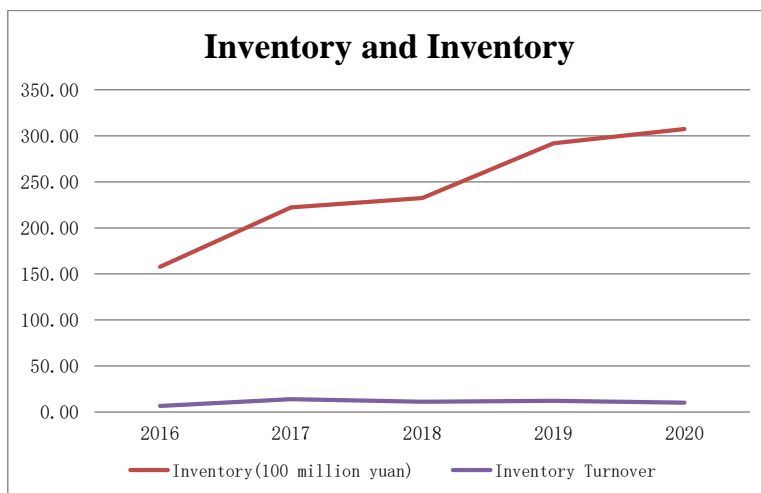


Figure 3. Inventory and Inventory Turnover

From 2016 to 2020, the inventory turnover remained stable, while the inventory increased dramatically, which indicates that the company's sales speed failed to keep up with the the production capacity. And it is not favorable to the company, or it may become a hidden trouble. For the electrical appliance manufacturing industry, the enterprise may fail to sell their products because of the fast upgrading, which will cause overstocked inventories to the enterprises. This not only takes up a large amount of cash flow of the company, but also takes up room of inventory and the management expenses of personnel. In addition, inventory is also faced with that the inventory price will drop at any time in the storage period, which will generate a lot of unnecessary costs to the enterprise. Therefore, increasing the control of inventory cost has obviously become one of the main starting

points for Haier Electrical cost control.

3.2.3 Fixed assets analysis

General definition: Fixed assets turnover =main business revenue/average total assets, which is an indicator of how many times fixed assets have been turned over in a fiscal year.

Table 10. Haier's Fixed Assets and Fixed Assets Turnover

Year	Fixed Assets (yuan)	Fixed Assets Turnover
2016	15,539,046,885.38	9.9374
2017	16,017,523,376.11	10.0917
2018	17,319,638,881.37	10.6203
2019	21,180,057,212.01	10.4094
2020	20,895,504,722.21	9.9690

From 2016 to 2020, Haier's fixed assets were 15.539 billion yuan, 16.018 billion yuan, 17.32 billion yuan, 21.18 billion yuan and 20.896 billion yuan, respectively.

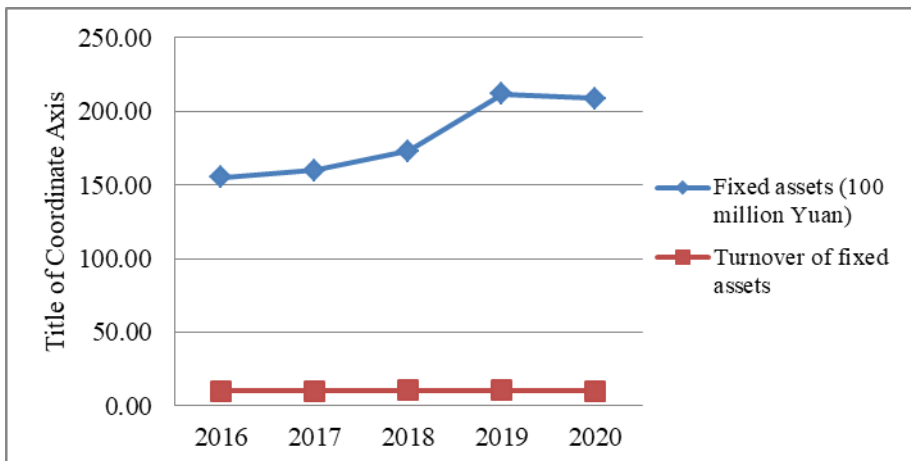


Figure 4. Haier's Fixed Assets and Fixed Asset Turnover

With the continuous expansion of production capacity in recent years, it has increased many new fixed assets. However, the fixed assets turnover is going down, which greatly increases the depreciation cost for the enterprises. Although the revenue from the company's new capacity can make up for the depreciation loss to a certain extent, the company will face new challenges if the market environment changes. When the company fails to get the expected revenue, the new depreciation will be a big burden.

4 Haier electric cost control

4.1 On-site employees fail to get sufficient awareness of the cost control

Although Haier Electric has established a special cost control group and encouraged the employees to have a sense of cost control. However, only the senior managers and financial personnel of the company truly care about the cost control. And they do not work in the on-site production, as well as not having a deep understanding of the production process and procedure. Therefore, their cost control concept is not suitable for the company, and they are not able to well control the company's cost in time. Without the relevant theoretical knowledge, the on-site employees cannot conduct any empirical analysis on the factors affecting the cost control or make any scientific prediction on the market demand. They are only concerned about the indicators related to their interests, such as production progress and delivery date, which results in the blind production. They may even reach the production indicators at the expense of the costs.

4.2 Cost control fails to stress the main points

Moreover, the cost control of Haier Electric fails to stress the main points. Taking manufacturing a refrigerator as an example, the company usually only pays attention to the costs related to the production process, such as the raw materials, labor costs and manufacturing costs. However, there is a limit to how much these costs can be reduced. The enterprises should control the cost from a higher perspective, such as strategic control and cost control under the value chain.

4.2.1 Labor cost control

The controlling labor costs of Haier Electric are simple and not systematic, and the employees are at a high turnover rate. The salary of workshop employees in the company is paid by piece, which can effectively motivate the enthusiasm of employees. However, the standards of the production capacity are stipulated in this system before manufacturing the products, and it lacks the reasonable tracking of product capacity, and rarely adjusts these standards. Finally, the paid by piece system fails to control the labor costs scientifically.

In recent years, the employees have been at a high turnover rate, especially after the Spring Festival, many employees quit their jobs. The enterprises have to spend a lot of money to invite the third-party to recruit the employees, which is just the recruitment cost. In addition, when new employees enter the company, the training on the employees will cost time and money, which is also the training cost. In addition, the loss of employees will cause significant losses to the company's experience and technology, productivity decline, time costs and replacement costs. And it will have a significant impact on the company. What's worse, if the employees in a team keep changing, the employees will not have faith in the enterprise and have no sense of belonging. The most serious problem is that it may cause the disclosure of core secrets, which will affect the company's performance and increase the turnover rate of Haier Electric.

4.2.2 Inventory cost control

In the past few years, the company has focused on expanding the market, and the sales revenue has also increased year by year. However, the company pays little attention to the capacity control. When the market demand is small and the company fails to settle it in a

short time, it will be under a risk of overstocking. And in case of product upgrading and poor sales, the temporary overstock may turn into long-term inventory, and it will also face the risk of inventory price decline, which generates a lot of unnecessary costs to the enterprise. The lack of a scientific and rational purchasing plan before production is also a cause for the overstocked inventory. Haier Electric usually purchases when finding out that the inventory is insufficient, and sometimes the lack of inventory is the illusion caused by the lack of good coordination and scheduling between different departments of the enterprise. Such kind of mode will lead to the frequent purchase of Haier Electric, which increases the purchase cost. Another reason for the inventory overstock is that the inventory flow mechanism is not perfect. When the departments fail to coordinate perfectly, the received raw materials may not be used up in time, and the rest may be detained in each workshop, which is also a considerable cost.

5 Improvement measures for cost control

5.1 All employees have the awareness of cost control

Haier Electric Co., Ltd. is the main body of cost control. The company's senior managers and financial personnel are responsible for the effective cost control, while the company shall encourage all employees to have the awareness of cost control, unite all departments of the enterprise to effectively maintain and supervise the implementation of cost control, and truly allow all employees to play a part in the whole process of the cost control. The financial personnel shall visit the on-site production to get the hang of the production process and procedure. Therefore, they can improve the awareness of workshop personnel on cost control through publicity and communication. The on-site employees shall play an active part in the company's training on the cost control, and combine the cost control with their own interests.

5.2 Adjust labor cost

First of all, combine the control of labor costs with the salary competition. The salary competition is the competition between different departments of the enterprise, as well as the competition with competitors' employees for the average salary. It shows the enterprise's attraction to employees, and is an important method that Haier Electric can adopt to solve the problem of its high employee turnover. It seems that strengthening the salary competitiveness will increase the labor cost, and that retaining employees and controlling costs have been contradictory. However, with the increase of the total labor cost, the competitiveness of enterprise labor compensation is becoming stronger and stronger, which will improve the employees' work efficiency and initiative, and will make more profits for the enterprise. Therefore, Haier Electric can improve the employee compensation to a certain extent, so as to improve the company's comprehensive income. When the enterprise's salary competitiveness is great, it will not have the risk of employee turnover, but attract more excellent talents.

Secondly, Haier Electric's current labor cost monitoring system should not only be combined with the labor cost control and salary competitiveness, but also shall monitor the total amount of labor costs. The most important thing is to have quantitative indicators and reasonable observation of employees' feelings and satisfaction. Therefore, the employees' true feelings shall be taken into consideration in the labor cost monitoring project, which will help to measure whether the current labor cost control is reasonable or not. If not, correct it in time.

5.3 Control inventory cost

Enterprises should pay attention to the total amount of inventory, instead of letting the production workshop not control the production capacity as before. Therefore, the company should formulate a scientific and reasonable production plan before purchasing, take full account of the changes in the market, and evaluate the demand for the next production cycle in a planned way. It shall optimize the spatial layout of the warehouse, improve the space utilization rate, and effectively count the inventory. It shall effectively combine the warehousing costs and ordering costs to find the optimal order quantity. The inventory cost can be controlled in two aspects as follows. 1. Reduce the holding cost of materials. The inventory cost can be reduced by reducing the storage cost, maintenance cost and transportation cost of the materials held. Generally, the more materials are held, the higher the holding cost. Therefore, it can be decreased by reducing the overstocked inventory in the warehouse without affecting the normal turnover operation of the company. 2. Optimize the cost structure of inventory. Inventory cost is composed of storage cost and order cost. When the company's order quantity minimizes the sum of storage cost and order cost, such order quantity is called economic order quantity. Although economic order quantity cannot minimize the absolute value of storage cost and order cost, it can minimize the sum of them. Haier Electric should strive to achieve the economic order quantity. And finally, it will achieve the optimal cost structure.

6 Conclusion

Haier Electric has gained the first opportunity in marketing channels in the past few years, which allows it to gain the priority in the market. However, with the participation of more peers, the final competition is the cost. The enterprise with the same product with low price not only wins consumers, but also increases the profit margin. In order to get the low cost, the cost control should become an important part of enterprise management, especially in the manufacturing industry, and become an enterprise culture, which will have a profound impact on the future development of the enterprise.

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