Research on Marketing Channel of Mobile Manufacturer Based on Analytic Hierarchy Process

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Abstract  Research on “marketing channel” of mobile attracts much attention in these years, but there’re only few articles referring to how to optimize the disposition of channel resources for mobile manufacturers. Based on a typically multiplex marketing channel system of mobile manufacturer, the analytic hierarchy process (AHP) structure model is established. Through the judgment matrix, simple and total hierarchy arrangement, consistent test, this paper gets the weight of each kind of marketing channel of mobile manufacturer. It provides the practical reference value for mobile manufacturers to distribute resources of marketing channels.

Key words  AHP; competitive advantage; mobile manufacturer; marketing channel

Up to the first half of 2005, having been in a period of decay, domestic mobile manufacturers encountered an entire industry loss after years of prosperity from 1998~2003. In comparison, the international mobile giants not only regained the big piece of market share, but also realized a stable finance growth. As the largest mobile market of the world, China not only acquires a deep concern by the domestic and foreign mobile manufacturers, but also has aroused scholars’ widespread interest. Thereinto, the research on “marketing channel” of mobile attracts much attention, including summarizing the channel experience of the domestic mobile manufacturers in prosper times and reflecting on the channel operation after the international giants’ strongly growing up [1-3]. However, looking through extant literatures, we find that there’re still few of articles about how to optimize the disposition of channel resources for mobile manufacturers. This paper analyses some multiplex marketing channels available for mobile manufacturers with the AHP method, whose findings may provide a theoretical reference for optimizing the disposition of channel resources.

1  The Multiplex Marketing Channels of Mobile Manufacturers

Taking an example by the domestic market, the present mobile marketing channel mainly comprises: 1) Mobile retail chain stores, with an overall marketing share 40% approximately; 2) Household appliances chain stores, 15% approximately; 3) Common mobile retail shops, 28% approximately; 4) Telecommunication operators, 12% approximately; 5) Department stores, 5% approximately; 6) Online selling, emerging, gradually occupying a certain market share and presenting a huge potential. In order to establish the marketing channels extending in all directions, many mobile manufacturers adopt a multiplex channel strategy. Therefore, the typical marketing channel of a mobile manufacturer may be indicated as Fig.1 shows.

Fig.1  The typical marketing channel of a mobile manufacturer
2 AHP Hierarchical Structure of the Mobile Manufacturers’ Marketing Channel Competence

To get a solution for the physical and value structures of mobile manufacturers’ marketing channels, we adopt analytic hierarchy process (AHP) in this paper. AHP is a kind of method, modeling and quantifying the policy-makers’ subjective judgments, demonstrating the differences with numerical value among various schemes and then finding out the best one. Accordingly, it is also regarded as a systematic analytical method with the combination of quantitative and qualitative analysis\(^4\)-\(^5\). According to the principle that the core of channel competence is to enhance the service of the channel and minimize the system total cost, as well as the author’s years of experience in mobile enterprise, the AHP hierarchical structure of the mobile manufacturers’ marketing channel can be established as Fig.2 shows.

In Fig.2, the marketing channel competence of mobile manufacturer \(Y\) is the function of channel cost \(X_1\), channel efficiency \(X_2\), and channel power \(X_3\), which means that \(Y=F(X_1, X_2, X_3)\).

The channel cost \(X_1\), channel efficiency \(X_2\) and channel power \(X_3\) are the functions of channel hierarchical structure \(Z_1\), channel width structure \(Z_2\), channel system structure \(Z_3\), respectively. That means, \(X_1=F_1(Z_1, Z_2, Z_3)\), \(X_2=F_2(Z_1, Z_2, Z_3)\), \(X_3=F_3(Z_1, Z_2, Z_3)\). Different marketing channels such as mobile retail chain shop, household appliances chain store, common retail shop, telecommunication operator, department store, and electronic commerce website have different channel hierarchical structure, width structure and system structure.

The channel cost mainly includes the scale cost, the personnel cost, the management cost, the time cost, the logistics cost, the marketing expense, the commercial frauds loss cost and so on\(^6\)-\(^7\). The channel efficiency is mainly regarded as the channel smoothness, the channel coverage, the channel circulating capability and so on. The channel power is a kind of influence to the others.

Generally speaking, the channel hierarchical structure could be separated as direct channels and indirect channels\(^8\). Channel width refers to the quantities of similar dealers in each channel level. The channel width structure mainly contains the following three types: exclusive sales, selective sales and intensive sales. According to the mutual relationship among channel members, the marketing channel system structure can be separated into the traditional channel system and the integrated channel system.

3 The Solution of the AHP

3.1 Construction of Judgment Matrix

Based on the hierarchical structure, Judgment matrix is the result matrix from the pair-comparison between elements in the same level and a certain element in the upper level and the accordingly compulsory evaluation and judgment. A certain element \(TM(i, j)\) in the judgment matrix expresses the relative importance of \(i\) and \(j\) to a certain element in the upper level. There are some characteristics of the judgment matrix as follows:

\[
TM(i, j)=TM(j, i)^{-1}, \quad TM(i, i)=1
\]

3.2 Hierarchical Single Arrangement and Its Consistency Test

Hierarchical single arrangement refers to the sequence about the weight of each element in this level to a certain element in the upper level, which is usually expressed by numerical value. Every judgment matrix
should be calculated. Here, we take root-mean-square method as an example to introduce the calculating method of single arrangement.

Suppose the judgment matrix is:

\[
P = \begin{bmatrix}
p_{11} & p_{12} & \cdots & p_{1n} \\
p_{21} & p_{22} & \cdots & p_{2n} \\
\vdots & \vdots & \ddots & \vdots \\
p_{n1} & p_{n2} & \cdots & p_{nn}
\end{bmatrix}
\]

the single arrangement \( \alpha \) is expressed as \( \alpha = \left( \prod \alpha_i \right)^{1/n} / \left( \sum \left( \prod \alpha_i \right)^{1/n} \right) \).

As judgment matrix is obtained through the pair-comparison of elements, the result of comparison will easily become inconsistent when there are too many elements and complex mutual relationships, which will result in the conclusion distortion. As a result, the consistency of the judgment matrix must be tested. The steps are as follows:

1) Calculate the consistency indicator of judgment matrix \( C.I \)

\[
C.I = (\lambda_{\text{max}} - n) / (n - 1)
\]

where \( \lambda_{\text{max}} \) is the characteristic root of judgment matrix, \( n \) is the order of judgment matrix. If and only if \( C.I \geq 0 \), test could be continued. Otherwise, the comparison, judgment and evaluation should be repeated.

2) The average random consistency indicator \( R.I \).

3) Calculate the random consistency indicator of judgment matrix \( C.R = C.I / R.I \) when \( C.R < 0.1 \), the judgment matrix consistency will be satisfying. If the judgment matrix does not get the satisfying consistency, the comparison and judgment should be repeated.

3.3 Hierarchical Total Arrangement and Its Consistency Test

Hierarchical total arrangement refers to the calculation about the integrative weight of elements in each level to the highest element on the basis of the hierarchical single arrangement. Suppose the elements in the upper level are \( B_1, B_2, \cdots, B_m \), whose total arrangement values to the first level elements are respectively \( b_1, b_2, \cdots, b_m \). Elements in this level are \( C_1, C_2, \cdots, C_n \), whose single arrangement to the relevant element \( B_j \) in the upper level is \( (w_{11}, w_{12}, \cdots, w_{1i})^T \).

If \( C_j \) is irrelevant with \( B_j \), then \( W_{ji} = 0 \).

The consistency test of total arrangement is the indicator to measure the quality of judgment matrix. If the judgment matrix test is passed, this judgment matrix can be put into use. Otherwise the elements in the judgment matrix should be adjusted to meet the need. The consistency indicator and random consistency indicator in the consistency test should be both satisfied.

\[
1) \text{Consistency indicator } C.I: \quad C.I = \sum_{i=1}^{n} b_i (C.I)_i,
\]

\( (C.I)_i \) is the relevant single arrangement indicator of \( b_i \). If and only if \( C.I \geq 0 \), the test is passed. Otherwise, not passed.

\[
2) \text{Random consistency indicator } C.R:
\]

\[
C.R = \sum_{i=1}^{n} b_i (C.I)_i / \sum_{i=1}^{n} b_i (R.I)_i.
\]

If and only if the random consistency indicator \( C.R < 0.1 \), the test is passed. Otherwise, not passed.

3.4 Case of Application

Taking the marketing channel of a famous mobile manufacturer (named as Z Corporation) as an example, this paper analyses the construction and optimization of the marketing channel based on AHP. The members in expert group include: the administrative cadres from corporation high level, backbone staffs from market department. Limited to the length of paper, the judgment matrix and single arrangement are omitted. The result of the total arrangement is shown in Tab.1, Tab.2 and Tab.3.

| Tab.1 The first level's integrative weight of Z Corporation's channel competence |
|------------------|------------------|------------------|
| Z Corporation’s channel competence | \( CW \) | \( C_w \) |
| Channel cost | 0.2583 | 0.2583 |
| Channel efficiency | 0.6370 | 0.6370 |
| Channel power | 0.1047 | 0.1047 |

| Tab.2 The second level's integrative weight of Z Corporation's channel competence |
|------------------|------------------|------------------|------------------|
| Channel cost | 0.1172 | 0.6144 | 0.1172 | 0.4339 |
| Channel efficiency | 0.2684 | 0.1172 | 0.2684 | 0.1721 |
| Channel power | 0.6144 | 0.2684 | 0.6144 | 0.3940 |

\( C.I = 0.0368 \quad C.R = 0.0634 \)
### Tab.3 The third level’s integrative weight of Z Corporation’s channel competence

<table>
<thead>
<tr>
<th>Channel hierarchical structure</th>
<th>Channel width structure</th>
<th>Channel system structure</th>
<th>(C_{IR})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile retail chain shops</td>
<td>0.2257</td>
<td>0.2791</td>
<td>0.2533</td>
</tr>
<tr>
<td>Household appliances chain stores</td>
<td>0.1320</td>
<td>0.1881</td>
<td>0.1746</td>
</tr>
<tr>
<td>Common mobile retail shops</td>
<td>0.0347</td>
<td>0.1079</td>
<td>0.0279</td>
</tr>
<tr>
<td>Telecommunication operators</td>
<td>0.4724</td>
<td>0.3278</td>
<td>0.4193</td>
</tr>
<tr>
<td>Department stores</td>
<td>0.0754</td>
<td>0.0605</td>
<td>0.0468</td>
</tr>
<tr>
<td>Electronic commerce websites</td>
<td>0.0598</td>
<td>0.0365</td>
<td>0.0781</td>
</tr>
</tbody>
</table>

\(C_I=0.0826\) \(C_R=0.0666\)

The result of total arrangement indicates us the main strategic direction. The analysis of result will pave the way of strategy implementation. From the result of total arrangement of Z Corporation, we can obtained some beneficial conclusions as follows:

1) The importance ranking of the elements affecting the marketing channel competence of Z Corporation is: channel efficiency\(\rightarrow\)channel cost\(\rightarrow\)channel power.

2) The importance ranking of the structural elements affecting the marketing channel competence of Z Corporation is: channel hierarchical structure\(\rightarrow\)channel system structure\(\rightarrow\)channel width structure.

3) The importance ranking of various specific marketing channels affecting the marketing channel competence of Z Corporation is: telecommunication operators\(\rightarrow\)mobile retail chain shops\(\rightarrow\)household appliances chain stores\(\rightarrow\)electronic commerce websites\(\rightarrow\)department stores\(\rightarrow\)common mobile retail shops.

The result of the marketing channel research based on AHP provides an important theoretical support for the strategic adjustment for Z Corporation. Obviously, the channel optimization for Z Corporation should be focused on telecommunication operators, mobile retail chain shops and household appliances chain stores. In a condition of limited resource, Z Corporation should distribute resource to these areas priorly, and take retrenchment strategy such as withdrawing, outsourcing, even giving up to the other channels.

### 4 Conclusions

Based on a typical multiple marketing channel system of mobile manufacturers, this paper establishes the AHP structure model. In virtue of the judgment matrix, single and total hierarchy arrangement, consistency test, we get the weight of each kind of marketing channel of mobile manufacturers. The research method used in this paper provides an intuitionistic systemic analytic framework with a strong maneuverability for mobile manufacturers to analyze their own marketing channels. However, it should be pointed out that as a kind of subjectively evaluating method, AHP analysis may lead to different results even when being used to same enterprise by different experts. Therefore, it is likely to get much different judgments of same enterprise by the academia and business circles. So, in practical enterprise application of this method, it is suggested to consider the area of evaluation sufficiently and enlarge sampling size in order to reduce the influence of its limitation.

### References


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