Head or Tail? An Integrative Analysis of

Customer Value and Product Portfolio

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Abstract

In prior e-commerce research, two distinct viewpoints—the customer-based view and the product-based view—were studied separately to determine optimal consumer marketing strategies. The former focuses on customer browsing/searching/purchasing behaviors to discover valuable customers; the latter concentrates on product popularity to discover optimal product portfolios. Recent research has shifted the focus from popularity towards the long-tail phenomenon and its driving factors; however, little is known about efficient and effective methods to promote the right (e.g. head- or tail-) products to the right (e.g. VIP or Non-VIP) customers. The current study integrates these two viewpoints to provide greater insights and thereby develop more comprehensive marketing strategies. Our findings show that VIP customers make the majority of long-tail purchases. Moreover, apart from their high number of head- and tail-product purchases, they also display distinct website browsing/searching behaviors compared to Non-VIP customers. Finally, we identify five customer segments and outline corresponding marketing strategies.

Keywords: 80/20 rule, Long-tail, On-line shopping

1. Introduction

It is widely accepted that companies should be able to discriminate valuable customers or products from valueless ones, and thereby correspondingly allocate available corporate resources. Based on the above, two distinct viewpoints—the customer-based view and the product-based view—have emerged. The former stems from the concept of key account management, and argues that a small proportion of customers of a company often generate a large proportion of sales (Blattberg et al., 2001). Usually, companies evaluate customer contributions in terms of purchasing frequency or monetary value (Gullinan, 1977; Schmittlein & Peterson, 1994; Boatwright et al., 2003; Fader et al., 2005; Homburg et al., 2008; Jen et al., 2009). Customers with a high purchase frequency or large purchase amounts from a firm are expected to exhibit greater loyalty to and generate greater profits for that firm (Jacoby and Kyner, 1973; Reichheld et al., 2000). The idea of customer prioritization based on customer value implies that customers should receive varied marketing treatments (Venkatesan and Kumar, 2004). For example, most companies offer loyalty programs to valuable customers; however, they often implement up-selling or cross-selling tactics to motivate less valuable customers. As such, the differing behavioral characteristics associated with various types of customers encourage companies to employ differentiated marketing instruments to increase their total sales.

The latter viewpoint originates from the concept of product profile management, and states that companies have to identify an optimal product profile that can generate additional sales, decrease risks, and assure potential growth. Based upon the Pareto-Principle, companies should select and maintain a limited range of popular products to increase the inventory turnover rate and decrease the unit cost associated with purchasing and storage (Schmittlein et al., 1993; Anschuetz, 1997). To achieve these goals, companies must monitor the sales figures of each product and continuously launch new products to replace outdated or unpopular ones.

However, in an E-commerce environment with unlimited shelf space and low in-stock cost, the long-tail theory proposes that this new economics of distribution allows us to consider a much greater number of tail-products, which collectively can create a new market as big as the one we already know (Anderson, 2006). Consequently, by adding and maintaining a wide variety of products, companies can attract additional customers from multiple segments and thereby increase sales. Moreover, despite the differences between the Pareto-principle and the long-tail theory, they actually complement each other in that popular (head-) products and tail-products are likely to appeal to different customer segments.

Although these two distinct viewpoints have been widely investigated and discussed separately, surprisingly few studies have examined whether any interdependent relationship exists between them (Tucker and Zhang, 2007). Further, considering these two viewpoints in isolation might not properly capture the exact purchasing pattern of each customer, which could lead to inappropriate marketing strategy suggestions. For example, consider two VIP customers, Mary and John, who have made an identical number of purchases from a single retailer. As Figure 1 shows, Mary prefers to purchase popular products, while John spends his money evenly on both popular products and tail-products. If a retailer adopts a solely product-based view, such as the Pareto-Principle, he or she will remove most tail-products from the shelf. By doing so, it is foreseeable that John may cut his expenditures on tail-products. In addition, he may choose not to patronize this retailer anymore. As such, Mary and John represent two types of customers with quite different behavioral characteristics. This example emphasizes that Mary and John need varied marketing programs even though they are both classified as VIP customers. In turn, the fact that companies are highly likely to adopt either the customer-based view or product-based view may not clearly illustrate customer purchasing behavior generalities.

--- Figure 1 ---

Unlimited shelf space and powerful search engines enable customers to purchase products that are hard to track down in brick-and-mortar stores, thereby stimulating the aggregate sales of tail-products (Brynjolfsson et al., 2003; Kilkki, 2007). This is a golden opportunity for marketing managers to capitalize on the potential profits from these tail-products. Most researchers have verified the importance of the long-tail and its drivers on the supply (producers/retailers) and demand (consumers) side of the market (Brynjolfsson et al., 2006; Elberse & Oberholzer-Gee, 2007; Brynjolfsson et al., 2007); however, Elberse (2008) stated that it would be imprudent for companies to upend traditional practices to focus on the demand for obscure products, and her research data shows how difficult it is to profit from the tail-end products. The research gap the current study investigates concerns how to efficiently and effectively promote the right (e.g. head or tail) products to the right (e.g. VIP or Non-VIP) customers. Since customer product preference is the key, we have to understand who sits on the head and who stands on the long-tail. Therefore, we propose a new segmentation strategy based on the integration of the customer-based and the product-based views, which can assist us both in terms of identifying the behavioral differences among customers and also in developing differentiated marketing campaigns.

Clearly, companies that can accurately segment their customers based on their behavioral characteristics will earn a better return on its marketing campaigns than competitors that cannot (Ferguson and Hlavinka, 2006; Kumar and Trivedi, 2006). In the following pages, we describe how companies can segment through the integration of customer-based and product-based views. Based on our empirical data, we demonstrate that interdependence between customers and products does exist. We also show that the interdependent relationship can help companies to segment their customers more insightfully and tactically. Finally, we offer a 3-D map of different customer segment online behaviors as a foundation for developing comprehensive marketing strategies.

2. Empirical Analysis and Discussion

Our sample included 6205 transactions of Amazon book sales from 2004 from ComScore. These transactions included 1590 customers who bought a total of 5591 books. We verified the sales rank of each book on the Amazon website and estimated that approximately 6 million book copies were on Amazon in 2004. In general, a typical large-scale brick-and-mortar bookstore carries 300 to 400 thousand book copies. Therefore, we defined a book as part of the head if its sales rank was greater than that of the 350 000th book (i.e., the top 5.8% of the 6 million total copies) and as the tail if its sales rank was lower than that of the 350 000th book. Further, we defined the 20% of customers who bought the most books as VIP customers, and the remainder as Non-VIP customers.

2.1 Five distinct customer segments

Table 1 shows the product portfolios for VIP and Non-VIP customers, respectively. The 273 VIP customers that purchased large amounts of both head-products and tail-products, and explicitly demonstrated their rich knowledge of both online shopping and variety-seeking behaviors are termed *Experts*. The remaining 27 VIP customers limited their purchases to head-products, reflecting their interest in popularity, and are referred to as *Fashion-addicts*. The 645 Non-VIP customers that purchased head books only (but significantly less than those purchased by Fashion-addicts) are labeled as *Fashion-followers*. A further 369 Non-VIP customers that occasionally purchased both head- and tail-books are called *Roamers*. Finally, the remaining 276 Non-VIP customers that seldom made purchases and only bought tail-books are termed *Treasure-hunters*.

--- Table 1 ---

According to Table 1, VIP customers are different from Non-VIP customers not only in terms of purchasing frequency but also in terms of product preferences. Among the 300 VIP customers, the 27 *Fashion-addicts* (9%) only purchased head-products, while the 273 *Experts* (91%) purchased both head-products and tail-products. None of the VIP customers bought tail-products exclusively. Among the 1,290 Non-VIP customers, however, the 645 *Fashion-followers* (50%) bought head-products only, the 369 *Roamers* (28.6%) purchased both head- and tail-products, and the 276 *Treasure-hunters* (21.4%) purchased only tail-products.

2.2 Different product portfolios purchased by VIP and Non-VIP customers

The product portfolios purchased by the various groups also differ. As shown in Figure 2, the product portfolio purchased by VIP customers exhibits an upside-down "V" shape, which means they are more likely to buy both head-products and tail-products. Only a small portion of VIP customers purchased head-products exclusively, and none of them bought only tail-products. In contrast, the product portfolio for Non-VIP customers exhibits a line shape with a negative slope, which reveals that most of these consumers only purchased head-products, and very few of them purchased only tail-products. When we consider what would happen if these Non-VIP customers increased their purchasing frequency, it seems quite likely that they would converge towards the *Experts* segment. In other words, there is a potential sales increase associated with capturing customer behavior characteristics and then successfully shifting product preferences of other customer segments' either from head-products to tail-products (i.e. *Fashion-followers*), or from tail-products to head-products (i.e. *Treasure-hunters*).

--- Figure 2 ---

2.3 Differences in product proportions

Next, we shift our focus to the proportions of products purchased by the five customer segments. Figure 3 shows that the percentages of head-products and tail-products purchased by the *Experts* segment were 61.3% and 38.7%, respectively. The proportions for the other four segments were 100% and 0% (*Fashion-addicts*), 100% and 0% (*Fashion-followers*), 55.92% and 44.08% (*Roamers*), and 0% and 100% (*Treasure-hunters*). Using *Experts* as the benchmark segment, we can see that different marketing efforts are required for the other four segments. For example, firms should try to promote tail-products to *Fashion-addicts* and *Fashion-followers* to increase their purchase proportion of tail-products. In contrast, companies could promote head-products to *Treasure-hunters* and *Roamers*.

--- Figure 3 ---

The above findings tell us that there is an interdependent relationship between customers and products. Therefore, by combining the customer-based view and the product-based view to analyze the tail phenomenon, we can capture a clearer picture of customer behaviors and that can lead to more effective marketing programs. More specifically, defining these five customer segments in terms of their behavioral characteristics will provide critical and valuable information to marketers, such that they can devise appropriate marketing strategies and programs and thereby realize potential sales increases (Lohse et al., 2000; Weinstein, 2002; Bellman et al., 2006; Reinartz et al., 2008).

2.4 Behavioral characteristics of the five customer segments

In order to distinguish between the profiles of the five segments, we summarize the characteristics of customers' buying and searching/browsing behaviors in Table 2. First, we can see that the highest average number of purchases was 12.14 for *Experts*, followed by *Fashion-addicts* (8.19), *Roamers* (3.14), *Fashion-followers* (1.76) and *Treasure-hunters* (1.36). It is quite logical that the average number of purchases is positively related to the average number of visits, which totaled 59.74 for *Experts*, 30.67 for *Fashion-addicts*, 23.81 for *Roamers*, 17.5 for *Fashion-followers* and 14.82 for *Treasure-hunters*. The highest average conversion rate, however, belonged to *Fashion-addicts* (38%), as opposed to *Experts* (34%). Moreover, the average purchase amounts for *Experts* and *Fashion-addicts* were $21.41 and $15.78, respectively, which both lagged behind the averages for the three Non-VIP customer segments; for example, the highest average purchase amount was $29.52 for *Treasure-hunters*. It seems reasonable to conclude that customers with a higher purchasing frequency would have lower average purchase amounts, and that those customers who buy more tail-products would have greater average purchase amounts. Therefore, if companies hope to raise the average purchase amounts, they should actively encourage customers to buy more tail-products.

--- Table 2 ---

Next, we examine customers' average browsing time and average pages viewed. These two browsing/searching behavioral characteristics also demonstrate a positive mutual relationship: 53.71 and 41.50 for *Treasure-hunters*,

51.03 and 40.14 for *Fashion-followers*, 34.77 and 29.95 for *Roamers*, 25.00 and 28.59 for *Fashion-addicts*, and 21.93 and 22.86 for *Experts*, respectively. Further, the two behavioral characteristics were negatively related to either the average number of purchases or the average number of visits; VIP customers visited and purchased more often, but spent less time and viewed fewer pages than the three Non-VIP customer segments did. This result could be due to the fact that the VIP customers were more familiar with the on-line shopping environment or with their target-oriented browsing/searching behaviors.

2.4.1 VIP customer behaviors

Although *Experts* and *Fashion-addicts* were both classified as VIP customers and had similar browsing/searching behaviors, their product preferences were quite different. *Fashion-addicts* showed a concentrated preference for popularity, while *Experts* exhibited a varied purchasing pattern that included both popular products and less popular ones (such as outdated or obscure products). In addition, the average number of purchases made by *Experts* also exceeded those made by *Fashion-addicts* (i.e. 12.14 to 8.19). Therefore, purchases of tail-products seem unlikely to crowd out or reduce the number of the head-products purchased.

2.4.2 Non-VIP customer behaviors

As for the Non-VIP customers, the conversion rate and the number of purchases made by *Roamers* were greater than those of both *Fashion-followers* and *Treasure-hunters*. This also reflects that purchases of tail-products are unlikely to crowd out or reduce the number of the head-products purchased. In fact, the tail-products had a synergistic effect on purchases. In addition, the fact that *Roamers* visited the site more frequently but spent less time browsing than both *Fashion-followers* and *Treasure-hunters* may have been caused by their occasional browsing/searching behaviors. Moreover, in spite of the similarity in the number of purchases made and the browsing/searching behaviors of *Fashion-followers* and *Treasure-hunters*, the two segments displayed distinct product preferences—the former bought only head-products while the latter bought only tail-products. Judging from these results, it can be inferred that companies should pursue marketing strategies that are based on the various customer behavior characteristics (Moe, 2003), which may include buying behaviors (such as purchasing frequency and preference for products) and browsing/searching behaviors (such as the average number of visits and average browsing time); these ideas are expanded on in the following section on strategic implications.

3. Strategic Implications

Based on the analytical results presented in section 2, Figure 4 displays our 3-D map of the relationships among the three important behavioral characteristics: the average number of purchases, the average number of visits and the average browsing time (per visit). This map clearly shows that the average number of purchases was positively related to the average number of visits, which is consistent with most prior studies including Moe and Fader (2004) and Boehm (2008). Secondly, along with the increase in the average number of purchases, the average browsing time was shorter and was also negatively related to the average number of visits, which can be explained by the learning effect. For instance, customers who visit more often learn how to browse and search more efficiently, and in the end, they make additional purchases. If marketing mangers set *Expert* as the benchmark in view of their high customer value, then they can try to move customers from the other four segments towards the *Expert* segment through the following approaches.

--- Figure 4 ---

3.1 Increasing the number of purchases

The first approach is to design marketing programs to increase the number of purchases. To do so, marketers must identify customer preferences to provide for their needs. One option is to build up proper recommendation systems that can create potential sales opportunities (Senecal et al., 2005; Felfernig et al., 2006; Hervas-Drane, 2010), and there are two recommendation systems that could be adopted (Burke, 2002; Huang et al., 2004). The first is a collaborative filtering recommendation system that makes automatic predictions (filtering) about user interests by means of collecting taste information from many users (collaborating). The second option is a content-based recommendation system: instead of relying on the preferences of other users, this system is based on creating a user profile by way of analyzing the product items rated by the user. In this way, items that are similar to those the user has rated highly would be recommended. Apart from recommendation systems, corresponding incentive systems based on different customers' behavioral characteristics and contributions are an option, such as customer loyalty programs for customers with high purchasing frequency or bundling discounts for those with low purchasing frequency (Nikolaeva & Sriram, 2006; Fleder & Hosanagar, 2009; Punj & Moore, 2009).

3.2 Increasing the number of visits

The second approach is to increase the number of visits by raising the value of the website. One way is to lend variety to the website content by detailing functions, entertainment shows or additional products, or by including professional forums or personalized user interfaces (Emmanouilides & Hammond, 2000; Kim & Forsythe, 2008). Greater entertainment value may help to attract those who seldom visit websites. However, for those interested in specific product items or issues, we should strengthen the linkages by providing them with in-depth product discussions or more personalized systems (Miceli et al., 2007).

3.3 Decreasing the average browsing time

Another potential approach would improve the website browsing and searching convenience. Prior research has verified that search engines offer efficient access to goods and services listed on the web (Kamis, 2006; Su et al., 2008). There are two different types of search engines could be implemented. The first is a quick-search engine, where users simultaneously consider the trade-offs among all item attributes, and process them without using a sequential procedure of gradually taking up the search space to receive feedback. The other type is an adaptive-search engine, where attributes are considered sequentially, with a cutoff value for each applied before the next attribute is considered. In consideration of the accuracy-effort trade-off associated with search engines, adaptive-search engines can be offered for those customers who know exactly what they want, to increase the accuracy of the search. Alternatively, customers who occasionally surf the web and make online purchases are more likely to use quick-search engines to decrease the time they spend searching.

3.4 Integrated strategies

Finally, we propose the use of varying marketing strategies and programs for these five segments by applying the concepts listed above, as summarized and shown in the 3-D map in Table 3. First, for the benchmarking segment *Experts*, the marketing strategic focus should be on retention and co-creation through invitations to post product reviews and recommendations to other customers on best-value products (Qiu and Papatla, 2008). Further, companies could institute customer loyalty programs to maintain customers' high purchasing frequency, and also provide personalized websites to motivate them to visit more.

Second, for the *Fashion-addicts* segment, the marketing strategic focus should be on cross-selling—trying to recommend both head- and tail-products based on the collaborative filtering recommendation system with bundled-pricing strategies. Moreover, as this group is highly interested in popular items, companies should set up online clubs or forums for special issues to attract buyers to visit more frequently. In addition, companies could enhance the review-product linkage to ensure that customers are exposed to more insightful contents. To help them efficiently find what they need, companies may suggest the use of adaptive-search engines, which are highly accurate.

Third, companies should focus on word-of-mouth strategies for the *Fashion-followers* segment. To increase these customers' purchasing frequency, they can also provide collaborative filtering recommendation systems. Further, based on customers' purchasing behavior characteristics, firms can adopt a direct marketing system to inform consumers of the top 100 available products and also offer time-limited discount incentives. Also, companies should emphasize browsers with rapid search engines so that customers can quickly locate desired products.

Fourth, for the *Roamers* segment, the major marketing strategy would be up-selling, such as quantity up-selling or package up-selling. Additionally, companies should enhance the richness of their websites by including a variety of functions and entertaining activities to better cultivate frequent website-visitors.

Finally, companies can implement habit-forming strategies for *Treasure-hunters* by supplying them with content-based filtering recommendation systems. In order to change purchasing habits from only considering brick-and-mortar stores to using click-and-mortar ones, user-friendly interfaces and sufficient virtual shelf-space are both vital. Online displays of sample book pages are also important in reinforcing this segment's purchasing behaviors, as are adaptive search engines designed for customers' purpose-oriented behaviors.

<div align="center">--- Table 3 ---</div>

4. Conclusions

The long-tail theory helps to create a picture of what really happens during online shopping. It states that a large proportion of tail-products in a market could generate a considerable proportion of sales. In terms of marketing implications, the long-tail theory is more insightful when we consider both product-based and customer-based viewpoints. Based on our analysis of a sample of Amazon user purchases, we have discovered that VIP

customers account for the major portion of long-tail product purchases. In other words, Non-VIP customers predominantly buy head-products. Further, we show that five customer segments exist, and that each is associated with dissimilar purchasing and browsing/searching behaviors. In turn, we propose marketing strategies and programs relative to each segment, which are aimed at increasing the purchasing frequency, increasing the number of visits, or shortening the average browsing time. These types of marketing efforts will help online companies to increase their sales growth rates.

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Table 1. Descriptive statistics of sample from Amazon's book sales in 2004

| | | Product Portfolio | | | Total |
		Head only	Head & Tail	Tail only	
VIP	# of purchases	221	3,315 (2,032/1,283)	-	3,536
	# of customers	27	273	-	300
	Name of Seg.	*Fashion-addict*	*Expert*		
Non-VIP	# of purchases	1,137	1,157 (647/510)	375	2,669
	# of customers	645	369	276	1,290
	Name of Seg.	*Fashion-follower*	*Roamer*	*Treasure-hunter*	
Total	# of purchases	1,358	4,472 (2,679/1,793)	375	6,205
	# of customers	672	549	369	1,590

Table 2. Behavioral characteristics of the five segments

	Expert	Fashion-addict	Roamer	Fashion-follower	Treasure-hunter
Number of Customers	273	27	369	645	276
Buying behavior					
Avg_Number of Purchases	12.14	8.19	3.14	1.76	1.36
Avg_Amount ($)	21.41	15.78	24.28	28.54	29.52
Total Amount ($)	70,957	3,489	28,132	32,399	11,081
Searching/Browsing behavior					
Avg_Number of Visits	59.74	30.67	23.81	17.50	14.82
Avg_Conversion Rate	34%	38%	26%	23%	21%
Avg_Browsing Time per visit (minutes)	21.93	25.00	34.77	51.03	53.71
Avg_Pages_Viewed	22.86	28.59	29.95	40.14	41.50
Avg_Browsing Time per page (minutes)	0.96	0.87	1.16	1.27	1.29

Table 3. Marketing strategies for various customer segments

		Fashion-addict	Expert	Fashion-follower	Roamer	Treasure-hunter
Behavioral Characteristics	Buying	Higher number of purchases The highest conversion rate The least average amount of purchases Head-products only	The highest number of purchases The higher conversion rate The lower average amount of purchases Both head & tail-products (2:1)	Lower number of purchases Lower conversion rate Higher average amount of purchases Head-products only	Middle number of purchases Middle conversion rate Middle average amount of purchases Both head & tail-products (1:1)	Lowest number of purchases Lowest conversion rate Highest average amount of purchases Tail-products only
	Browsing & Searching	Higher number of visits Shorter avg. browsing time Less average pages viewed	The highest number of visits The shortest avg. browsing time The least average pages viewed	Lower number of visits Longer avg. browsing time More average pages viewed	Middle number of visits Middle avg. browsing time Middle average pages viewed	Least number of visits Longest avg. browsing time Most average pages viewed
Strategic Implications	Strategic Focus	Cross-selling strategy	Retention strategy Co-creation	WOM strategy	Up-selling strategy	Habit-forming strategy
	Increase Purchase Frequency	Collaborative filtering recommendation system Bundling strategies	Customer loyalty program	Collaborative filtering recommendation system Direct marketing Provide most reviews	Hybrid recommendation system Quantity up-selling Package up-selling	Content-based filtering recommendation system
	Increase Visit Frequency	Review-product linkage On-line book clubs Special issue forums	Personalized website	Billboard hot 100	The richness of website On-line book clubs Forums	Virtual shelf-space Friendly user interface Free trial reading
	Shorten Browsing Time	Adaptive search engine	-	Quick search engine	Quick search engine	Adaptive search engine
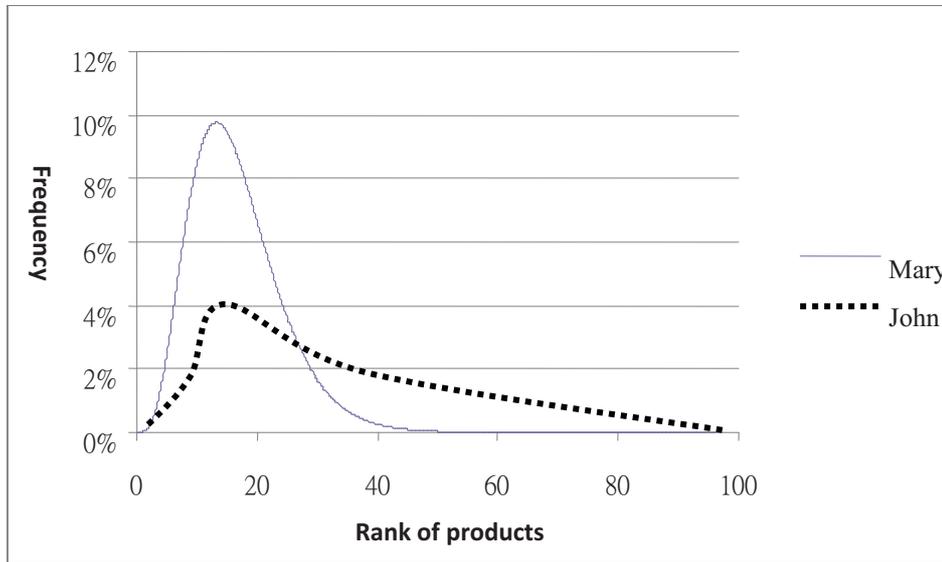
Figure 1. Two distinct types of VIP customers
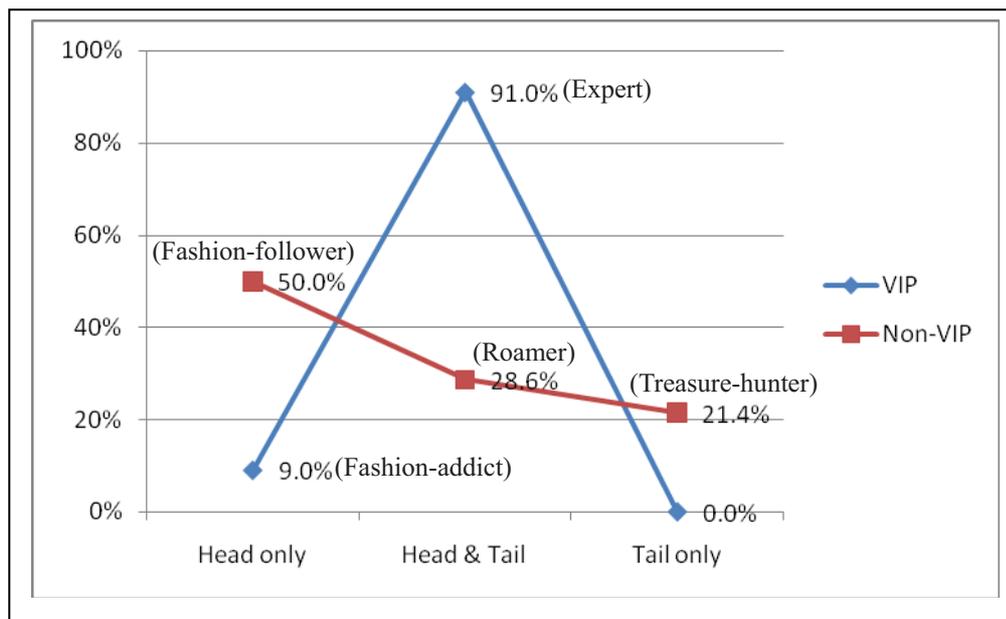
Figure 2. Different product portfolio structures purchased by VIP and non-VIP customers
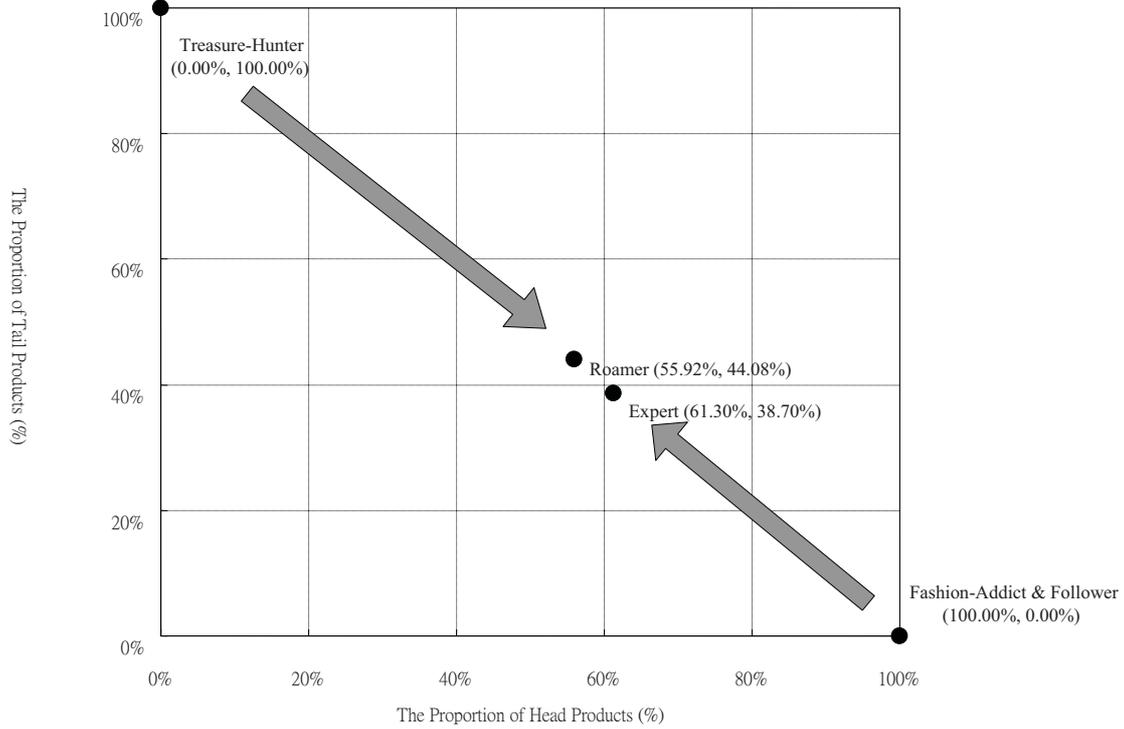
Figure 3. The proportion of products purchased by various segments
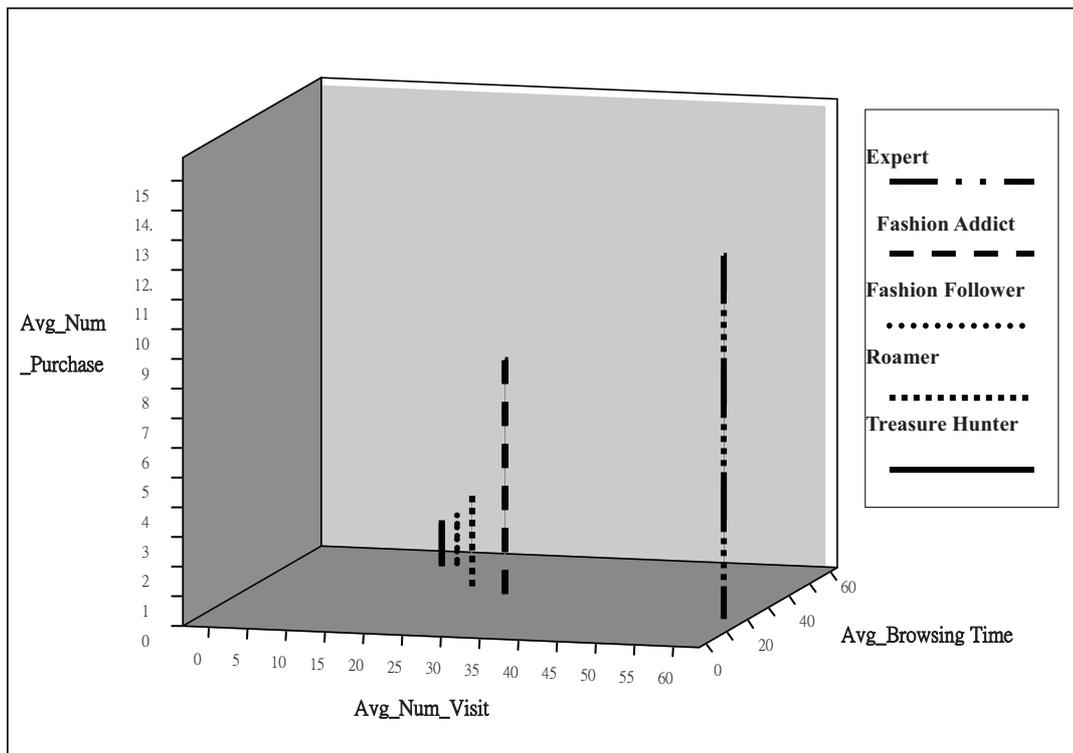
Figure 4. 3-D map of online behaviors of different segments