



## TRADEMARK IDENTIFICATION AND EXPANSION- USING VISUAL INFORMATION MAP TO SUPPORT TREND ANALYSIS



**Rain Chen<sup>1+</sup>**  
**Jo-Han Chang<sup>2</sup>**  
**Hung-Yuan Chen<sup>3</sup>**

<sup>1</sup>*Department of Visual Communication Design, Southern Taiwan University of Science and Technology, Taiwan, R.O.C.*

Email: [ocean@stust.edu.tw](mailto:ocean@stust.edu.tw)

(+ Corresponding author)

<sup>2</sup>*Department of Industrial Design, National Taipei University of Technology, Taiwan, R.O.C.*

<sup>3</sup>*Department of Visual Communication Design, Southern Taiwan University of Science and Technology, Taiwan, R.O.C.*

### ABSTRACT

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Comprehending global brand identification and expansion is critical because trademarks are one major approach employed by top hundred companies worldwide for staying competitive. This study examined 173 word marks of the top hundred global trademarks, and 60 ordinary consumers participated in this trademark identification experiment. Multidimensional scaling (MDS) was used to assess study participants' level of similarity of word marks from eight major industries. The present study also built a trademark map to facilitate companies' trademark-related decision-making. Company managers can use this trademark map approach to assess the identification of their trademarks in the industry. Trademark analysis too is useful for exploring trademark expansion, which suppresses the competitors. The results here show that the top hundred global trademarks had a very good identifiability among consumers. In the future, companies can use this analysis method to build their own trademark maps for evaluating the identification and expansion of their trademarks in the industry.

### 1. INTRODUCTION

Trademark infringement litigation has always played a crucial role in trademark competition. Trademarks are usually reviewed by the trademark authority of each country for approval, but in trademark infringement litigation, the scope of coverage of the plaintiff's trademark will still catch great attention because it is a key factor for judging whether the defendant has infringed the plaintiff's trademark or not. Therefore, how to determine the level of similarity of trademarks objectively is critical not only for the two parties, as well as their lawyers, in trademark infringement litigation but also the judge, who needs to identify and evaluate concrete evidence of trademark infringement. As for trademark designers, it is risky if they are unaware of infringing the

intellectual property of others. Even if designers intentionally stay away from the trademark design or trademark right of others, they still need to know how to design around safely while maximizing trademark benefits. That's why the above issues should be handled carefully.

Trademarks were designed by companies to represent their goods and services (Palumbo and Herbig, 2000). A trademark not only differentiates one's goods and services from those of others in the market but also protects the goods and services by law (Yu and Yi, 2011). The World Intellectual Property Organization (WIPO) gave trademarks a general definition: A trademark is a sign capable of distinguishing the goods or services of one enterprise from those of other enterprises. Trademarks are protected by intellectual property rights (WIPO, 2016).

A trademark should allow consumers to identify easily the goods or services labeled with the trademark. This feature of trademarks is called "identifiability" or "distinctiveness", and it is an essential component for the application of trademark registration (TAPTO, 2016).

Trademark similarity refers to partial similarities, either visually or conceptually, between word marks or figurative marks, and trademark similarity could prevent consumers from differentiating goods or services of a similar kind. The purpose of using trademarks is to help consumers identify the source of goods and services, and there are three main types of trademark infringement: similar pronunciation, similar appearance, and similar concepts (Zeng and Cai, 2007).

There are studies analyzed the evaluation models of brand identification in product design (Herm and Moeller, 2014). Because patents and trademarks share some similar properties, some studies proposed pattern identification in patents (Venugopalan and Rai, 2015). Researchers pointed out that when judging whether two trademarks are similar or not, such judgment should be made based on objective facts and by consumers with an average level of knowledge and experience. The researchers when conducting experiments should observe if two goods or services are mistaken as from the same source with a common level of attention. Moreover, trademark identification should be performed based on (1) overall observation, (2) isolated observation at different time and different place, and (3) overall impression of similarity (Wang, 2008).

Trademark confusion and misidentification refers to the condition where consumers misidentify the source of goods or services because of highly similar trademarks. According to the guidelines on "possible confusion and misidentification" issued by the Ministry of Economic Affairs, there are eight factors that should be considered: (1) Level of distinctiveness of trademark(s); (2) Whether two trademarks are similar and the extent of the extent of their similarity; (3) Whether the goods or services are similar and the extent of their similarity; (4) Status of diversified operation of a prior right holder; (5) Circumstances of actual confusion; (6) The extent to which relevant consumers are familiar with the trademarks concerned; (7) Whether the application to register a trademark at issue is filed in good faith; and (8) Other factors that cause confusion (TIPO, 2004).

Chen et al. used MDS to build a visual map Studies for examining design patent expansion (Chen and Chang, 2015). There are also many patent expansion studies focusing on patent search technology (Sharma et al., 2015; Mahdabi and Crestani, 2014; Al-Shboul and Myaeng, 2014). Chen et al. examined the distance relationship among brands by analyzing data of the top hundred global brands of a specific year (Chen and Liang, 2013). Cheng et al. used Google as an example to study factors causing word mark confusion (Chen and Cheng, 2013).

The present study used trademark maps to review industry mapping and competitive stress of the top hundred global trademarks. The aim of the present study is to replace the old trademark infringement reviewing approach by exploring the development of internationally well-known trademarks of a sector over the past decade (2006-2015) using trademark maps. Because trademark innovation is the major competitive approach employed by companies, it is urgent to understand the identification and expansion of global brand names.

## 2. METHOD

### 2.1. Subjects

This study recruited 60 ordinary consumers because the key trademark observers are ordinary consumers. Among them, 35% were males (N=21); 65% females (N=39). The average age of the participants was 37 years old. A Likert scale (Chernyak *et al.*, 2016) with a range from 1 (very unfamiliar) to 5 (very familiar) was used to assess the participants' level of familiarity with trademarks from the eight major industries. The average score of familiarity with trademarks from the eight major industries was 3.14, suggesting that the study participants had an above medium level of familiarity.

### 2.2. Samples

Each year, world-famous trademark valuation companies would rank global brands by brand value. Well-known brands are often counterfeited, and for word marks, counterfeiting is especially serious. This study explored the word marks of the top hundred global brands (BrandZ) between 2006 and 2015 (for a total of ten years) (Brand, 2016). A total of 173 word marks were picked and examined (See Table 1). For figurative marks, they were not discussed here but in another study.

Table-1. Word mark study samples

No.	Trademark	Code	No.	Trademark	Code	No.	Trademark	Code
1	BMW	C1	59	HDFC Bank	F23	117	Avon	P1
2	Chevrolet	C2	60	HSBC	F24	118	Colgate	P2
3	Ford	C3	61	ICBC	F25	119	Gillette	P3
4	Harley-Davidson	C4	62	ICICI	F26	121	Nivea	P5
5	Honda	C5	63	ING	F27	122	Pampers	P6
6	Lexus	C6	64	Itaú	F28	123	Pfizer	P7
7	Mercedes	C7	65	JP Morgan	F29	124	Tide	P8
8	Nissan	C8	66	Mastercard	F30	125	ALDI	R1
9	Porsche	C9	67	Merrill Lynch	F31	126	Alibaba Group	R2
10	Renault	C10	68	Mitsui Sumitomo Bank	F32	127	Amazon	R3
11	Toyota	C11	69	Mizuho Bank	F33	128	Asda	R4
12	Volkswagen	C12	70	Morgan Stanley	F34	129	Auchan	R5
13	Budweiser	D1	71	PayPal	F35	130	Best Buy	R6
14	Coca-Cola	D2	72	Ping An	F36	131	Carrefour	R7
15	Hennessy	D3	73	Royal Bank of Canada	F37	132	Caterpillar	R8
16	KFC	D4	74	Royal Bank of Scotland	F38	133	Costco	R9
17	Marlboro	D5	75	Sberbank	F39	134	DHL	R10
18	McDonald's	D6	76	Scotiabank	F40	135	eBay	R11
19	Moutai	D7	77	Standard Chartered Bank	F41	136	FedEx	R12
20	Pepsi	D8	78	State Farm	F42	137	Home Depot	R13
21	Red Bull	D9	79	TD	F43	138	IKEA	R14
22	Starbucks	D10	80	UBS	F44	139	Lowe's	R15
23	Subway	D11	81	VISA	F45	140	Marks & Spencer	R16
24	Wrigley's	D12	82	Wachovia	F46	141	Target	R17
25	Cartier	E1	83	WaMu	F47	142	Tesco	R18
26	Chanel	E2	84	Washington Mutual	F48	143	UPS	R19

27	Disney	E3	85	Wells Fargo	F49	144	Wal-Mart	R20
28	Esprit	E4	86	Westpac	F50	145	Woolworths	R21
29	Gucci	E5	87	Telecom Italia	O1	146	Accenture	T1
30	H&M	E6	88	Airtel	O2	147	Apple	T2
31	Hermes	E7	89	AT&T	O3	148	Baidu	T3
32	Louis Vuitton	E8	90	Beeline	O4	149	BlackBerry	T4
33	Nike	E9	91	BP	O5	150	Canon	T5
34	Prada	E10	92	BT	O6	151	Cisco	T6
35	Rolex	E11	93	Chevron	O7	152	Dell	T7
36	Zara	E12	94	China Mobile	O8	153	Electronic Arts	T8
37	US Bank	F1	95	China Telecom	O9	154	Facebook	T9
38	ABN AMRO	F2	96	Cingular Wireless	O10	155	GE (General Electric)	T10
39	Agricultural Bank of China	F3	97	ExxonMobil	O11	156	Google	T11
40	AIG	F4	98	Movistar	O12	157	HP	T12
41	Allstate	F5	99	MTN	O13	158	Huawei	T13
42	American Express	F6	100	MTS	O14	159	IBM	T14
43	ANZ	F7	101	NTT DoCoMo	O15	160	Intel	T15
44	AXA	F8	102	O2	O16	161	LinkedIn	T16
45	Banco Santander	F9	103	Orange	O17	162	Microsoft	T17
46	Bank of America	F10	104	Petrobras	O18	163	Motorola	T18
47	Bank of China	F11	105	PetroChina	O19	164	Nintendo	T19
48	Barclays	F12	106	Shell	O20	165	Nokia	T20
49	BBVA	F13	107	Sinopec	O21	166	Oracle	T21
50	Bradesco	F14	108	SoftBank	O22	167	Samsung	T22
51	Chase	F15	109	Telcel	O23	168	SAP	T23
52	China Construction Bank	F16	110	Telefónica Movistar	O24	169	Siemens	T24
53	China Life	F17	111	Telstra	O25	170	Sony	T25
54	China Merchants Bank	F18	112	TIM	O26	171	Tencent/QQ	T26
55	Citi	F19	113	T-Mobile	O27	172	Twitter	T27
56	Commonwealth Bank of Australia	F20	114	verizon	O28	173	Yahoo!	T28
57	Deutsche Bank	F21	115	Verizon Wireless	O29			
58	Goldman Sachs	F22	116	Vodafone	O30			

### 2.3. Tools

For experiment planning, his study followed the three general trademark-judging principles: (1) general cautions, (2) overall observation, and (3) isolation comparison. The researchers of this study first prepared picture cards for the experiment; each card was 8cm x 8cm. Because the target of the analysis was word marks, Times, a commonly used serif typeface, was used to make the picture cards. This measure is to prevent special typefaces from distracting the participants' attention.

### 2.4. Statistical

There were 173 word mark samples from the top hundred brands worldwide between 2006 and 2015. Trademark competitors are usually companies in the same industry, and therefore, in the study, the 173 word mark samples were classified into eight groups based their industry. The eight

industries were (1) cars, (2) drinks and food, (3) entertainment, apparel, and luxury, (4) financial, (5) oil, gas, and telecom, (6) personal care and medical, (7) retail and logistics, and (8) technology. Then, the level of similarity of word marks of each industry was determined. The present study used the MDS approach and established a trademark map for each of the eight major industries.

### 3. TRADEMARK DEVELOPMENT TREND

To show the level of trademark competitiveness of each year, the present study plotted a trademark map for each year from 2006 to 2015, and trademarks were classified by the industry (eight industries) for the analysis. The researchers further calculated the trademark competitive stress between 2006 and 2015 of the eight major industries. Trademark competitive stress refers to the number of trademarks of a specific industry in a specific year, and the more trademarks, the greater the trademark competitive stress (the maximum stress coefficient is 1 and the minimum is 0). Take the car industry (coded C) as an example, the industry had twelve trademarks in the global top hundred between 2006 and 2015, and in 2007, the number of trademarks of the car industry was 11. Therefore, the trademark competitive pressure of the car industry in 2007 was  $11/12=0.92$ , which means that the car industry was highly competitive. The present study calculated the average competitive stress of each year and the average competitive stress of the industry between 2006 and 2015. See Table 2.

Table-2. Trademark competitive stress

Year	Industry code	C	D	E	F	O	P	R	T	Average trademark competitive stress by year
2006	Number of trademarks	12	8	11	21	10	5	13	20	--
	Competitive stress	1.00	0.67	0.92	0.42	0.33	0.63	0.62	0.71	0.66
2007	Number of trademarks	11	7	11	25	9	4	14	19	--
	Competitive stress	0.92	0.58	0.92	0.50	0.30	0.50	0.67	0.68	0.63
2008	Number of trademarks	10	7	10	26	11	5	12	19	--
	Competitive stress	0.83	0.58	0.83	0.52	0.37	0.63	0.57	0.68	0.63
2009	Number of trademarks	6	10	8	24	13	7	14	18	--
	Competitive stress	0.50	0.83	0.67	0.48	0.43	0.88	0.67	0.64	0.64
2010	Number of trademarks	6	9	7	25	18	5	11	19	--
	Competitive stress	0.50	0.75	0.58	0.50	0.60	0.63	0.52	0.68	0.60
2011	Number of trademarks	6	8	6	27	19	4	10	20	--
	Competitive stress	0.50	0.67	0.50	0.54	0.63	0.50	0.48	0.71	0.57
2012	Number of trademarks	6	10	6	23	22	4	12	17	--
	Competitive stress	0.50	0.83	0.50	0.46	0.73	0.50	0.57	0.61	0.59
2013	Number of	6	10	8	25	18	4	12	17	--

	trademarks									
	Competitive stress	0.50	0.83	0.67	0.50	0.60	0.50	0.57	0.61	0.60
2014	Number of trademarks	6	9	8	27	16	4	11	19	--
	Competitive stress	0.50	0.75	0.67	0.54	0.53	0.50	0.52	0.68	0.59
2015	Number of trademarks	6	9	7	26	17	4	12	19	--
	Competitive stress	0.50	0.75	0.58	0.52	0.57	0.50	0.57	0.68	0.58
2006-2015	Industry Total	12	12	12	50	30	8	21	28	Sum: 173
	Industry average trademark competitive stress	0.63	0.73	0.68	0.50	0.51	0.58	0.58	0.67	Ave: 0.61

3.1. 2006 Trademark map

Among 2006 global top hundred trademarks, the financial industry had the highest number of trademarks, accounting for 21% of all trademarks in 2006. The technology industry had the second highest number of trademarks, 20%. The personal care and medical industry had the lowest number of trademarks, 5%. The average trademark competitive stress of 2006 was 0.66. In terms of the level of overlap, most of the industries had excellent trademark identifiability, except the financial industry. The financial industry had a greater number of trademarks, and therefore more intense trademark stress. As for other industries, the trademark competitive stress was relatively smaller compared to that of the financial industry. Please refer to Figure 1.

2006

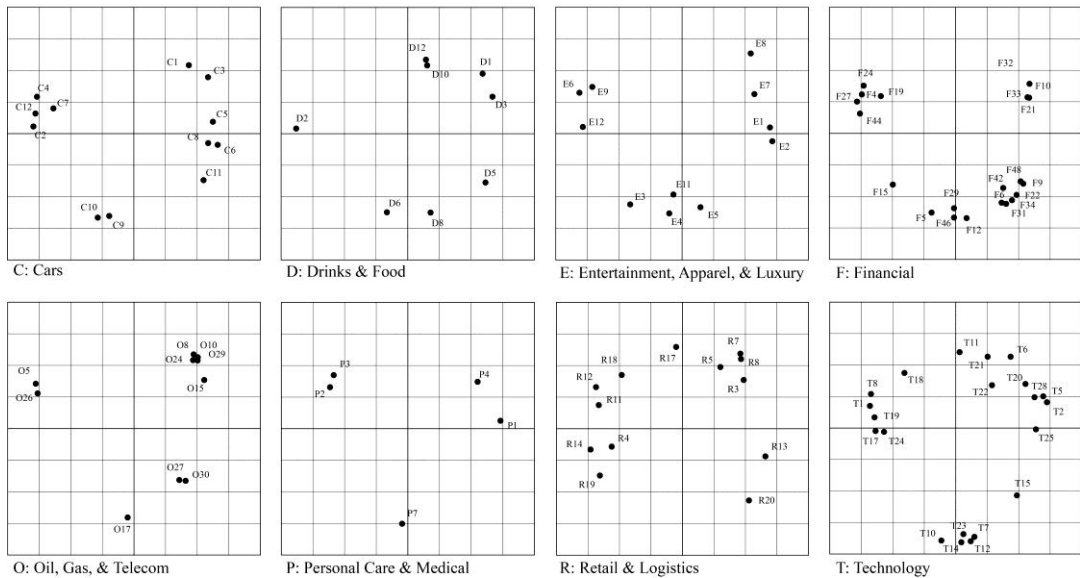


Figure-1. 2006 Trademark map of the eight major industries

3.2. 2007 Trademark map

Among the global top hundred trademarks in 2007, the financial industry had the highest number of trademarks, accounting for 25% of all trademarks in 2007. The technology industry had the second highest number of trademarks, 19%. The personal care and medical industry had the lowest number of trademarks, 4%. The average trademark competitive stress of 2007 was 0.63. In terms of the level of overlap, most of the industries had excellent trademark identifiability, especially the drinks and food industry. The drinks and food industry had fewer brand competitors, and therefore, the trademark competitive stress was relatively small. Moreover, the trademark competitive stress of the oil, gas, and telecom industry was the lowest (0.30) over the years. Please refer to Figure 2.

2007

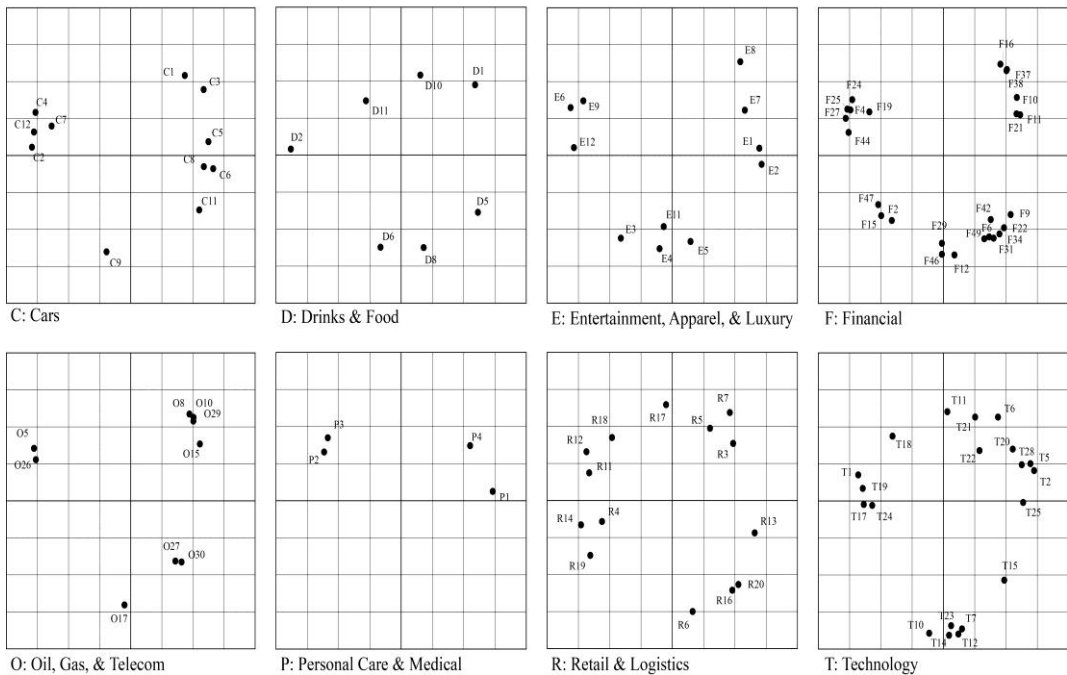


Figure-2. 2007 Trademark map of the eight major industries

3.3. 2008 Trademark map

Among the global top hundred trademarks in 2008, the financial industry had the highest number of trademarks, accounting for 26% of all trademarks in 2008. The technology industry had the second highest number of trademarks, 19%. The personal care and medical industry had the lowest number of trademarks, 5%. The average trademark competitive stress of 2008 was 0.63. In terms of the level of overlap, most of the industries had excellent trademark identifiability, especially the car industry, the drinks and food industry, the entertainment, apparel, and luxury industry, and the personal care and medical industry. Please refer to Figure 3.

2008

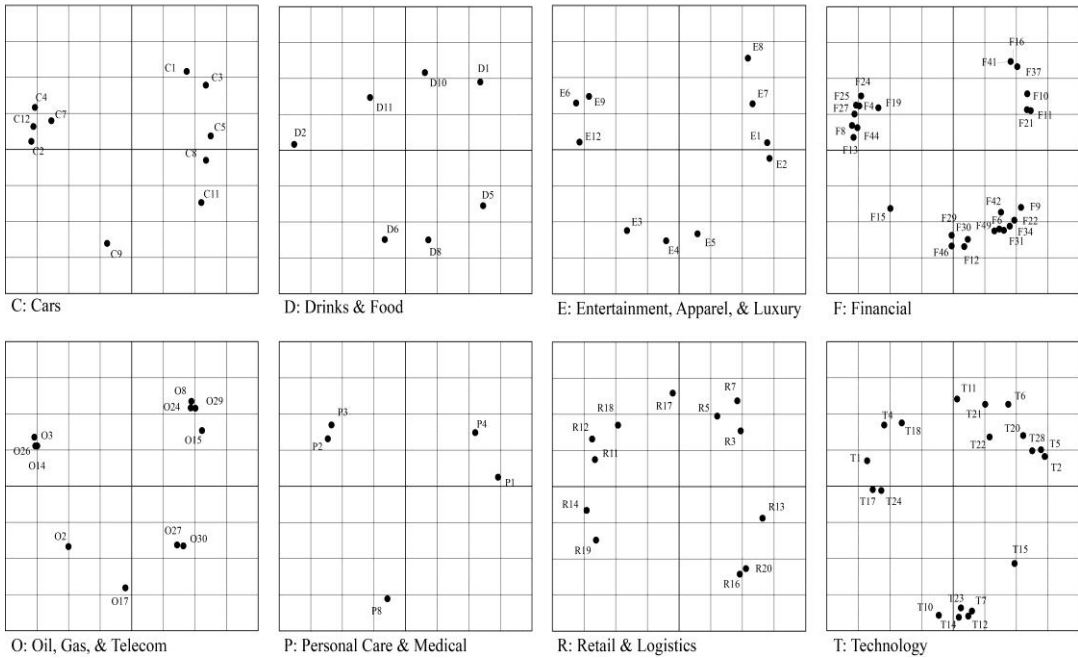


Figure-3. 2008 Trademark map of the eight major industries

3.4. 2009 Trademark map

Among the global top hundred trademarks in 2009, the financial industry had the highest number of trademarks, accounting for 24% of all trademarks in 2009. The technology industry had the second highest number of trademarks, 14%. The car industry had the lowest number of trademarks, 6%. The average trademark competitive stress in 2009 was 0.64. In terms of the level of overlap, most of the industries had excellent trademark identifiability, especially the car industry, the entertainment, apparel, and luxury industry, the personal care and medical industry, and the retail and logistics industry. In addition, the personal care and medical industry had the highest trademark competitive stress (0.88) over the years. Please refer to Figure 4.

2009

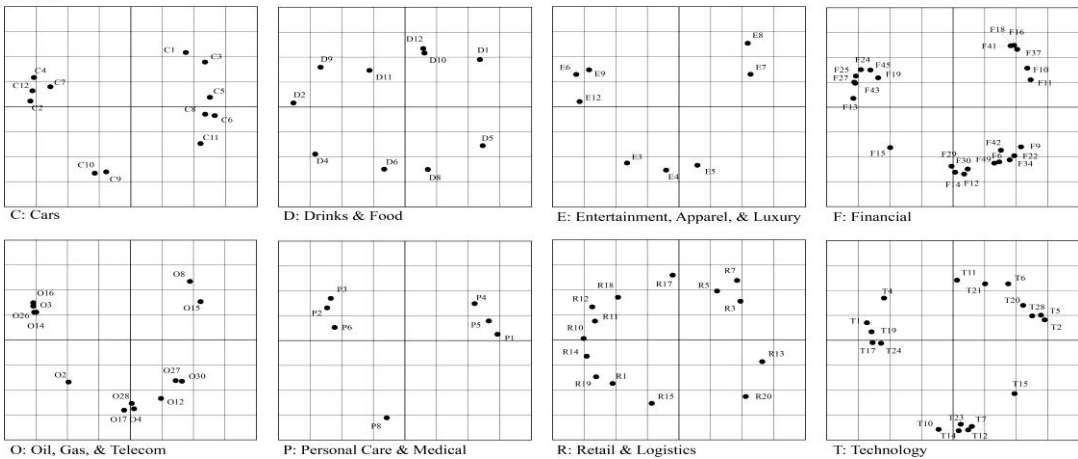


Figure-4. 2009 Trademark map of the eight major industries



3.5. 2010 Trademark map

Among the global top hundred trademarks in 2010, the financial industry had the highest number of trademarks, accounting for 25% of all trademarks in 2010. The oil, gas, and telecom industry had the second highest number of trademarks, 18%. The personal care and medical industry had the lowest number of trademarks, 5%. The average trademark competitive stress in 2010 was 0.60. In terms of the level of overlap, most of the industries had excellent trademark identifiability, especially the car industry, the entertainment, apparel, and luxury industry, the personal care and medical industry, and the retail and logistics industry. Please refer to Figure 5.

2010

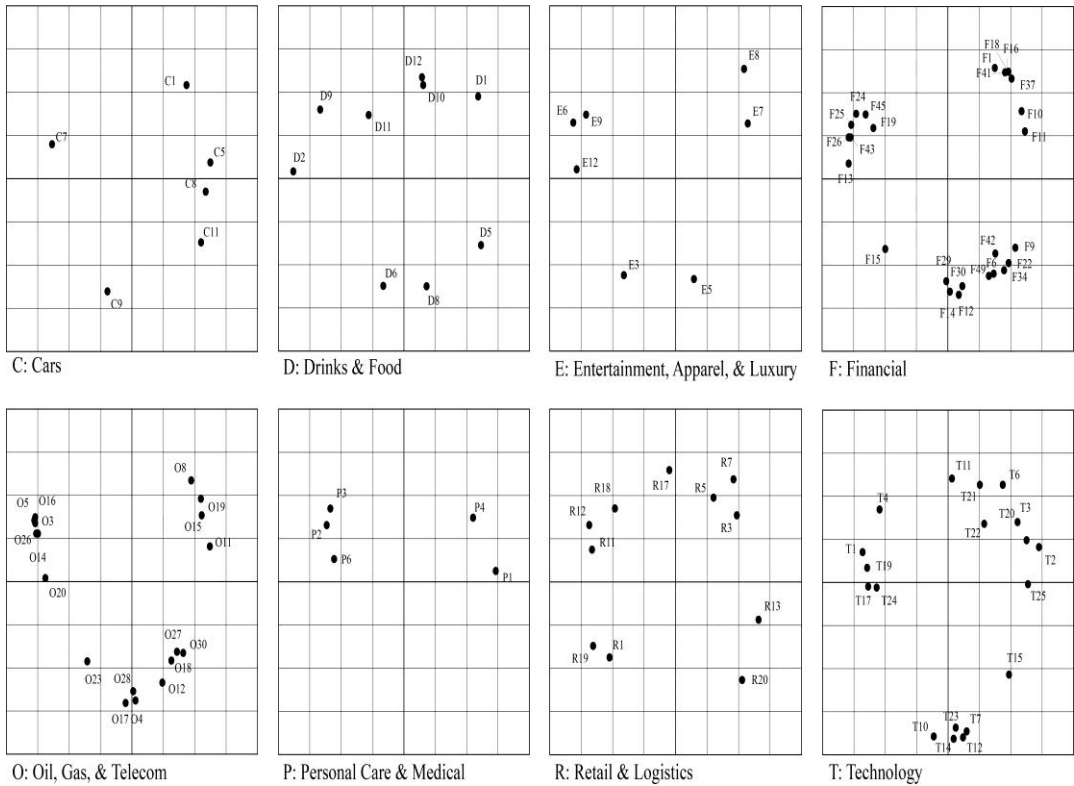


Figure-5. 2010 Trademark map of the eight major industries

3.6. 2011 Trademark map

Among the global top hundred trademarks in 2011, the financial industry had the highest number of trademarks, accounting for 27% of all trademarks in 2011. The technology industry had the second highest number of trademarks, 20%. The personal care and medical industry had the lowest number of trademarks, 4%. The average trademark competitive stress in 2011 was 0.57, the lowest over the years. In terms of the level of overlap, most of the industries had excellent trademark identifiability, especially the car industry, the drinks and food industry, the entertainment, apparel, and luxury industry, the personal care and medical industry, and the retail and logistics industry. In addition, the retail and logistics industry's trademark competitive stress of 2011 was the lowest (0.48) over the years. Please refer to Figure 6.

2011

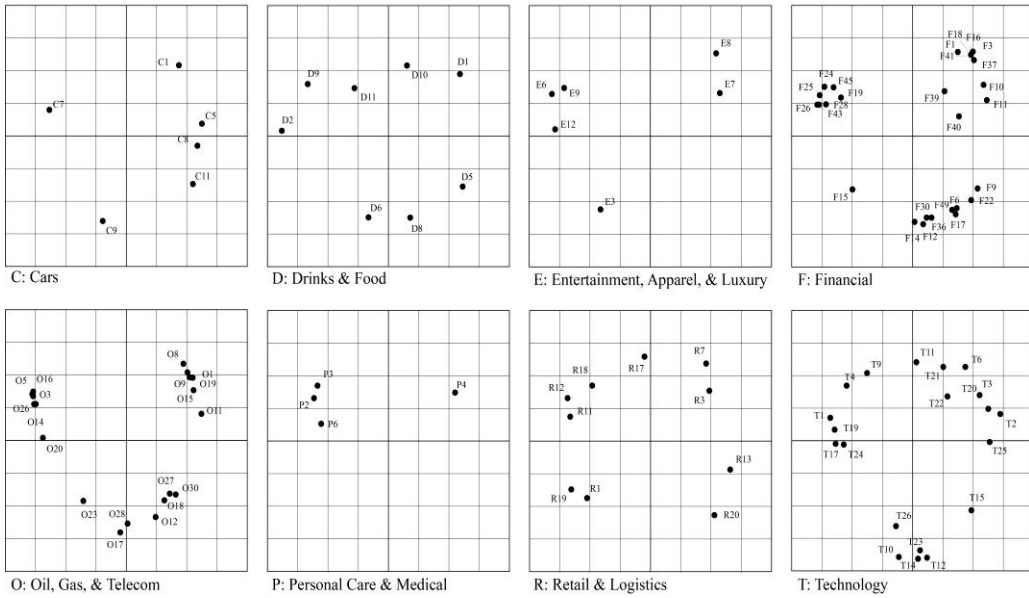


Figure-6. 2011 Trademark map of the eight major industries

3.7. 2012 Trademark map

Among the global top hundred trademarks in 2012, the financial industry had the highest number of trademarks, accounting for 23% of all trademarks in 2012. The technology industry had the second highest number of trademarks, 22%. The personal care and medical industry had the lowest number of trademarks, 4%. The average trademark competitive stress in 2012 was 0.59. In terms of the level of overlap, most of the industries had excellent trademark identifiability, especially the car industry, the drinks and food industry, the entertainment, apparel, and luxury industry, and the retail and logistics industry. Please refer to Figure 7.

2012

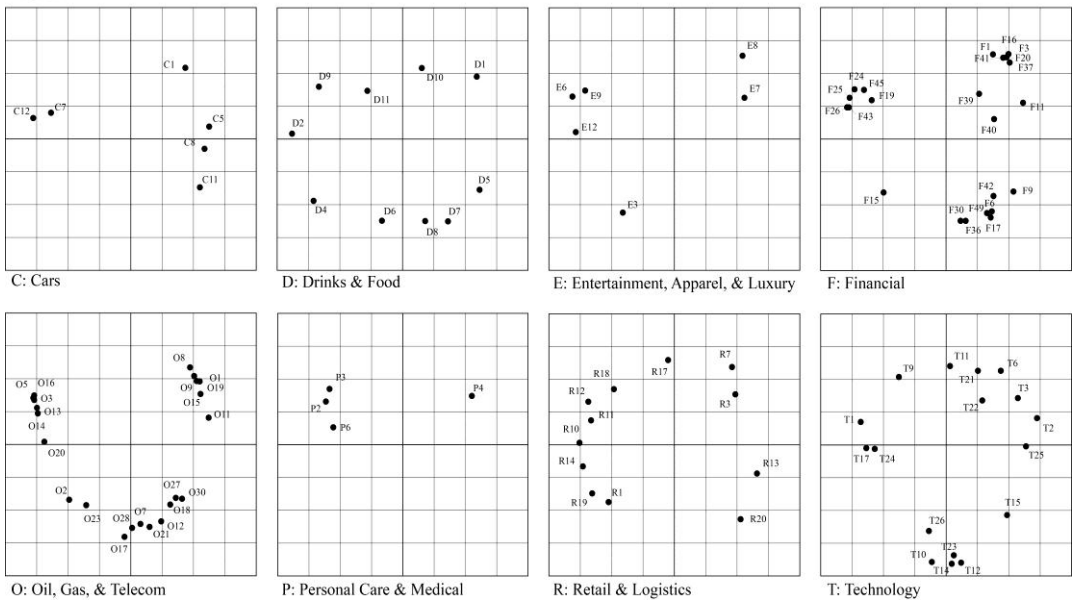


Figure-7. 2012 Trademark map of the eight major industries

3.8. 2013 Trademark Map

Among the global top hundred trademarks in 2013, the financial industry had the highest number of trademarks, accounting for 25% of all trademarks in 2010. The oil, gas, and telecom industry had the second highest number of trademarks, 18%. The personal care and medical industry had the lowest number of trademarks, 4%. The average trademark competitive stress in 2013 was 0.60. In terms of the level of overlap, most of the industries had excellent trademark identifiability, especially the car industry, the drinks and food industry, the entertainment, apparel, and luxury industry, the personal care and medical industry, and the retail and logistics industry. Please refer to Figure 8.

2013

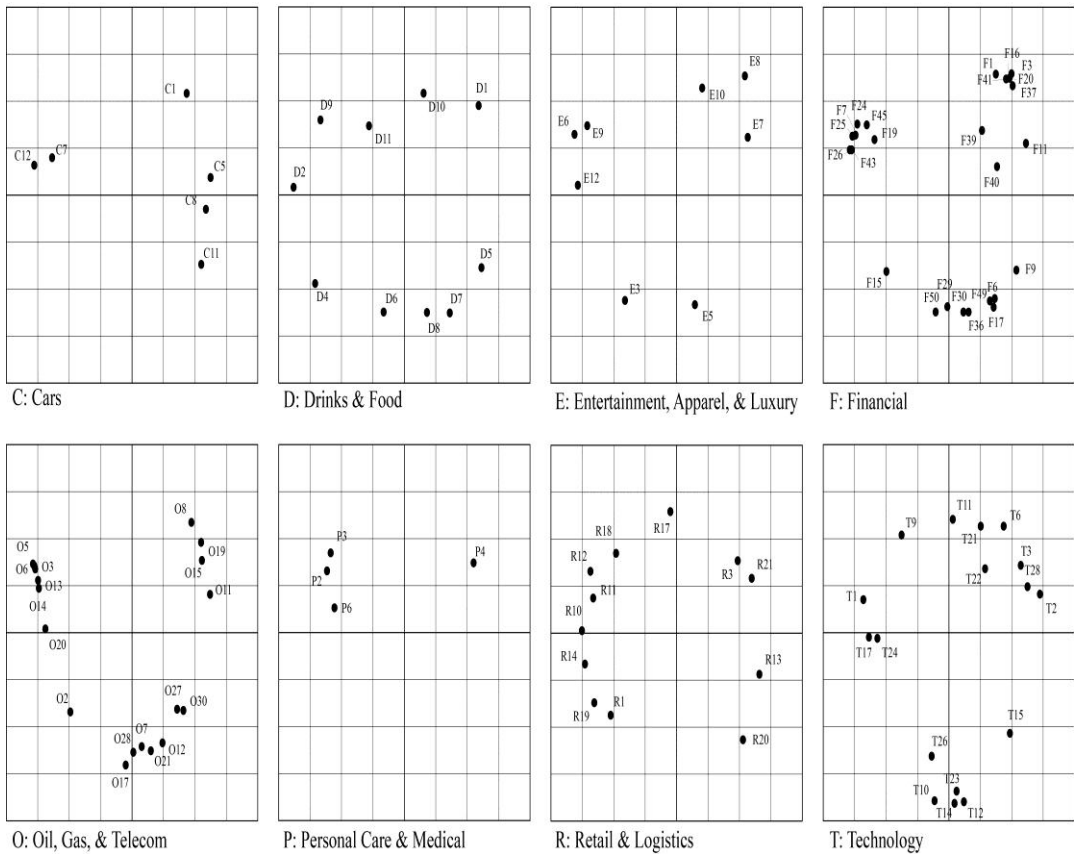


Figure-8. 2013 Trademark map of the eight major industries

3.9. 2014 Trademark map

Among the global top hundred trademarks in 2014, the financial industry had the highest number of trademarks, accounting for 27% of all trademarks in 2014. The technology industry had the second highest number of trademarks, 19%. The personal care and medical industry had the lowest number of trademarks, 4%. The average trademark competitive stress in 2014 was 0.59. In terms of the level of overlap, most of the industries had excellent trademark identifiability, especially the car industry, the drinks and food industry, the entertainment, apparel, and luxury industry, the personal care and medical industry, and the retail and logistics industry. Please refer to Figure 9.

2014

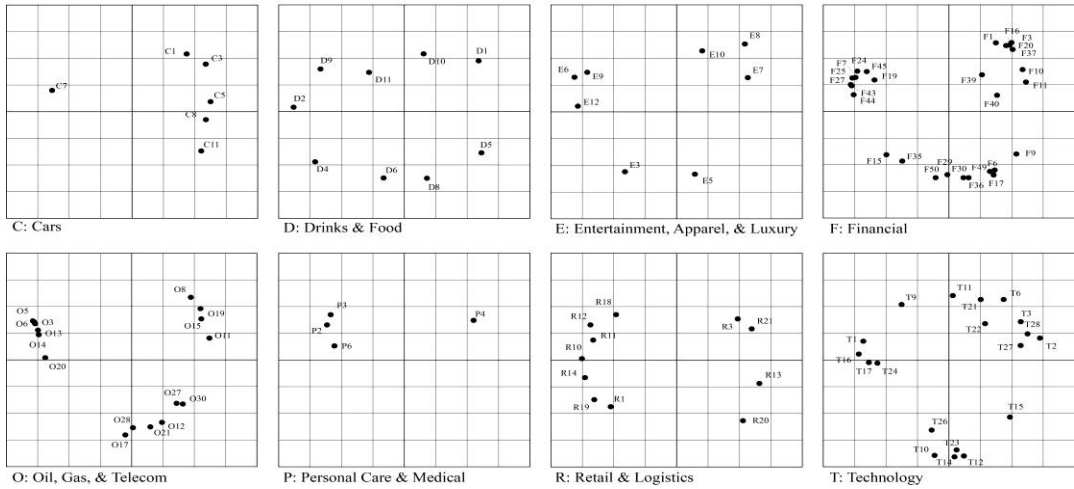


Figure-9. 2014 Trademark map of the eight major industries

3.10. 2015 Trademark map

Among the global top hundred trademarks in 2015, the financial industry had the highest number of trademarks, accounting for 26% of the number of trademarks of 20015. The technology industry had the second highest number of trademarks, 19%. The personal care and medical industry had the lowest number of trademarks, 4%. The average trademark competitive stress in 2015 was 0.58. In terms of the level of overlap, most of the industries had excellent identifiability, especially the car industry, the drinks and food industry, the entertainment, apparel, and luxury industry, the personal care and medical industry, and the retail and logistics industry. Please refer to Figure 10.

2015

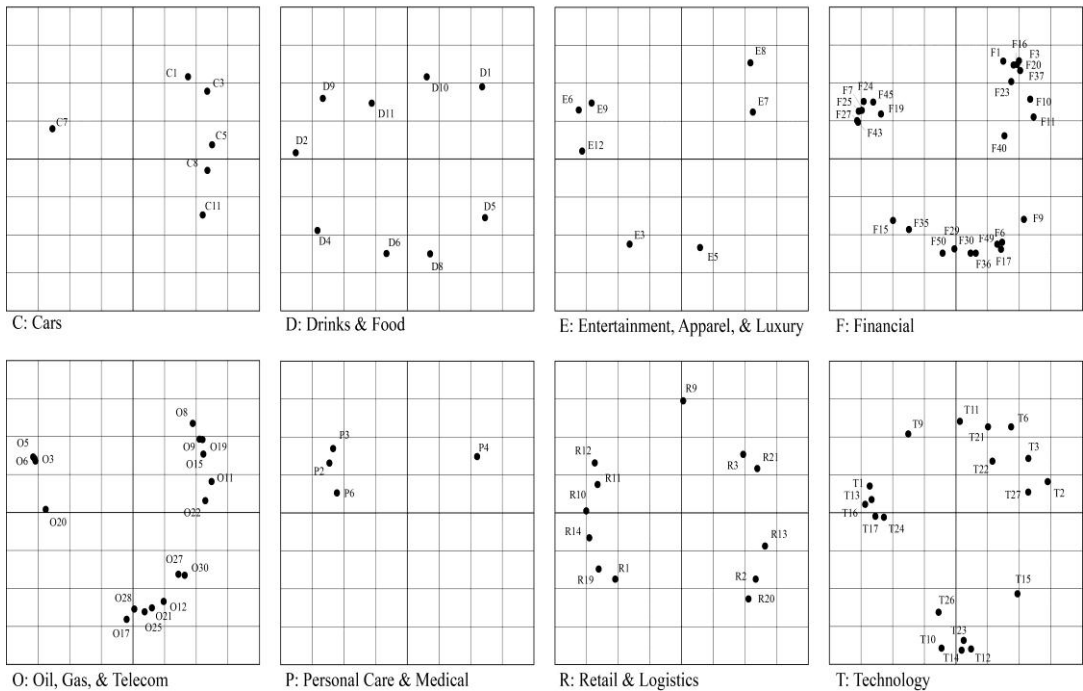


Figure-10. 2015 Trademark Map of the Eight Major Industries

#### 4. TRADEMARK MAPS OF THE EIGHT MAJOR INDUSTRIES

Similarity judgment in this study was made based on MDS, which analyze quantitative data, such as ratio scales. The present study examined the level of similarity of the word marks of the eight major industries and then set up a data matrix of the similarity level. Next, a two-dimensional trademark map was plotted. Though this kind of two-dimensional map may slightly exaggerate the stress coefficient, it is good for visualizing the trend of trademarks over years. See Table 3 for the stress and RSQ of the eight major industries.

Table-3. Stress and RSQ of the eight major industries

Number	Industry	Industry code	Stress	RSQ
1	Cars	C	0.1549	0.9318
2	Drinks & Food	D	0.2831	0.5963
3	Entertainment, Apparel, & Luxury	E	0.2791	0.6692
4	Financial	F	0.3170	0.6693
5	Oil, Gas, & Telecom	O	0.3121	0.6304
6	Personal Care & Medical	P	0.2413	0.7181
7	Retail & Logistics	R	0.3030	0.6232
8	Technology	T	0.3584	0.4107

The present study used the MDS approach to plot the trademarks of the eight major industries on a plane based on trademark identifiability. Figures 11 to 18 showed the trademark maps of the following eight industries: (1) cars, (2) drinks and food, (3) entertainment, apparel, and luxury, (4) financial, (5) oil, gas, and telecom, (6) personal care and medical, (7) retail and logistics, and (8) technology.

##### 4.1. Trademark map of car industry

For the car industry (coded C), the industry had a total of 12 trademarks in the global top hundred between 2006 and 2015. There are three to four key competitive groups. The good identifiability among the trademarks suggested that it was unlikely for consumer to misidentify trademarks used in the car industry. Please refer to Figures 11.

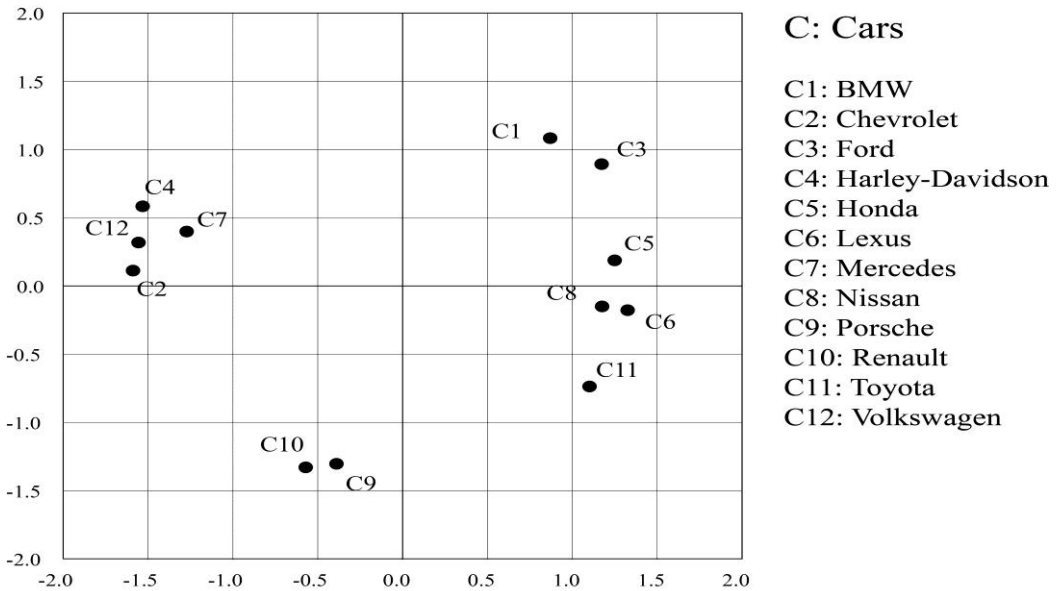


Figure-11. Trademark map of car industry

4.2. Trademark map of drinks and food industry

For the drinks and food industry (coded D), the industry had 12 trademarks in the global top hundred between 2006 and 2015. The non-decentralized distribution of trademarks suggests that these trademarks had a good identifiability. Moreover, the trademark competitors were the same between 2006 and 2015, meaning that competitors in the drinks and food industry were quite stable. Please refer to Figure 12.

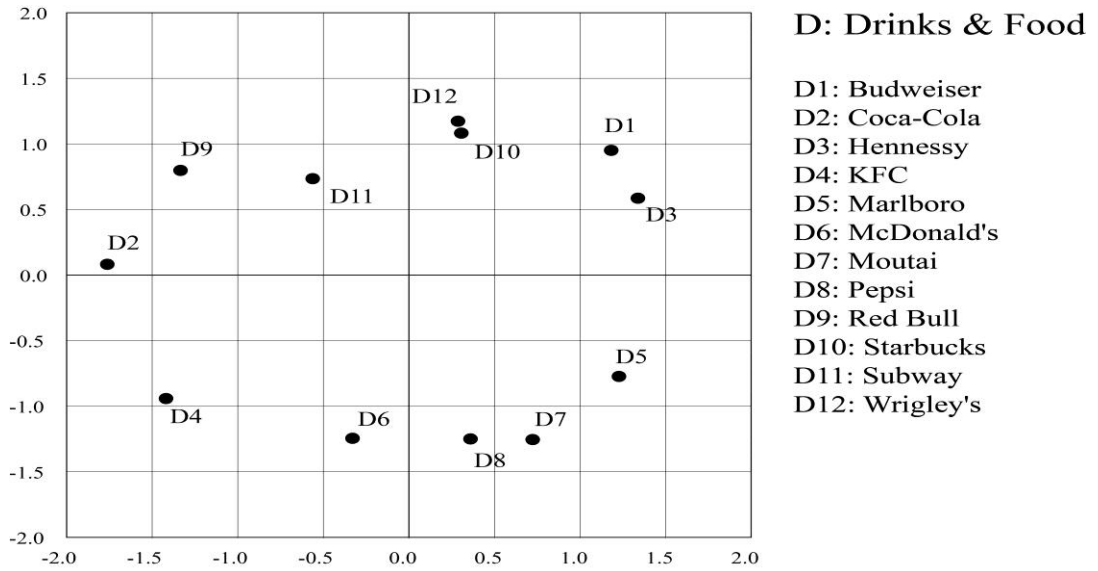


Figure-12. Trademark map of drinks and food industry

4.3. Trademark map of entertainment, apparel, and luxury industry

For the entertainment, apparel, and luxury industry (coded E), the industry had 12 trademarks in the global top hundred between 2006 and 2015. The non-decentralized distribution of trademarks suggests that the trademarks had a very good identifiability. This result may be directly attributed to the fact that the luxury industry tends to put great emphasis on brand positioning. Please refer to Figure 13.

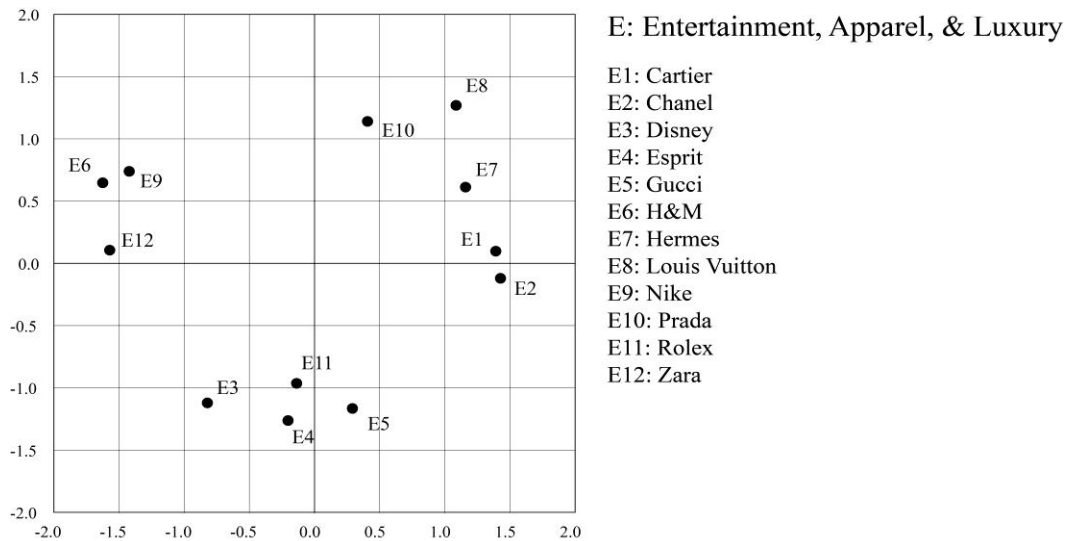


Figure-13. Trademark map of entertainment, apparel, and luxury industry

4.4. Trademark map of financial industry

For the financial industry (coded F), the industry had 50 trademarks in the global top hundred between 2006 and 2015. There were three to four key competitor groups. Among the eight major industries, this industry had the highest number of trademarks, suggesting that the financial industry was highly dependent on trademark competition. As a result, the number of trademark competitors of this industry is likely to remain the highest among the eight major industries in the future. Please refer to Figure 14.

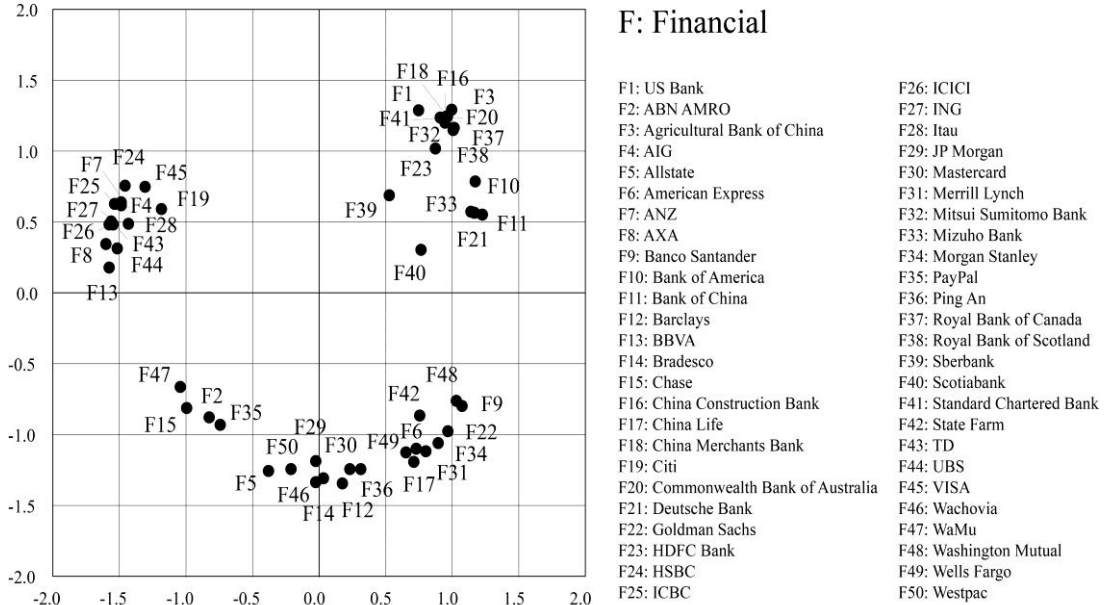


Figure-14. Trademark map of financial industry

4.5. Trademark map of oil, gas, and telecom industry

For the oil, gas, and telecom industry (coded Q), the industry had 30 trademarks in the global top hundred between 2006 and 2015. The trademarks can be classified into three to four groups. Moreover, some of the samples were found to be highly overlapped, suggesting that the trademark identifiability of this industry was lower than of other industries. As a result, consumers may easily misidentify trademarks of the oil, gas, and telecom industry. Please refer to Figure 15.

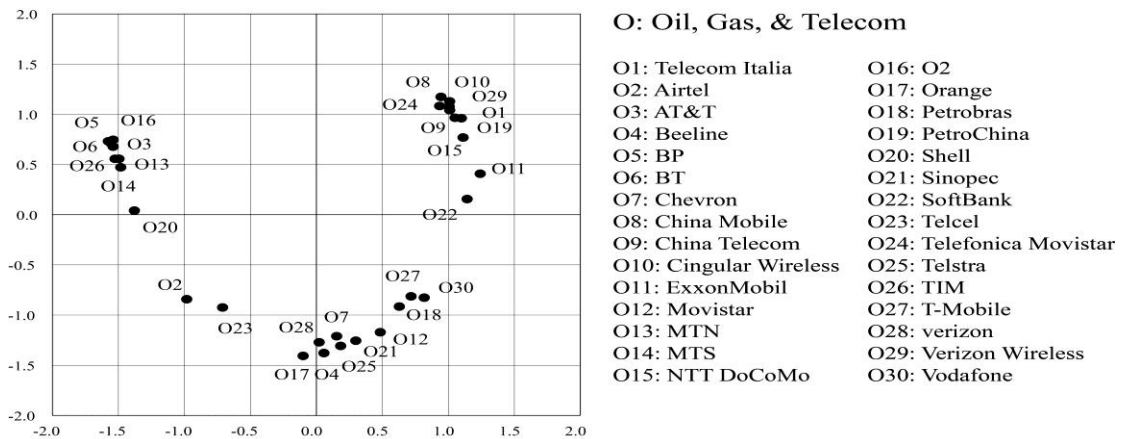


Figure-15. Trademark map of oil, gas, and telecom industry

4.6. Trademark map of personal care and medical industry

For the personal care and medical industry (coded P), the industry had eight trademarks in the global top hundred between 2006 and 2015. There were three key competitor groups. This industry had the lowest number of trademark competitors among the eight, and moreover, the trademarks can be easily identified. This finding suggests it was unlikely for consumers to misidentify trademarks of the personal care and medical industry. Please refer to Figure 16.

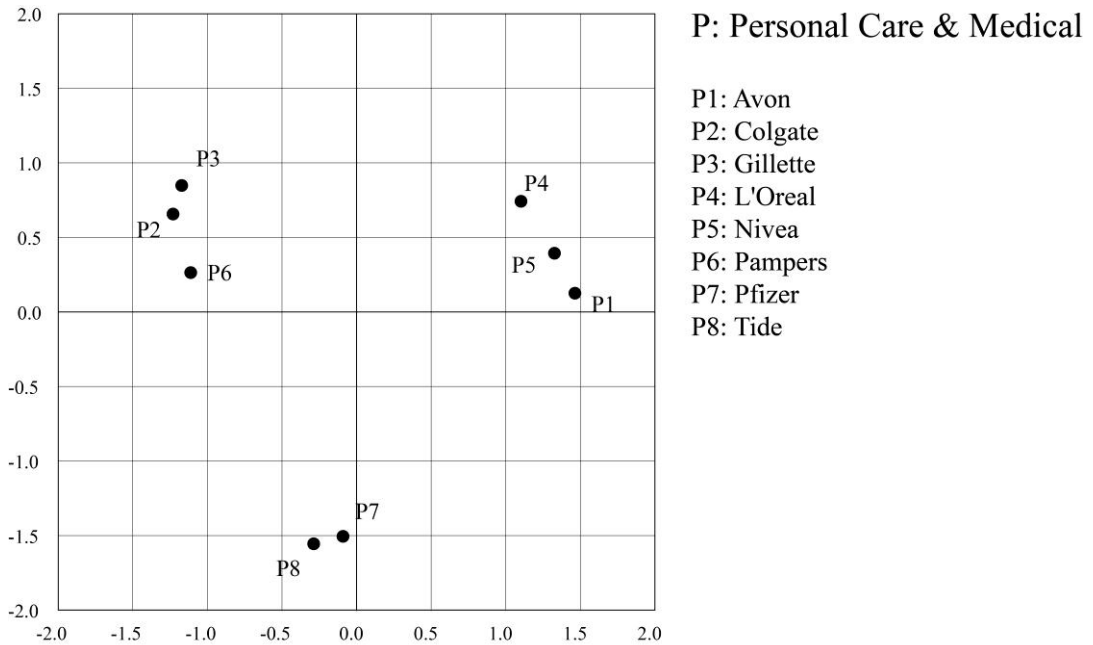


Figure-16. Trademark map of personal care and medical industry

4.7. Trademark map of retail and logistics industry

For the retail and logistics industry (coded R), the industry had 21 trademarks in the global top hundred between 2006 and 2015. Aside from a bigger overlap between R7 and R8, trademarks of this industry had pretty good identifiability. This finding suggests that it was unlikely for consumers to misidentify trademarks from the retail and logistic industry. Please refer to Figure 17.

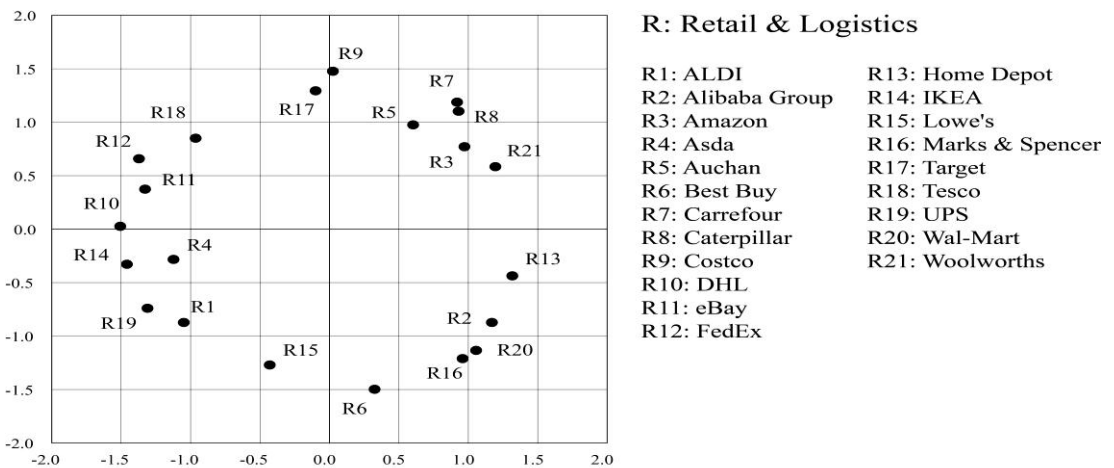


Figure-17. Trademark map of retail and logistics industry



#### 4.8. Trademark map of technology industry

For the technology industry (coded T), the industry had 28 trademarks in the global top hundred between 2006 and 2015. There were three key competitor groups. This industry had many trademarks, but overall, the identifiability of trademarks was good. This finding indicates that it was unlikely for consumers to misidentify trademarks from the technology industry. Please refer to Figure 18.

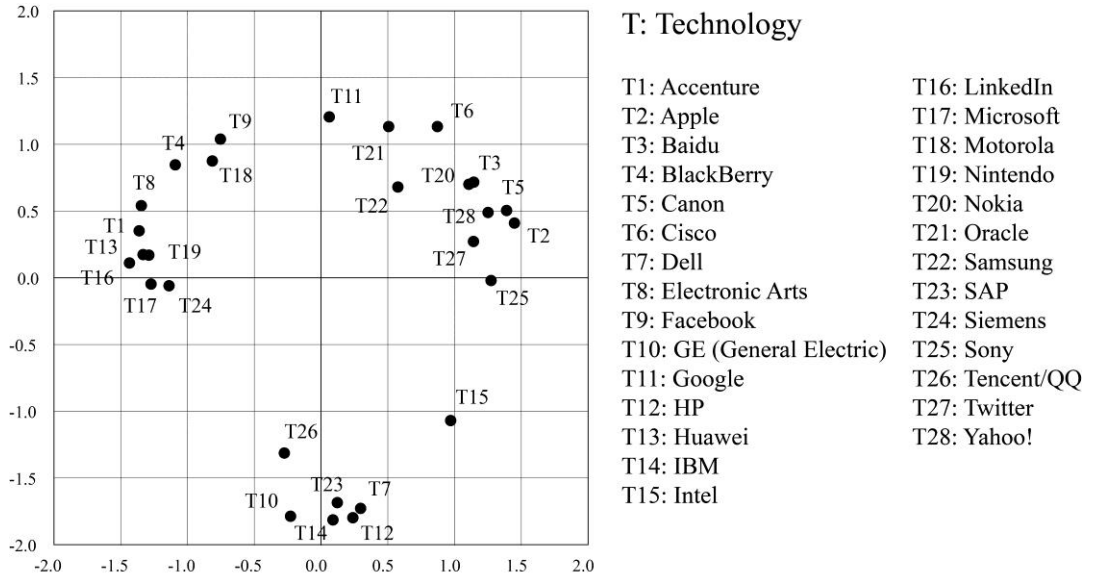


Figure-18. Trademark map of technology industry

## 5. DISCUSSION AND CONCLUSION

This study recruited sixty general consumers. Among them, 35% were males (N=21); 65% females (N=39). The participants in average showed a medium level of familiarity with trademarks from the eight major industries (a Likert-scale score of 3.14).

Similarity judgment in this study was performed using MDS, and the participants' word mark distance of the eight major industries were obtained. The researchers in this study further set up a data matrix for the level of similarity and created two-dimensional trademark maps. Two-dimensional distribution maps were used to present the trademark distribution visually, which is useful for corporate executives in their trademark-related decision-making process.

It can be found from the 2006 to 2015 trademark maps that the financial industry always had the highest number of trademarks, the oil, gas, and telecom industry the second, and the technology industry the third. Although these three industries had the highest number of trademarks, their trademark competitive stress was not the highest.

The top three industries with the highest trademark competitive stress were the drinks and food industry (0.73), the entertainment, apparel, and luxury industry (0.68), and the technology industry (0.67). Because trademark competition is continuous and accumulative, the average trademark competitive stress of industries reflects the continuous brand competitiveness of a company in its specific industry.

The two industries with the lowest trademark competitive stress were the financial industry (0.50) and the oil, gas, and telecom industry (0.51), suggesting that the trademarks of these two industries had changed gradually.

In terms of the total quantity, the financial industry had 50 trademarks that were the top hundred global trademarks from 2006 to 2015, and they account for 29% of all the trademarks (173 trademarks).

This finding shows that trademarks were a primary area of competition in the financial industry. For trademark identifiability, all industries were found to have a good trademark identifiability, except the financial industry, which had a bigger overlap. This finding indicates that for consumers, international trademarks were distinct enough for clear identified.

The present study explored the identification and expansion of global trademarks through examining the distribution of the top hundred global trademark samples.

The results here are useful for companies in developing their trademarks. Other companies can also use the analysis method presented here to build their own trademark map for determining the identification and expansion of their trademarks in their industries.

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## REFERENCE

- Al-Shboul, B., & Myaeng, S. H. (2014). Wikipedia-based query phrase expansion in patent class search. *Information Retrieval*, 17, 430-451.
- Brand, Z. (2016). *Global top 100*. <http://wppbaz.com/ContentCollection/23>, accessed 20 October 2016.
- Chen, R., & Chang, H. Y. (2015). Expansion of design patent: from united patents to continuation patents. *Journal of Industrial and Production Engineering*, 32, 16-23.
- Chen, R., & Cheng, I. T. (2013). Studying factors causing wordmark confusions to improve brand identity. *International Journal of Information and Management Sciences*, 24, 265-277.
- Chen, R., & Liang, C. (2013). The strategy tool: the trademark map of best 100 brands in the world. *Journal of Management and Strategy*, 4, 21-31.
- Chernyak, N., Stephan, A., Bachle, C., Genz, J., Julich, F., & Icks, A. (2016). Assessment of information needs in diabetes: development and evaluation of a questionnaire. *Primary Care Diabetes*, 10, 287-292.
- Herm, S., & Moeller, J. (2014). Brand identification by product design: the impact of evaluation mode and familiarity. *Psychology & Marketing*, 31, 1084-1095.
- Mahdabi, P., & Crestani, F. (2014). The effect of citation analysis on query expansion for patent retrieval. *Information Retrieval*, 17, 412-429.
- Palumbo, F., & Herbig, P. (2000). The multicultural context of brand loyalty. *European Journal of Innovation Management*, 3, 116-124.
- Sharma, P., Tripathi, R., & Tripathi, R. C. (2015). *Finding Similar Patents Through Semantic Query Expansion*. 11th International Conference on Data Mining and Warehousing (ICDMW). Bangalore, India, pp.21-23.
- TAPTO (2016). *Trademark system in Taiwan*. Taiwan advance patent & trademark office, [http://www.aipo.com.tw/tc/p4-trademark\\_2.asp](http://www.aipo.com.tw/tc/p4-trademark_2.asp), accessed 20 October 2016.
- TIPO (2004). *Examination guidelines on likelihood of confusion*. Taiwan Intellectual Property Office. [http://www.tipo.gov.tw/en/AllInOne\\_Show.aspx?guid=91d7cea5-e737-4b18-a96a-a676063930d3&lang=en-us&path=1466](http://www.tipo.gov.tw/en/AllInOne_Show.aspx?guid=91d7cea5-e737-4b18-a96a-a676063930d3&lang=en-us&path=1466), accessed 20 October 2016.

- Venugopalan, S., & Rai, V. (2015). Topic based classification and pattern identification in patents. *Technological Forecasting and Social Change*, 94, 236-250.
- Wang, D. C. (2008). *Trademark law*. Wu-Nan Culture Enterprise Co. Ltd.
- WIPO (2016). *What is a trademark?*, <http://www.wipo.int/trademarks/en/>, accessed 20 October 2016.
- Yu, L., & Yi, W.Y. (2011). Initial exploration to the enterprise brand strategy centering on trademark in the minority concentrated area, Heilongjiang National Series.
- Zeng, C. M. R., & Cai, M. C. (2007). *Trademark law*. New Sharing Culture Enterprise Co. Ltd.

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