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Global Brand Equity Patterns in High-Tech Industries: A 24-Year Analysis

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Abstract

The objective of the study is to investigate major brand equity trends among High-Tech brands. Using Interbrand's Top 100 global brands list from 2001 to 2024 as its population, the methodology focused on 48 extracted High-Tech brands. The analysis employed descriptive statistics, including cumulative brand equity and growth rates, alongside country- and region-specific analyses and cluster formation. This approach allowed for an examination of the 2008 global financial crisis and the recent pandemic's impact. Brands from nine countries were categorized into Hardware, Software, and Internet Services, with the analysis grounded in Interbrand's reported brand equity values and annual growth rates. Analysis of High-Tech brands reveals common strategic lessons alongside unique nuances. Resilience during global financial crises and pandemic COVID-19, the country-of-origin effect (US dominance), maintaining financial thresholds, diversified global earnings, and adapting to evolving market standards are universally important. However, High-Tech particularly emphasizes innovation as core, the dominance of internet services and software, and the rapid rise and fall in niche areas in internet-based services. Hardware faces distinct challenges. The emergence of industry "Giants" and strong niche players underscores diverse success paths. Digital transformation is foundational, and effective brand portfolio management is crucial. This research provides novel strategic lessons for brand managers, emphasizing the crucial role of rapid, continuous innovation and strategic digital transformation for maintaining brand equity.

Keywords: Interbrand; Brand Equity; Top 100 Global Brands; High-Tech; Information Technology; Hardware; Software; Internet.

1. Introduction

The High-Tech industry, encompassing computer software/business services, computer hardware/consumer electronics, and internet services, is a monumental force in the global economy. As of 2024, the technology market alone commanded approximately \$6 trillion globally, with projections soaring to an estimated \$12 trillion by 2030 [1]. Within this dynamic landscape, characterized by relentless innovation and rapid technological advancements, maintaining robust brand equity is not merely beneficial, it is essential for sustained success [2]. Over the past two decades, the High-Tech sector has undergone profound transformations, propelled by groundbreaking innovations, shifts in consumer behavior, and evolving market dynamics [3].

Brand equity stands as a critical asset for High-Tech brands, directly influencing their market positioning, customer loyalty, and long-term growth [4]. The industry is replete with examples of companies that masterfully leverage their brand equity. Apple, for instance, utilizes its powerful brand to not only differentiate itself in highly competitive markets [5] but also to forge deep emotional connections with consumers, fostering repeat purchases and enduring relationships

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[6]. This strong brand foundation also facilitates the rapid adoption of their innovative technologies and products [7]. Similarly, IT giants like Microsoft and IBM rely on their formidable brand equity to instill trust in their diverse range of products and services. Trust is paramount in the IT sector, where customers prioritize security, reliability, and cutting-edge innovation above all else [8]. Google's unparalleled brand equity, for example, has been instrumental in its global expansion and its ability to adapt seamlessly to diverse consumer needs worldwide [1, 9]. Beyond market differentiation and consumer trust, strong brand equity provides crucial resilience during economic downturns and crises. Trusted IT brands are demonstrably better positioned to retain their customer base and recover swiftly from economic shocks [10]. Empirical evidence further supports this, with studies consistently showing that companies boasting strong brand equity often achieve higher market valuations and superior revenue growth [4, 11]. Indeed, earlier research has unequivocally demonstrated that brand equity exerts a significantly positive effect on business performance, underscoring its role as a fundamental driver of business success [2, 12].

While previous research has extensively explored brand equity trends across various sectors, including regional and global brands [13, 14], global financial institutions [15, 16], fashion brands [17], luxury brands [18], and automobile brands [19], a notable void exists in the literature regarding a comprehensive brand equity trend analysis specifically for High-Tech brands. This glaring absence serves as the primary motivation for the current research.

Moreover, prior studies have often linked global crises to only isolated segments of the High-Tech industry. For example, the global financial crisis was examined in relation to consumer electronics [20] and software segments [21], and its overall impact on the IT sector has been discussed [22]. However, while several studies have broadly linked global crises to brand equity trends across other industries [13-19], High-Tech brands have not been systematically studied for their specific links to major global crises.

This study aims to fill this critical gap by presenting the major trends observed in brand equity fluctuations for High-Tech brands over the last two decades, drawing from Interbrand's Top 100 global brands list. Crucially, it also seeks to provide granular findings with reference to different geographic locations and distinct industry segments within the High-Tech sector. A significant contribution of this research will be to provide empirical evidence for the impact of key crises, specifically the 2008-09 global financial crisis and the COVID-19 pandemic, on different segments of the High-Tech industry, including hardware, software, and internet services.

The following section presents a comprehensive literature review, synthesizing previous studies on brand equity trend analyses and underscoring a significant research gap concerning High-Tech brand equity trend analysis. Subsequently, the methodology outlines the approach taken, leveraging 24 years of Interbrand's longitudinal data (2001-2024) for 48 prominent High-Tech brands. This includes the application of descriptive statistics and the formation of five distinct brand clusters. The findings reveal compelling trends, such as the consistent dominance of US brands, higher minimum equity thresholds for High-Tech companies, their faster growth trajectory, and remarkable resilience during global crises, with the Internet services sector showing particular leadership. Finally, the analysis provides crucial insights into the characteristics of these clusters and the performance of individual brands, offering valuable strategic brand management lessons for the ever-evolving High-Tech industry.

2. Literature Review

This literature review is structured into two main sections: first, an overview of existing brand equity trend analyses across various industries, and second, an exploration of brand equity within the high-tech sector.

2.1. Brand Equity Trend Analysis: Longitudinal Studies Across Industries

Brand equity trend analysis has emerged as a significant area of research over the past 15 years, consistently leveraging Interbrand's annual "Best Global Brands" data to track longitudinal changes. Several prominent studies, often co-authored by author, have applied this rigorous approach to specific industries and regions:

- **Region-wise Analysis:** Pioneering work by Siddiqui analyzed brand equity trends among the top 100 global brands (2001-2010). This study highlighted key shifts, including the declining dominance of American brands and the rise of European and Asian brands. It also specifically noted the significant impact of the 2008-2009 global recession on American automotive brand equity [13].
- **Global Financial Institutions:** Bajwa et al. [15] and Siddiqui et al. [16] investigated financial institutions (2001-2020). These studies consistently showed the leadership of American institutions, higher growth rates for European banks, and proposed "Leaders," "Challengers," and "Extinct" brand clusters. They also contrasted the severe impact of the 2008-09 financial crisis with the relatively lesser effect of the 2019-20 pandemic on this sector's brand equity.
- **Automobile Brands:** Siddiqui & Ahmad [19] analyzed 18 global auto brands (2001-2020). Their findings identified distinct brand clusters ("Leaders," "Challengers," "Starlets," and "Intermittent") and revealed the resilience of Asian brands, the strong presence of European brands, and a decline in American brands' dominance within the automotive sector.

- Fashion Brands: Siddiqui [17] examined 30 leading fashion brands (2001-2021), segmenting the industry into Apparel, Cosmetics, Sportswear, and Luxury. The research showed overall brand equity growth despite the impacts of financial crises (2008-09) and pandemics (2019-20), with the apparel segment being most affected. Notably, France emerged as a global fashion hub.

These longitudinal studies on brand equity trends share several key commonalities. All aim to analyze and present brand equity trends over extended periods (typically 10-20 years), consistently relying on Interbrand's longitudinal data, often using metrics like cumulative brand equity and growth rates. Each study also investigates the effects of major global economic events, such as the 2008 global financial crisis and the COVID-19 pandemic, generally finding that while growth rates might fluctuate, overall brand equity often continues to increase. Furthermore, the analysis of brand equity based on the region or country of origin is a recurring theme, consistently identifying shifts in dominance and growth among American, European, and Asian brands. Finally, a common analytical tool is the formation of brand clusters (e.g., "leaders," "challengers," "extinct," "starlets") based on brand equity performance, providing nuanced insights into industry dynamics.

While sharing these foundational elements, these studies primarily differ in their specific industry focus, leading to unique insights for each sector. For instance, France's emergence as a fashion center is distinct to the fashion study, just as the detailed performance of specific auto brands like Ferrari or Porsche is specific to the automotive analysis. Collectively, these works provide a comprehensive, data-driven understanding of how brand equity evolves across diverse global industries, emphasizing the profound influence of global events and regional shifts in brand power.

2.2. Brand Equity in the High-Tech Sector and Beyond

The literature on brand equity in the high-tech industry revolves around several major themes. Primarily, innovation is a core driver. Companies like Apple, known for products such as the iPhone and Apple Watch, consistently build brand equity through innovative technology and design [23]. Innovation, particularly product and process advancement, directly contributes to brand equity and must align with consumer needs. Secondly, the brand equity of high-tech companies is significantly influenced by digital transformation [3, 24]. This integration of digital technologies fundamentally alters how high-tech brands interact with consumers and manage their brand equity.

Furthermore, studies highlight several factors shaping consumer perceptions of high-tech brands, especially in emerging markets. Brand awareness, fueled by marketing and promotional activities, is crucial for recognition. Positive brand associations, such as innovation, quality, and reliability, are vital for attracting consumers to brands perceived as technological leaders. Perceived quality and performance critically influence purchasing decisions. Brand loyalty is cultivated through consistent positive experiences, reliable products, and excellent customer service. Beyond these, cultural influences, like collectivism and power distance, also affect consumer perceptions and interactions with high-tech brands. Finally, brand equity is intrinsically linked to consumer perception, trust, and loyalty, with innovation often strengthening customer retention, and cultural and economic factors playing a significant role [25].

Despite the existing research, a notable gap exists in the current literature regarding a dedicated, comprehensive brand equity trend analysis specifically for High-Tech brands. This study aims to bridge that critical gap by examining the major fluctuations and trends in the brand equity of High-Tech brands over the past two decades, leveraging data from Interbrand's Top 100 global brands list. Understanding these historical trends and the factors influencing brand equity is crucial for strategic brand management in the high-tech industry, offering valuable lessons for marketers and industry leaders in navigating an ever-changing market landscape [24].

3. Methodology

This section outlines the research methodology. It begins by justifying the selection of Interbrand's global brand list as the study's population and sampling frame and concludes by detailing the data collection methodology.

3.1. Population and Sampling

Interbrand, recognized globally as a leader in brand management consulting, has been publishing its annual rankings of the 100 best global brands for over two decades [26]. These rankings are widely accepted and appreciated by both industry professionals and academic scholars [27]. Interbrand evaluates brand equity by applying the financial market value technique, which converts future income into present value. Furthermore, the rankings are developed based on multiple criteria established by Interbrand [26]. Since 2001, Interbrand has consistently released its list of the 100 best global brands, adhering to this evaluation framework. The overarching group of interest is all global brands that meet Interbrand's criteria for inclusion in its Top 100 Global Brands list from 2001 to 2024. These criteria include being a truly global brand with significant international earnings and presence across major continents, demonstrating positive long-term economic profit, delivering returns above the cost of capital, being market-facing, operating in a competitive environment, being from a publicly listed parent firm with transparent financial data, having a broad public profile and awareness, and possessing a specific brand equity value (e.g., over \$6 billion in 2024). The Interbrand Top 100 Global Brands list published annually from 2001 to 2024. This list serves as the comprehensive compilation from which the specific brands for this study were drawn.

The text implies a purposive or criterion-based sampling approach. While Interbrand selects the initial Top 100 based on its criteria, this study further selects a subset of those brands: 48 High-Tech brands that appeared in Interbrand's Top 100 Global Brands from 2001 to 2024 (Table 1). This specific selection of High-Tech brands, excluding others from the broader Interbrand list, demonstrates a deliberate choice based on the study's focus on the high-tech sector. For the cluster analysis, a further subset of "30 brands" was selected, specifically excluding "discontinued brands," which also suggests a criterion-based approach.

Table 1. High-Tech brands appeared in Interbrand's List (2001–2024)

No.	Brand	Country	Appeared	Sector
1	Microsoft	US	24	Software / Business Services
2	SAP	Germany	24	
3	Accenture	US	23	
4	Oracle	US	21	
5	Adobe	US	16	
6	Salesforce	US	8	
7	Apple	US	24	Computer Hardware/ Consumer Electronics
8	Samsung	Korea	24	
9	Cisco	US	24	
10	IBM	US	24	
11	Sony	Japan	24	
12	Intel	US	24	
13	Hewlett-Packard	US	24	
14	Panasonic	Japan	24	
15	Canon	Japan	23	
16	Nintendo	Japan	21	
17	Xerox	US	16	
18	Dell	US	14	
19	Nokia	Finland	14	
20	Huawei	China	11	
21	Duracell	US	11	
22	hp	US	9	
23	Motorola	US	8	
24	Kodak	US	7	
25	BlackBerry	Canada	5	
26	LG	Korea	4	
27	Xiaomi	China	3	
28	Lenovo	China	3	
29	Ericsson	Sweden	3	
30	Sun	US	3	
31	Compaq	US	2	
32	Nvidia	US	1	
33	HTC	Taiwan	1	
34	Texas	US	1	
35	Amazon	US	24	Internet Services
36	eBay	US	21	
37	Google	US	20	
38	Facebook	US	13	
39	Yahoo!	US	12	
40	Spotify	US	7	
41	LinkedIn	US	6	
42	Instagram	US	5	
43	YouTube	US	5	
44	Uber	US	4	
45	AOL	US	4	
46	Airbnb	US	3	
47	Zoom	US	2	
48	AT&T	US	2	

** Number of appearances in Interbrand's list of Top 100 Global Brands (2001-2024)

3.2. Data Collection

The study adopts secondary data analysis and directly uses longitudinal data on brand equity values and characteristics from Interbrand's annually published Top 100 Global Brands lists from 2001 to 2024. The study then processes and analyzes this pre-existing data (e.g., forming clusters based on Cumulative Brand Equity, Brand Equity Growth, consistency, country of origin, and industrial sector).

4. Analyses

The analyses were based on Interbrand's brand equity values (in \$Bs), annual brand rankings, annual growth rates in brand equity, country of origin, and industrial sector. Cumulative Brand Equity (CBE) depicts the sum of brand equities (in \$Bs) for the country, region, and/or industrial sector. Consistency reflects the number of years a brand is listed on Interbrand's Top 100 global brand list. The study employs descriptive statistics and includes country-wise and region-wise analyses, cluster formation, and an examination of the effects of the global financial crisis (2008-09) and global pandemic (2019-20) on the brand equity of High-Tech brands.

4.1. Discontinued Brands

Table 2 lists 18 discontinued High-Tech brands from Interbrand's top 100 global brands list (2001-2024), along with the reasons for their discontinuation. Some brands, including Dell, AT&T, and Texas, are still active and profitable but have limited earnings, primarily from the USA. Interbrand's criteria for enlistment in the Top 100 brand list require the brand to be global, with at least one-third of the earnings coming from outside the home country. Brands such as Canon, Xerox, Nokia, and Duracell are still active and profitable but no longer meet Interbrand's profit threshold. Others, such as Yahoo!, Motorola, and AOL, were removed because of mergers or acquisitions. The duration of appearances varies, with Canon appearing for 24 years and others such as HTC and Texas appearing only once.

Table 2. Discontinued High-Tech brands in Interbrand's List

S. No.	Brand	Country	Number of Appearances **		Reasons
			Frequency	Duration	
1	Dell	US	14	2001-13 & 2019	Still active but earnings are mainly from USA.
2	AT&T	US	2	2001- 02	
3	Texas	US	1	2001	
4	Canon	Japan	23	2001-23	Still active but annual profits are less than the minimum threshold set by Interbrand.
5	Xerox	US	16	2001-16	
6	Nokia	Finland	14	2001-14	
7	Duracell	US	11	2001-09 & 2013-14	
8	Kodak	US	7	2001-07	
9	BlackBerry	Canada	5	2008-12	
10	Lenovo	China	3	2015-17	
11	Ericsson	Sweden	3	2001-03	
12	HTC	Taiwan	1	2011	Mergers/ acquisitions with other information technology giants.
13	Zoom	US	2	2020-21	
14	Yahoo!	US	12	2001-12	
15	Motorola	US	8	2001-08	
16	AOL	US	4	2001-04	
17	Sun	US	3	2001-03	
18	Compaq	US	2	2001-02	

** Number of appearances in Interbrand's list of Top 100 Global Brands (2001-2024)

Another brand transformation occurred in this period. HP split into two companies [28]: (1) HP Inc.: Focused on personal computers and printers, continuing the legacy of consumer products; and (2) Hewlett Packard Enterprise (HPE): Concentrated on enterprise products and services, such as servers, storage, and networking.

4.2. Country-of-Origin Effect: Constant Dominance of US High-Tech Brands

Table 3 summarizes the number of High-Tech brands and their country of origin that appeared in the Top 100 Global Brands list from 2001 to 2024. The US consistently had the highest number of brands, starting with 19 in 2001 and peaking at 22 in 2024. Japan has maintained a steady presence of 3-4 brands each year. China saw an increase from no brands in the early years to two brands from 2015 onwards. Korea has a consistent presence of 1-2 brands annually. Germany consistently has one brand each year. Canada, Finland, Sweden, and Taiwan had sporadic appearances, with Canada and Finland having brands listed in the early years and Taiwan appearing briefly in 2011.

Table 3. Number of High-Tech Brands among Top 100 Brands – Country wise Summary

Country	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
US	19	19	17	17	17	17	17	16	16	15	15	16	16	15	14	15	15	16	19	20	20	19	20	22
Japan	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	3	3	4	4	4	4	4	4	3
China														1	2	2	2	1	1	1	1	2	2	2
Korea	1	1	1	1	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
Germany	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Finland	1	1	1	1	1	1	1	1	1	1	1	1	1	1										
Canada								1	1	1	1	1												
Sweden	1	1	1																					
Taiwan											1													

In the Internet Services and Software/Business Services sectors, 100% of brands belong to the United States except SAP, which belongs to Germany, indicating a strong US presence in these sectors.

4.3. Minimum Listed CBE for High-Tech Brands is Higher Than All Other Brands

Figure 1 shows Interbrand's minimum acceptable criteria for listing the Top 100 Global Brands list from 2001 to 2024. Over the years, the minimum acceptable criteria have also risen, beginning at \$1.0 B in 2001 and stabilizing at \$6.0 B by 2023. Similarly, minimum listed brand equity generally increased, starting at \$1.0 B in 2001 and reaching \$6.3 B in 2024. High-Tech brands began higher at \$3.1B in 2001 and increases to \$6.4 B by 2024. The increase in the "Minimum Acceptable Criteria" suggests rising expectations and industry standards over the last two decades. This shows that High-Tech brands consistently demand higher equity for listings, underscoring their dominance and significance in the market. This trend reflects the growing value and competitiveness of High-Tech brands on Interbrand's list over the past two decades.

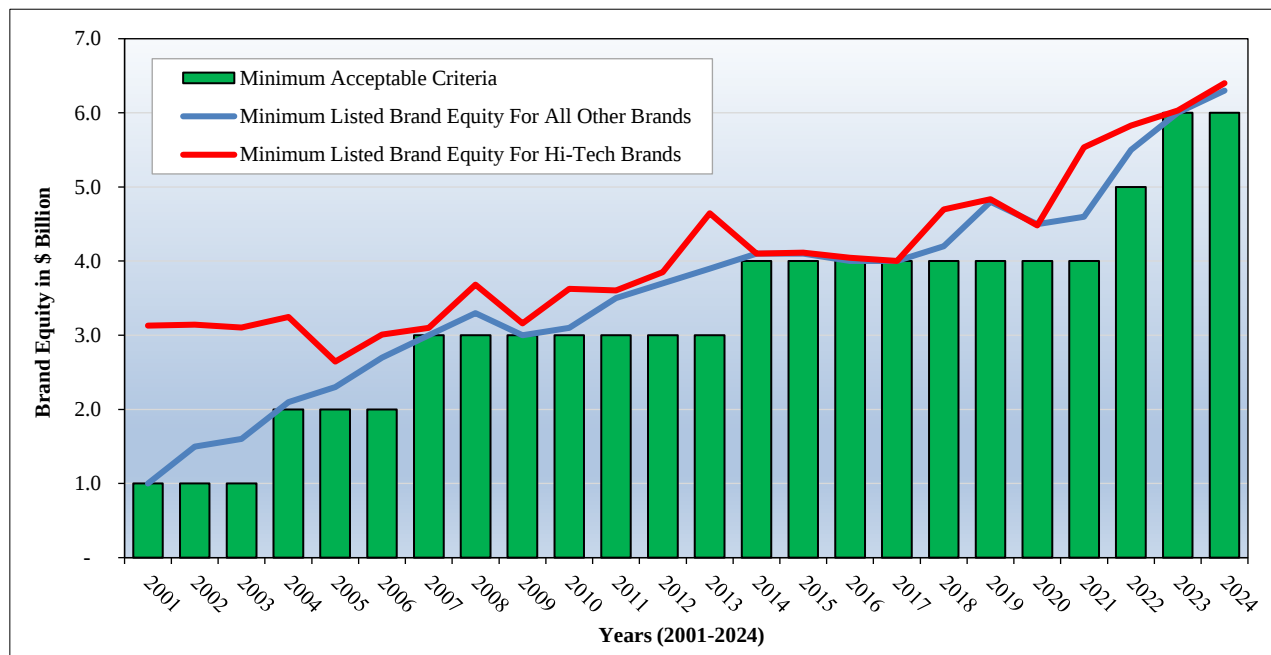


Figure 1. Minimum Listed Brand Equity for High-Tech Brands VS All Other Brands

4.4. CBE for High-Tech Brands Are Growing Faster Than All Other Brands

Figure 2 illustrates the cumulative brand equity and the number of High-Tech brands among the top 100 brands from 2001 to 2024. During this period, the cumulative brand equity of all brands increased from \$627 B in 2001 to \$1369 B in 2024. Similarly, the cumulative brand equity of High-Tech brands saw a substantial rise from \$361 B in 2001 to \$2056 B in 2024. The number of High-Tech brands experienced slight fluctuations but generally showed an upward trend, starting at 26 in 2001 and reaching 30 in 2024. Notably, in 2019, 26 High-Tech brands amassed brand equity comparable to that of 74 other brands on Interbrand's list. By 2024, 30 High-Tech brands generated \$2056 B, while 70 other brands accounted for \$1369 B. This indicates the increasing dominance and value of High-Tech brands in the global market over the years.

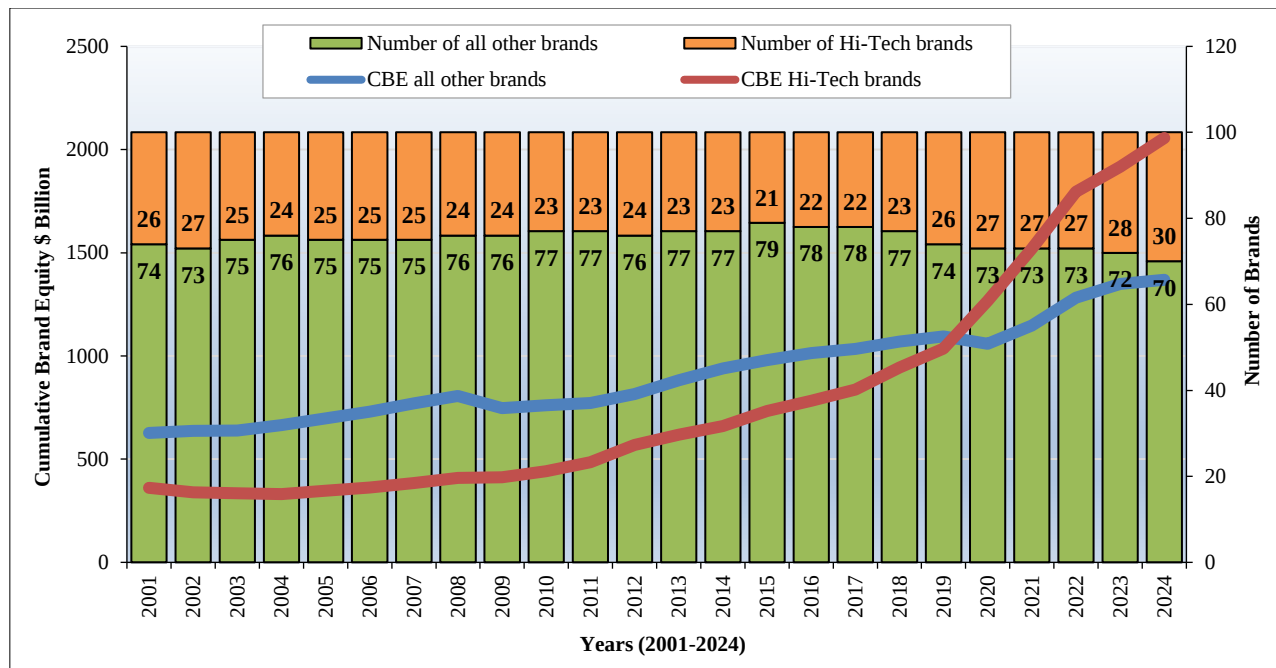


Figure 2. CBE of all other brands VS CBE of High-Tech brands

4.5. High-Tech brands have shown resilience in their growth during global crises:

Over the past two decades, the global economy has faced two significant crises. The first, starting in 2008, originated as a financial crisis in the U.S. and quickly escalated into a global economic recession, affecting nearly all industries and regions worldwide. Similarly, the COVID-19 pandemic in early 2020 brought the global economy to an unprecedented standstill, heavily impacting all aspects of life, particularly the economy. Figure 3 shows that from 2001 to 2024, the brand equity growth rates for "All other brands" and "High-Tech brands" show distinct patterns, especially during significant global events. During the Global Financial Crisis (2008-09), "All other brands" experienced a decline, with growth rates of -4% in 2008 and a modest recovery to 4% in 2009. In contrast, "High-Tech brands" showed resilience, with a slight positive growth of 1% in 2008 and 4% in 2009. During the Global Pandemic Crisis (2019-20), "All other brands" saw stagnation with a 0% growth rate in 2019 and a slight recovery to 4% in 2020. "High-Tech brands," however, demonstrated stronger performance with growth rates of 10% in 2019 and 12% in 2020. Overall, "High-Tech brands" consistently outperformed "All other brands," particularly during these global crises, highlighting their robustness and adaptability in challenging times.

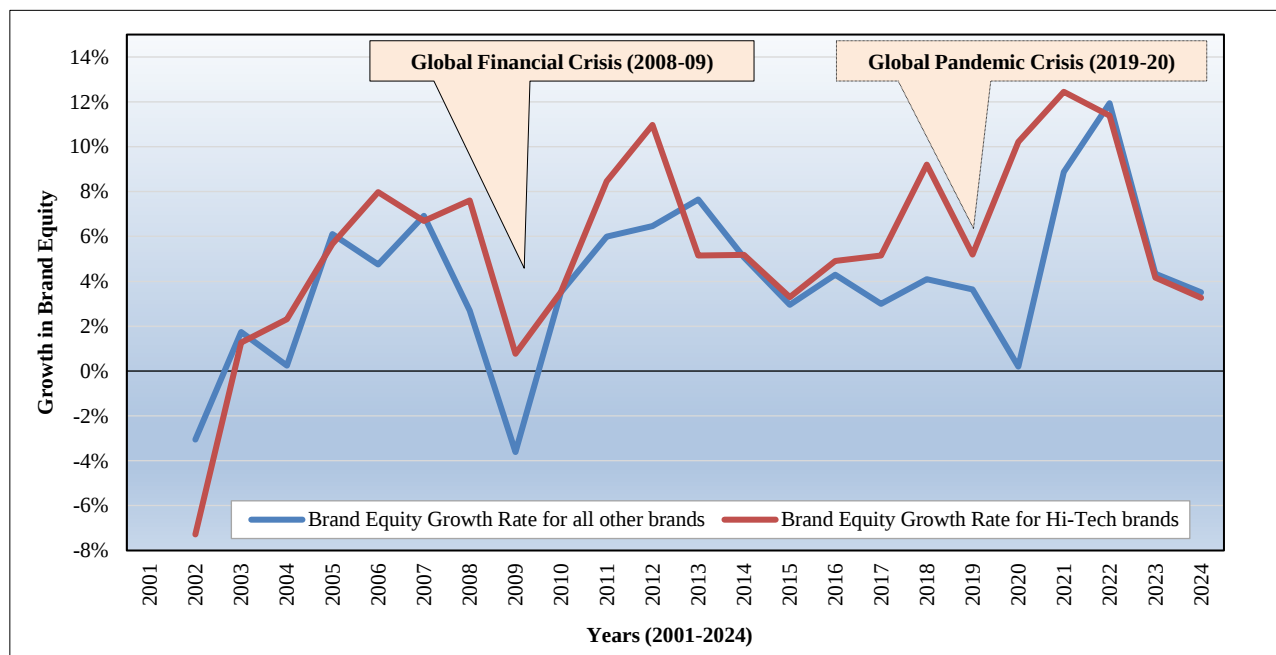


Figure 3. Growth rate in CBE for High-Tech brands vs. All other brands

4.6. Internet Services Have Exhibited Higher Growth as Compared to Software and Hardware Sectors

All three sub-sectors have shown impressive growth rates, but Internet services have exhibited higher growth as compared to the software and hardware sectors (Figure 4). The Software/Business Services sector has demonstrated growth, with a few minor declines, resulting in an overall growth of 9%. The Hardware/Electronics sub-sector experienced volatile growth with both positive and negative periods, leading to an overall growth of 2%. The Internet Services sector has exhibited rapid and significant growth, with some fluctuations, achieving an overall growth of 13%. Notable years of high growth for Internet Services include 2012 (31%), 2013 (34%), and 2014 (23%).

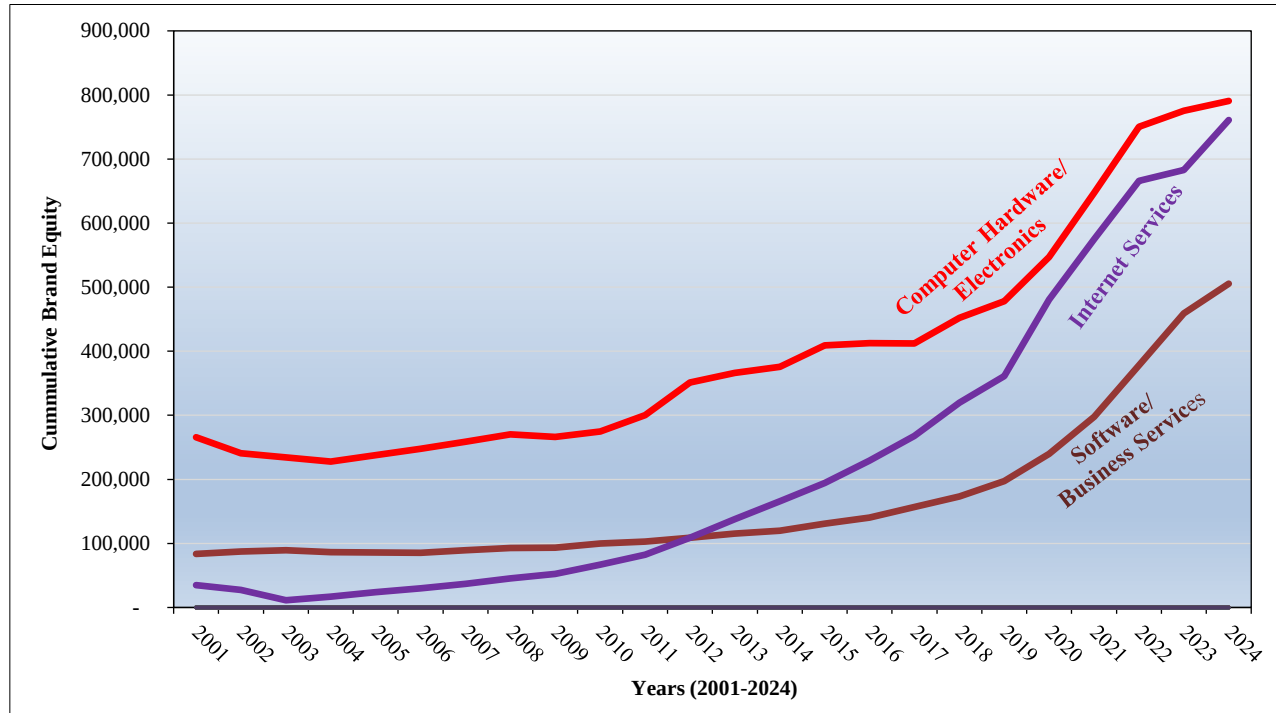


Figure 4. Internet services exhibited higher growth rate

4.7. Cluster Formation

To provide a micro-level trend analysis, five clusters were formed using Cumulative Brand Equity (CBE; reflecting size), Brand Equity Growth (BGR; reflecting rate), consistency (CON; reflecting number of years brands are listed in Interbrand's top 100 brands), Country of Origin (ORI), and industrial sector (IND). The base year for cluster formation was 2024, and discontinued brands (Table 3) were excluded from cluster formation. A total of 30 brands were considered for cluster formation. Table 4 presents the five clusters, the criteria for each cluster, and the resulting characteristics of the clusters, including average CBE, average brand equity growth rate, and average consistency in the cluster. Finally, the clusters were named based on their characteristics.

Table 4. Clusters in High-Tech Brands

Cluster	Criteria	Number of brands	Average Cumulative Brand Equity Size	Average Brand Equity Growth Rate	Average Consistency in Brand listing
High-Tech Giants Cluster	Minimum CBE \$ 100,000.	5	306,320	18%	23
Software Brands Cluster	Minimum acceptable CBE and listed as a software brand	5	30,580	12%	18
Internet Services Brands Cluster	Minimum acceptable CBE and listed as an internet service	8	21,425	13%	8
US Hardware Brands Cluster	Minimum acceptable CBE and listed as a hardware brand	6	23,485	0%	18
Asian Hardware Brands Cluster	Minimum acceptable CBE and listed as a hardware brand	6	10,000	4%	15

This table emphasizes the dominance of High-Tech Giants, the stability of Software Brands, and the growth challenges faced by hardware clusters. The hardware/consumer electronics cluster was subdivided into two distinct clusters: differentiating growth rates, average CBE size, and varying consistency levels.

Figure 5 presents a bubble chart with the Average Brand Equity Growth Rate (%) on the X-axis, Average Consistency in Brand Listing on Y-Axis. The size of each bubble represents the Average CBE (\$ \$Bs) of each cluster. High-Tech Giants, represented by the largest bubble as average CBE US 308 B, have led to both average brand growth rate (18%)

and average consistency (23) for the last two decades. Internet services brands Smaller than High-Tech Giants, but still influential, have a strong growth rate (15%) and are the youngest cluster in the age of brands. Software brands with a moderate growth rate (12%) and higher brand consistency (18) were positioned as stable but not as fast-growing as Internet Services. The hardware cluster is subdivided into two distinct clusters: the US Hardware cluster has a near 0% growth rate but higher brand consistency (18), while Asian Hardware has slightly positive growth (4%) but is relatively younger in age (15).

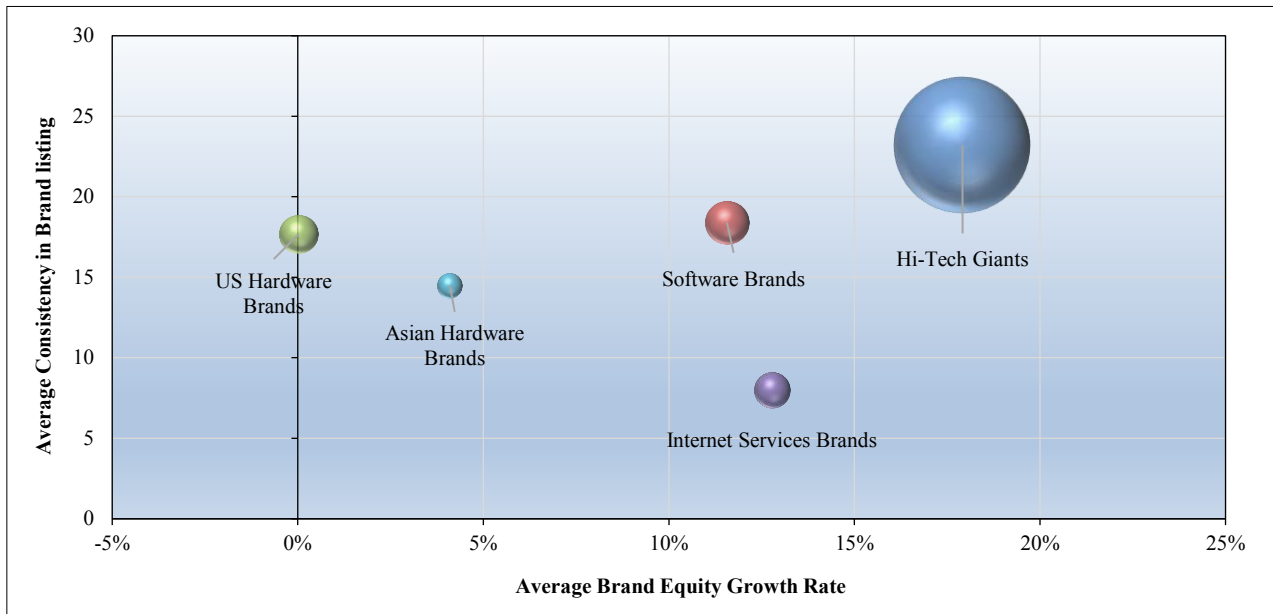


Figure 5. Clusters in High-Tech Brands

4.8. High-Tech Giants Emerge as Massive for Their Size and Growth Rate

The High-Tech Giants cluster include brands such as Apple, Microsoft, Amazon, Google, and Samsung. All brands have a cumulative brand equity (CBE) of \$ 100,000 or more. Most of these brands are from the USA, with Samsung as the exception. This cluster exhibits a high growth rate in brand equity and an exceptionally large CBE, indicating a strong market presence and brand value.

Figure 6 illustrates exceptional brand equity growth, with Apple leading the group, followed by Microsoft, and Amazon. Samsung is a prominent Asian representative company. Consistent increases in equity across these brands reflect innovation and a strong market presence.

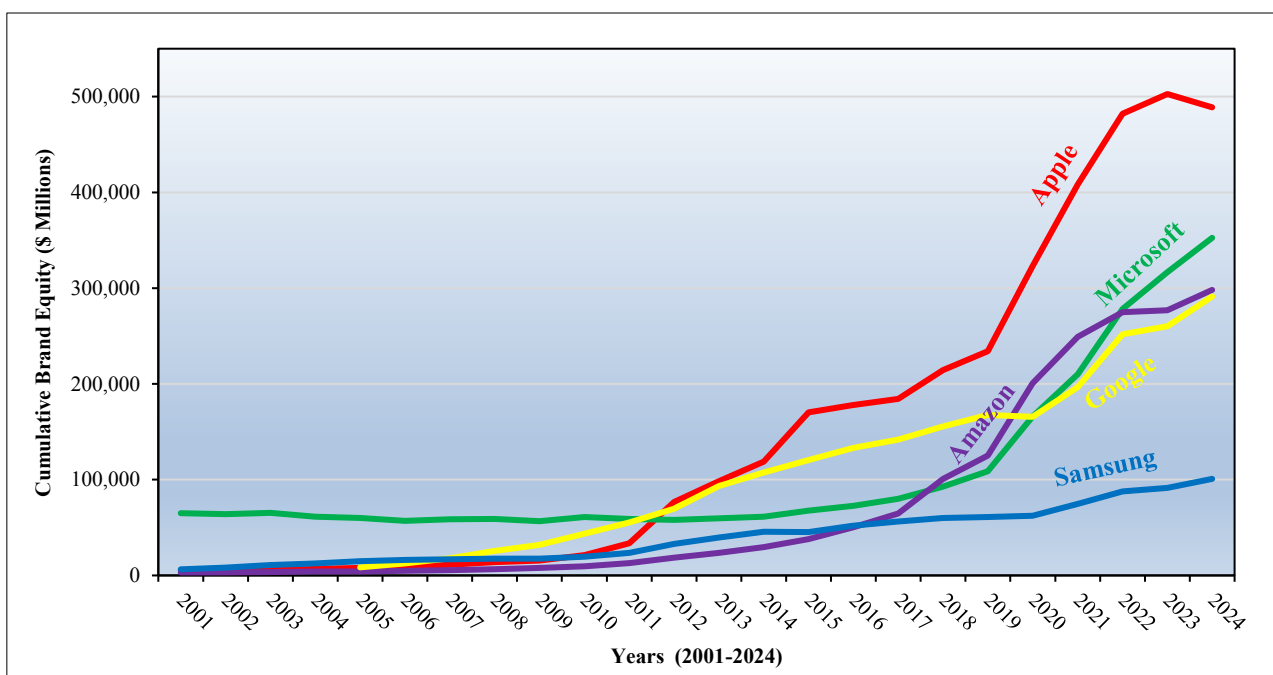


Figure 6. CBE Trends in High-Tech Giants Cluster

4.9. Apple Outperforms Peers in the High-Tech Giants Cluster

Apple's brand equity has grown from \$5 B in 2001 to \$489 in 2024, with an annual growth rate of 24%, the highest among all brands. Notable years of high growth include 2010 (37%), 2011(58%), 2012(129%), 2015(43%), and 2020(39%). Apple's remarkable growth can be attributed to its innovation in consumer electronics (e.g., iPhones, iPads, and Macs), strong brand loyalty, and consistent market expansion. Over the years, it has become a symbol of technological advancement and luxury, outperforming its peers in the High-Tech giant cluster. There are many reasons for this success [29]. Apple's emphasis on continuous innovation is pivotal to maintaining its market leadership. The company invests heavily in R&D to introduce ground breaking products. Apple's strong brand equity is built upon delivering exceptional customer experiences, fostering brand loyalty, and creating a premium brand image. The seamless integration of Apple's hardware, software, and services creates a unique ecosystem that enhances customer retention and cross-product usage [30].

4.10. High and Steady Growth of Microsoft, Amazon, and Google

All three giants have shown steady growth over the years, with significant jumps in brand equity during the last few years. Microsoft grew from \$65 in 2001 to \$352 in 2024, with an average annual growth rate of 8%. For Microsoft, key growth drivers include its focus on cloud computing (Azure), AI integration, and productivity tools such as Microsoft 365 [31]. Amazon's brand equity grew from \$3 B in 2001 to \$298 B in 2024, with an average annual growth rate of 23%. Amazon's growth has been rapid and consistent, especially from 2016 onwards, with major contributions from its e-commerce dominance and Amazon Web Services (AWS) [32]. Google's brand equity grew from \$8 B in 2005 to \$291 B in 2024, with an average annual growth rate of 21%. Google has experienced steady growth, with notable acceleration in recent years owing to its advertising business and investments in AI and cloud computing [33].

4.11. Steady Performance of Samsung

Samsung's brand equity grew from \$6 B in 2001 to \$101 B in 2024, with an average annual growth rate of 13%. Samsung's performance demonstrates its ability to adapt, innovate, and maintain leadership in a highly competitive industry [34].

Figure 7 highlights the CBE of the five brands in the software cluster from 2001 to 2024. It demonstrates varying timelines and growth trajectories, with Adobe, SAP, and Accenture showing sustained increases, Oracle showing fluctuations but overall growth, and Salesforce achieving impressive equity gains within a brief period of time

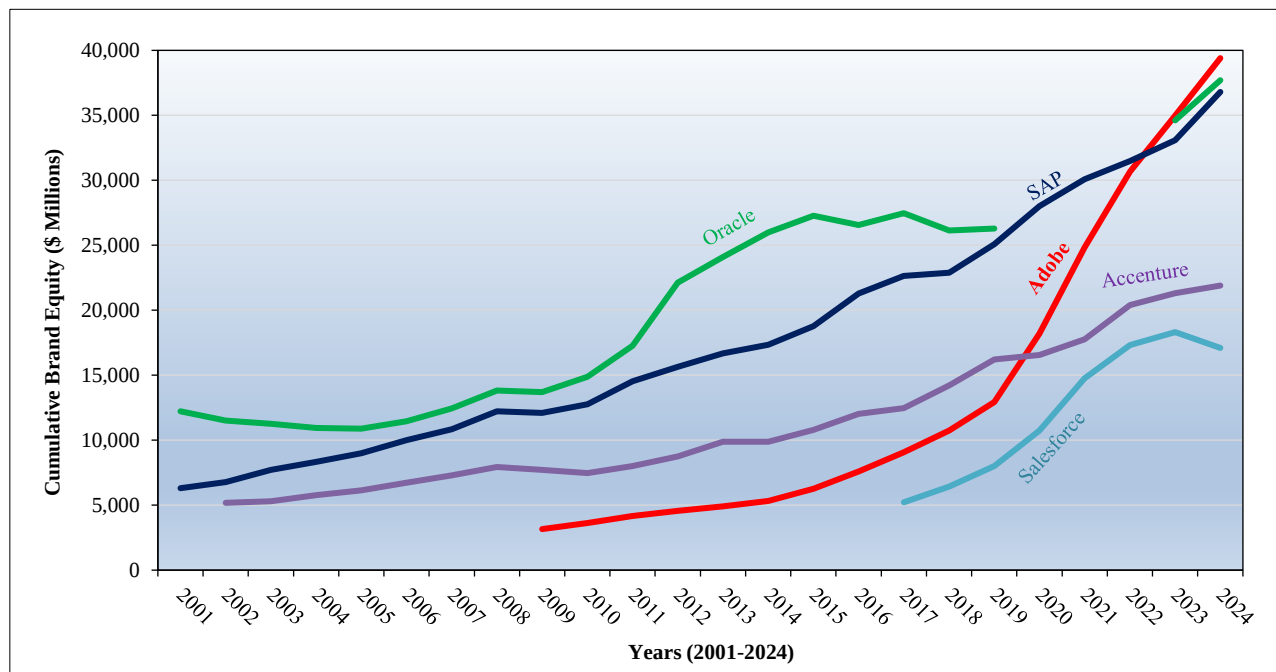


Figure 7. CBE Trends in Software Cluster

4.12. Dominance of US Brands in Software Cluster

This cluster comprises brands such as SAP, Adobe, Oracle, Accenture, and Salesforce. All brands are from the USA, offering business services and software, with SAP being the only non-US brand. The software brand cluster shows a high growth rate in brand equity, reflecting the increasing demand for and value of software and business services.

4.13. Emergence of Adobe as Industry Standard

Adobe's growth trajectory exhibits consistent growth starting from 2009 at \$3 B, its value steadily climbs each year, reaching \$39 B by 2024, with an average annual growth rate of 19%. Many strategic moves by Adobe are contributing factors to this extraordinary success, ensuring steady revenue streams and reduced software piracy. For example, there was a shift from traditional software licensing to a subscription-based model with Creative Cloud in 2013, acquisitions such as Magento and Marketo, and integrated AI and ML [35].

4.14. Revival of Oracle

Oracle's growth trajectory started at \$12 B in 2001 and steady increases until 2019, at \$26 B. A slight dip occurred between 2020 and 2022 due to the impact of the COVID 19 pandemic on Oracle's sales and financial stability [36]; followed by a rebound to \$35 B in 2023 and finishing at \$38 B in 2024. Oracle's dominance in enterprise software and database solutions is pivotal for brand strength.

4.15. Steady growth at SAP and Accenture

SAP has shown consistent and steady growth over the years, with its brand value increasing from \$6 B in 2001 to \$37 B in 2024 at an annual growth rate of 8%. The company's shift towards cloud-based solutions such as SAP S/4HANA has significantly boosted its revenue and market presence [37]. Accenture has also demonstrated steady growth, with its brand value rising from \$5 B in 2002 to \$22 B in 2024 at an average annual growth rate of 7 %. Its emphasis on digital transformation, including AI, cloud computing, and analytics, has positioned it as a leader in the technology consulting space [38].

4.16. High growth of Salesforce

The Salesforce has shown consistent and steady growth over the years, with its brand value increasing from \$5 B in 2017 to \$17 B in 2024, with an annual growth rate of 19%. Salesforce revolutionized CRM with its cloud-based platform, making it accessible and scalable for businesses of all sizes, and the integration of AI tools such as Einstein Analytics has enhanced Salesforce's offerings, attracting more customers as a major reason for its growth [39].

Figure 8 shows diverse trends in brand equity growth, with Instagram and YouTube achieving rapid gains, while long-established brands, such as eBay, exhibit steady performance. Newer players such as Airbnb and LinkedIn show promising upward trajectories.

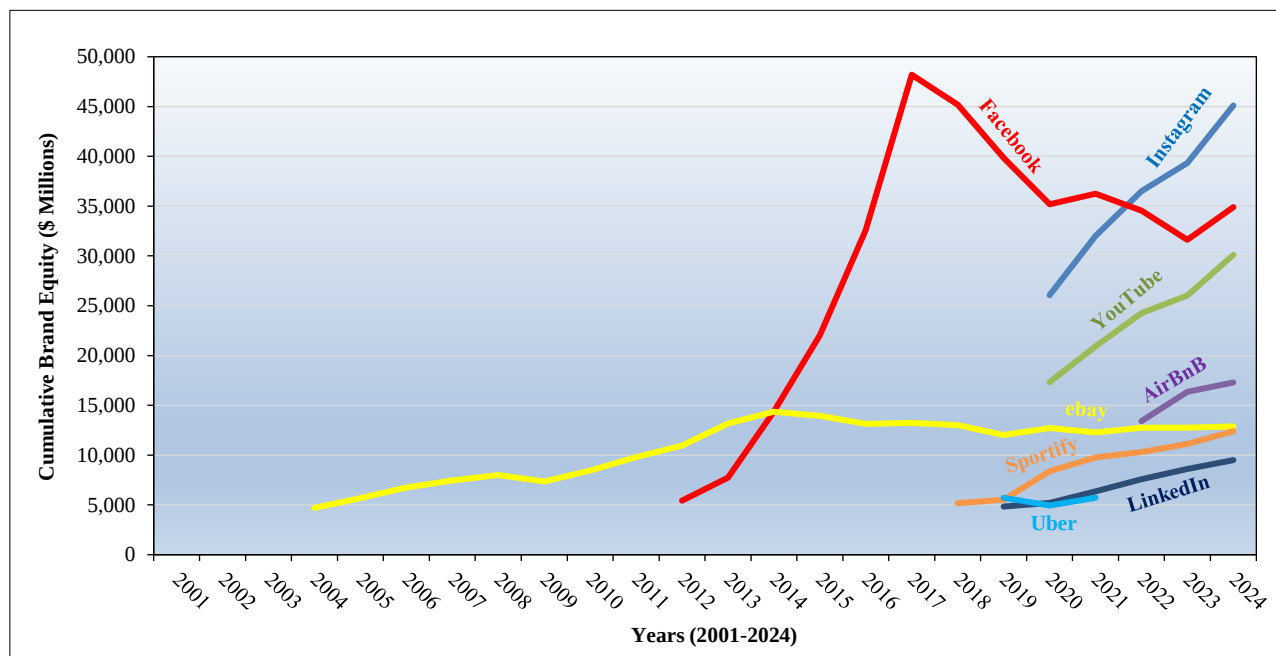


Figure 8. CBE Trends in Internet Services Cluster

4.17. Dominance of US Brands in Internet Services Cluster

This cluster consists of brands from the USA providing business Internet services. The Internet Services Brands cluster demonstrates a healthy growth rate in brand equity, indicating the growing importance of and reliance on Internet services in the business sector.

4.18. Rise and Fall of Facebook

Facebook demonstrated significant growth from 2012 (\$5 B to a peak of \$48 B in 2017). However, its brand equity will decline afterward, reaching \$35 billion in 2024. This drop could be related to challenges, such as user privacy concerns or increased competition. The decline in Facebook's popularity and influence is due to negative news cycles, controversies, and changing user perceptions [40].

4.19. High Growth of Instagram, YouTube, Airbnb, Sportify and LinkedIn

Instagram has shown sharp growth in brand equity in a brief period of time, with its brand value increasing from \$26 B in 2020 to \$45 B in 2024, with an annual growth rate of 15%. Similarly, YouTube has increased its brand equity from \$17 B in 2020 to \$30 B in 2024, with an annual growth rate of 15%. Airbnb has grown its brand equity from \$13 B in 2022, to \$17 B in 2024, with an annual growth rate of 14%. Sportify has grown its brand equity from \$5 B in 2019 to \$10 B in 2024, with an annual growth rate of 15%. LinkedIn has grown its brand equity from \$5 B in 2019 to \$10 B in 2024, with an annual growth rate of 15%. All brands grow by 15% annually. Santoro and Bargoni (2024) summarized the high growth rates among these Internet-based services as (a) Product-Led Growth: Instagram prioritizes creating exceptional products that directly address user needs, fostering virality through word-of-mouth, and simplifying onboarding processes; (b) Community and Ecosystem-Led Growth: Platforms such as Airbnb and LinkedIn leverage user communities and ecosystems to enhance engagement and scalability; (c) Content and Brand-Led Growth: Instagram and YouTube thrive by delivering compelling content and building strong brand identities; and (d) Velocity-Driven Growth: Companies like Spotify emphasize rapid scaling and market dominance, adapting quickly to competitive dynamics [41].

4.20. Steady Performance of eBay

eBay exhibits early growth from \$5 B in 2004 to \$13 B in 2024, with an annual growth rate of 6%. This trend reflects the increased competition in the e-commerce market.

4.21. Comeback of Uber

Brand equity data for Uber fluctuating around \$5-6 B during 2019-21. It came back at \$9 B in 2024, showcasing Uber's impact on transportation.

Figure 9 shows diverse trends among leading US computer hardware/consumer electronic brands, illustrating Cisco's consistent upward trajectory, IBM's decline, and Nvidia's late emergence as a significant player. Cisco consistently strengthened its position, while IBM and Intel showed varying degrees of decline. Nvidia reflects its recent emergence as a newer player with substantial equity.

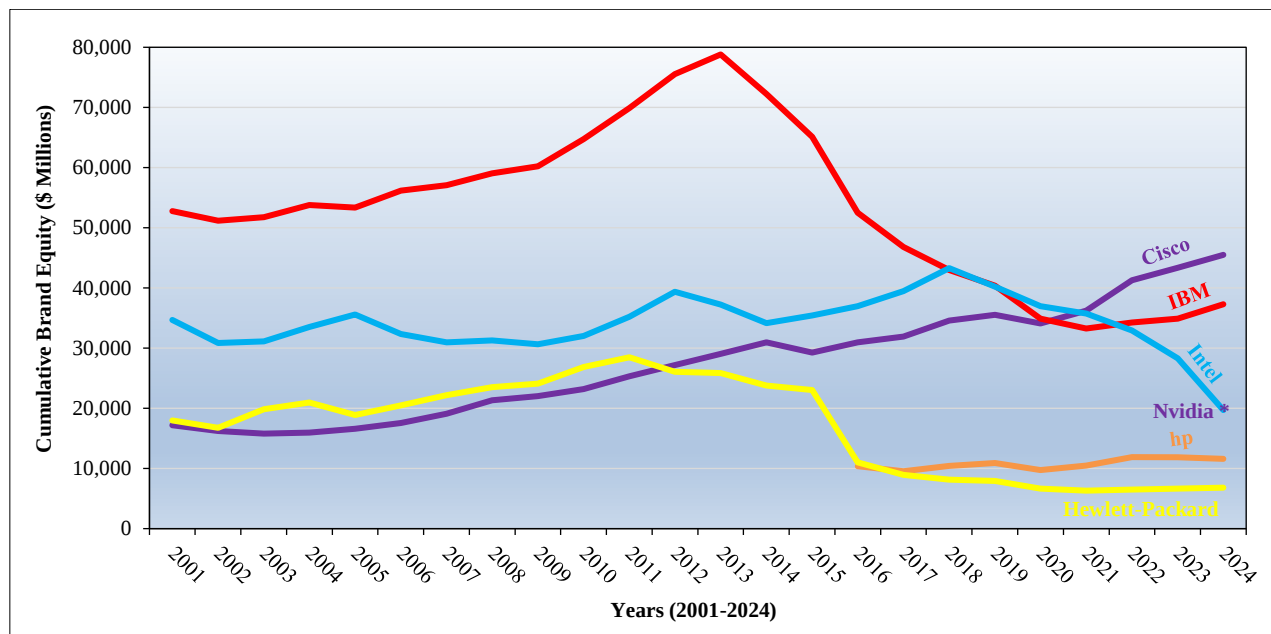


Figure 9. CBE Trends in US Hardware Cluster

4.22. Stagnancy in US Hardware Brands Cluster

The US Hardware brand cluster includes brands such as Cisco, IBM, Intel, HP, Hewlett-Packard, and the more recently added Nvidia. All brands belong to the USA, which offers consumer electronics and computer hardware. This cluster has a stagnant growth rate in brand equity, suggesting a stable, but non-expanding market.

4.23. Steady Performance of Cisco

The world's leader in Networking Cisco's brand equity started at \$17 Billion in 2001 and grows consistently, reaching \$45 B in 2023. The company's focus on cloud computing, AI analytics, and observability has helped it remain relevant in the rapidly evolving technology landscape [42].

4.24. Downfall of IBM, and Intel

The world's microprocessor giant Intel's brand equity grew from \$34 B in 2001 and peaked at \$43 B in 2018, driven by its dominance in microprocessors and the success of its "Intel Inside" campaign, which made it a household name. Intel's brand equity began to decline after 2018, reaching \$20 B in 2024. This drop can be attributed to increased competition from rivals like AMD and Nvidia, as well as challenges in adapting to new markets such as mobile and cloud computing [43]. Similarly, IBM's brand equity grown from \$52 B in 2001 to \$79 B in 2013, reflecting its leadership in enterprise solutions, cloud computing, and consulting services. Its ability to innovate and maintain relevance in the business sector contributed to its robust performance. Post-2013, IBM's brand equity saw a steady decline, reaching \$37 B by 2024. This decline is linked to challenges in transitioning from hardware to software and services as well as competition from newer tech companies [44].

4.25. Reorganization at Hewlett Packard

Hewlett Packard's brand equity grew from \$18 B in 2001, reaching \$23 B in 2015. As mentioned above, in 2014/15, Hewlett Packard split into two companies, HP (HP Inc.) and Hewlett-Packard Enterprise (Hewlett Packard Enterprise). After the split, hp's brand equity grew from \$10 B in 2016, reaching \$12 B in 2024. Simultaneously, Hewlett-Packard's brand equity declined from \$11 B in 2016, reaching \$7 B in 2024. The split allowed each entity to focus on its core strengths, which helped refine its brand identities. HP Inc. concentrated on personal computers and printers, whereas HPE focused on enterprise solutions such as servers, storage, and networking. HP Inc. managed to maintain its reputation in the PC and printer markets by innovating and adapting to the market demands. HPE has established itself as a leader in enterprise technology, leveraging its expertise in hybrid cloud infrastructure and analytics [45].

4.26. Emergence of Nvidia

In Interbrand's most recent edition, Nvidia has entered the brand equity list 2024 with a brand equity of \$20 B. Its market position is based on its AI cloud initiatives, robotics, automotive/drive-assist parts, gaming chips, and fostering an AI ecosystem [46].

Figure 10 presents the Cumulative Brand Equity Trends for Asian Hardware Cluster from 2001 to 2024: Japanese brands such as Sony, Nintendo, and Panasonic dominate in terms of longevity and equity size. Chinese brands, including Xiaomi and Huawei, demonstrate strong recent growth and an emerging presence. Korean brands, represented by LG, displayed moderate equity trends. Overall, the Asian Hardware Cluster highlights diversity in brand equity growth and maturity, with established players continuing to thrive and new entrants gaining momentum.

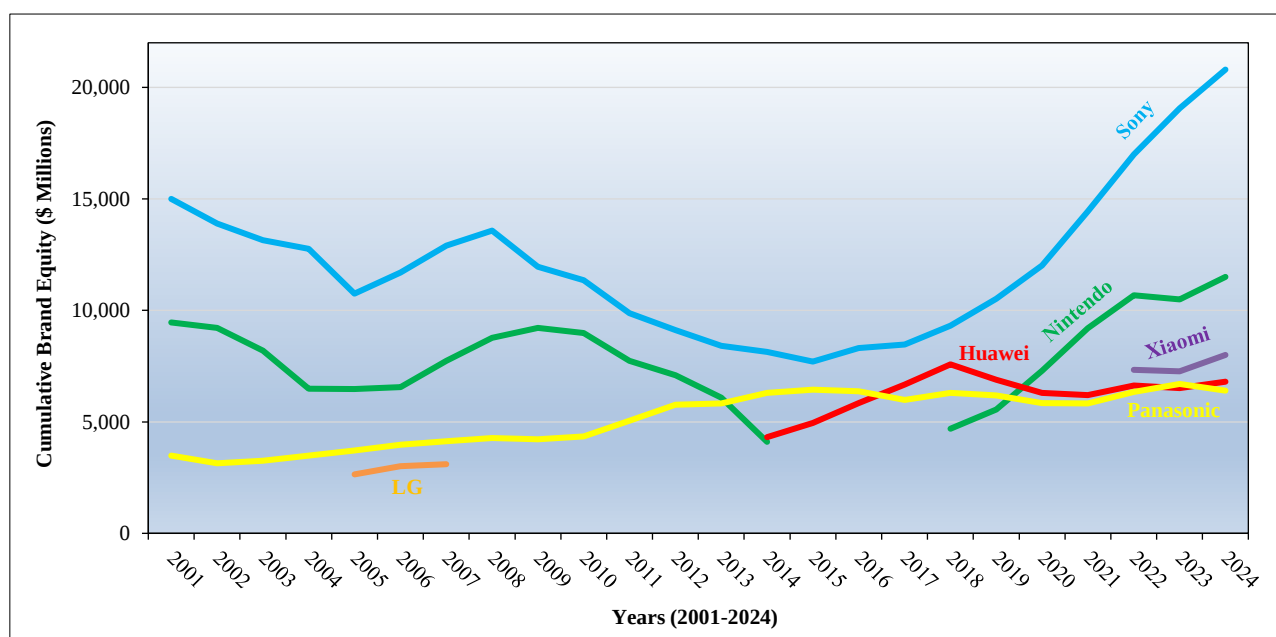


Figure 10. CBE Trends in Asian Hardware Cluster

4.27. Great Comeback of Korean LG

Brand equity data for Korean brand LG fluctuating around \$2-3 B during 2005-07. It came back at \$6 B in 2024, with recent improvements in branding and product performance after periods of lower visibility.

4.28. Emergence of Chinese Brands Like Huawei and Xiaomi

Huawei's brand equity increased from \$4 B in 2013 to \$7 B in 2024, driven by its innovation and focus on diverse product portfolios. Xiaomi, a relatively new entrant (tracked for only three years), shows rapid growth, with brand equity reaching \$8 B in 2024. Both brands Xiaomi and Huawei demonstrate the rising influence of Chinese companies, leveraging innovation and competitive pricing [47].

5. Conclusion

This paper aims to present the trends in brand equity among High-Tech brands listed by Interbrand for 2001 to 2024. A total of 48 High-Tech brands appeared on this list during the period, categorized into three segments: Hardware, Software, and Internet Services. These brands originate from nine countries: the US, Japan, China, Korea, Canada, Finland, Germany, Sweden, and Taiwan. The analysis is based on Interbrand's brand equity values (\$), annual brand rankings, and annual growth rates in brand equity (%). The study employs descriptive statistics and includes country-wise and region-wise analyses, cluster formation, and examines the effects of the global financial crisis and the global pandemic on the brand equity of High-Tech brands. This study provides many interesting findings for brand equity trends. Firstly, US High-Tech brands dominate software, internet services, and hardware sectors, highlighting consistent dominance. Secondly, it suggests reasoning for discontinued High-Tech brands in Interbrand's list with three main reasons including lower profits, mergers/acquisitions, and geographically concentrated earnings. Thirdly, it presents growth in Interbrand's minimum acceptable criteria for listing from \$1 B in 2001 to \$6 B in 2024 reflecting the growing value and competitiveness of brands in the Interbrand's list over the past two decades. Fourth, CBE for High-Tech brands are growing faster than all other brands. Fifth, it shows High-Tech brands have shown more resilience in their growth during financial crisis (2008-09) and global pandemic crisis (2019-20). High-Tech brands consistently outperformed all other brands, particularly during these global crises. Sixth, Internet services outpace software and hardware sectors in growth. Notable years of high growth for Internet Services include 2012-2014. Seventh, High-Tech giants like Apple, Microsoft, Amazon, and Google display high growth, with Apple outperforming competitors. Eighth, US hardware brands faces stagnation, with IBM and Intel declining while Asian hardware brands, show resilience. Ninth, a few revivals and comebacks of brands like Facebook, Oracle, LG, Sony, and Uber. Tenth, Hewlett Packard reorganizing and splitting into signaling sustainability. Eleventh, steady growth in many brands like Adobe, SAP, Accenture, Cisco, Nintendo, and Panasonic. Twelfth, rise of Chinese brands like Huawei and Xiaomi. Finally, High growth for Instagram, YouTube, Airbnb, Spotify, LinkedIn, Salesforce, and emergence of Nvidia. In addition, the findings invite future research on probing the reasons behind the drastic changes in the brand equity of various global High-Tech brands in the last two decades.

5.1. Strategic Lessons For Brand Managers

The strategic lessons derived from the High-Tech brand analysis share significant commonalities with findings from earlier studies on fashion, auto, financial, and general global brands, yet also present some distinct nuances.

5.1.1. Shared Strategic Lessons Across Industries

This analysis of High-Tech brand equity trends reveals several crucial strategic lessons for brand managers aiming for sustained growth and resilience in a dynamic global market. Key takeaways from the High-Tech analysis strongly resonate with the broader brand equity literature:

Resilience during Crises is a Hallmark of Strong High-Tech Brands: High-Tech brands, as a sector, have demonstrated remarkable resilience during global crises like the 2008 financial downturn and the COVID-19 pandemic. While other sectors experienced declines or stagnation, High-Tech brands generally maintained positive growth. This suggests that the products and services offered by High-Tech companies often become indispensable during times of disruption, reinforcing their value. Brand managers should leverage this inherent resilience by emphasizing the utility and stability of their offerings during uncertain times. This ability to maintain growth during crises is a recurring theme across industries, echoed by studies on auto brands [19], financial institutions [15, 16], and fashion brands [17]. This implies that strong brands, regardless of industry, possess an underlying robustness that helps them weather economic storms.

Country-of-Origin Effect: The consistent dominance of US High-Tech brands, particularly in software and internet services, mirrors observations in other sectors. Studies on financial institutions [15, 16] noted the strong influence of country of origin, with American institutions leading. Similarly, research on fashion [17] observed European dominance, while studies on auto brands [19] pointed to the declining dominance of American brands as Asian and European brands gained ground. This highlights that national identity and industry leadership often go hand-in-hand.

Maintaining Financial Thresholds: Brands like Canon, Xerox, Nokia, and Duracell, though still active, were discontinued from the Top 100 list because they no longer met Interbrand's rising profit thresholds. This emphasizes that strong brand equity is not solely about recognition; it's deeply tied to sustained financial performance and meeting evolving industry benchmarks. Brand managers must continuously monitor profitability and ensure their brand's economic value keeps pace with market expectations and competitive pressures.

The Imperative of Diversified Earnings: Brands must genuinely operate on a global scale. The discontinuation of brands like Dell, AT&T, and Texas, despite profitability, highlights that relying primarily on a home market (e.g., USA) and failing to meet the one-third international earnings criterion for global recognition can lead to exclusion from top-tier global brand rankings. Strategic expansion into North America, Europe, Asia, and emerging markets is not just about market share; it's fundamental to global brand status and perception.

Adapting to Evolving Market Standards: The increasing minimum brand equity threshold for Interbrand's Top 100 list, noted in the High-Tech analysis, points to rising industry standards. While not explicitly stated as a lesson in all prior studies, the continuous analysis of brand equity trends across auto, fashion, and financial sectors implicitly acknowledges that what constitutes a "top brand" evolves over time, requiring brands to continuously justify and grow their value.

5.1.2. Nuances and Distinct Lessons for High-Tech Brands

While many lessons overlap, the High-Tech sector presents some unique or more pronounced strategic implications:

Innovation as the Core DNA (More Pronounced in Hi-Tech): The analysis consistently shows that innovation drives brand equity. Apple's exceptional growth exemplifies continuous innovation in consumer electronics and its strong ecosystem. Similarly, Adobe's shift to a subscription model and AI integration, and Salesforce's cloud-based CRM with AI tools, demonstrate how adapting business models and integrating cutting-edge technology are crucial for sustained high growth. Conversely, the decline of Intel and IBM after 2018 signals the peril of failing to adapt to market shifts (e.g., competition, mobile, cloud computing). Brand managers must foster a culture of relentless innovation and be prepared to pivot strategically. While innovation is valued across all industries (e.g., fashion design, auto engineering, financial product development), the High-Tech analysis explicitly positions innovation as the primary driver of brand equity, directly contributing to market leadership and consumer loyalty. The pace and necessity of continuous, disruptive innovation appear more critical and direct contributors to brand value in High-Tech than in more traditional sectors like finance or even luxury, where heritage and craftsmanship might play a larger role (as implied by Siddiqui, 2021, on luxury brands).

The Rising Tide of Internet Services and Software Dominance: The data clearly indicates that Internet Services and Software/Business Services sectors consistently exhibit higher growth rates compared to hardware. Internet Services, in particular, showed rapid and significant growth. This underscores the strategic importance of digital platforms, cloud-based solutions, and subscription models. For brand managers, this means prioritizing digital product-led growth, community building (e.g., Airbnb, LinkedIn), and compelling content strategies (e.g., Instagram, YouTube). Even in software, brands like Adobe and Salesforce thrived by embracing cloud and AI.

Rapid Rise and Fall in Niche Areas: The incredibly rapid growth of Internet Services brands like Instagram, YouTube, Airbnb, Spotify, and LinkedIn, along with the equally swift decline of others like Facebook (Meta), indicates a highly volatile and competitive landscape within specific High-Tech sub-sectors. While auto or financial brands might experience declines, the speed of ascent and descent, driven by product-led, community-led, or content-led growth, seems particularly accelerated in internet services. This suggests brand managers in this area must prioritize extreme agility and continuous user engagement.

Hardware Challenges: The analysis points to stagnant growth in the US Hardware cluster and the decline of giants like Intel and IBM. This contrasts with the generally positive growth trends seen in fashion, auto (for resilient brands), and financial services. It implies that for hardware brands, maintaining relevance requires not just innovation but potentially deeper diversification into services (e.g., Cisco's focus on cloud) or entirely new segments (e.g., Nvidia's AI focus).

Power of "Giants" and Niche Strengths: The emergence of "High-Tech Giants" (Apple, Microsoft, Amazon, Google, Samsung) with massive Cumulative Brand Equity and high growth rates signals a winner-take-all dynamic in some segments. However, the success of specialized players like Nvidia (AI, gaming chips) and the resilience of traditional hardware brands like Cisco show that niche leadership and consistent innovation within a specific domain can also lead to long-term success. Brand managers should assess whether their strategy should aim for broad market dominance or deep specialization.

Digital Transformation as a Foundational Shift: High-Tech analysis highlights digital transformation as fundamentally changing how these brands interact with consumers and manage brand equity. While digital presence is crucial for all modern brands (fashion e-commerce, online banking, auto configurators), for Hi-Tech, it is about the very core of the business model (e.g., cloud services, AI integration, app-based platforms). This is a more inherent and defining aspect of brand management in Hi-Tech.

Managing Brand Portfolios is an Art: The case of HP splitting into HP Inc. and HPE demonstrates that strategic reorganizations can be vital for refining brand identities and focusing on core strengths. Similarly, the disappearance of brands due to mergers and acquisitions (e.g., Yahoo!, Motorola, AOL) highlights the need for brand managers to understand and plan for potential shifts in ownership and how they might impact brand equity. Managers must be prepared to manage complex brand transitions, whether through divestiture or integration. This is consistent with observations in the general context of global brand analysis [13].

In summary, while core principles of brand management like global reach, resilience, and adaptability are universally applicable, the High-Tech sector amplifies the criticality of rapid, continuous innovation and strategic digital transformation as central pillars for building and sustaining brand equity.

5.2. Limitations of the Research

This study, while offering valuable insights into broader market trends, had certain limitations that warrant consideration. Firstly, it provided limited focus on specific brands. While the research highlighted overall trends and growth patterns, it did not delve deeply into the individual brand strategies or internal factors that drove specific equity changes. Similarly, while the study observed brand resilience during global crises like the 2008 financial crash and the recent pandemic, it did not thoroughly investigate the specific strategies that enabled certain brands to thrive during these challenging periods. Secondly, the reliance on a single source of brand valuation data (Interbrand), while providing consistency, means the findings are inherently tied to Interbrand's specific methodology and criteria. Other brand valuation metrics might yield different insights, and a comparative analysis was beyond the scope of this research. Thirdly, the study primarily focused on quantitative trend analysis. It did not incorporate qualitative data, such as consumer perceptions, brand narratives, or expert interviews, which could offer richer context and deeper understanding of the "why" behind the observed brand equity shifts. Finally, while the research covered a significant longitudinal period (2001-2024), it inherently presents a historical perspective. Predicting future brand equity trends or providing prescriptive strategies based solely on past performance carries inherent uncertainties due to rapid technological advancements, evolving consumer behaviors, and unforeseen market disruptions in the dynamic High-Tech sector.

5.3. Need For Further Research

The current investigation, while shedding light on significant brand equity trends within Interbrand's longitudinal data of High-Tech brands, also illuminates several avenues for future inquiry. These limitations of the present research set a compelling agenda for subsequent studies. Firstly, a deeper dive into the causal factors driving the observed brand equity fluctuations is warranted. For instance, future research could explore the specific strategies, such as innovation pipelines, evolving marketing approaches, and customer experience improvements, implemented by High-Tech brands that have experienced sharp rises and declines (e.g., IBM, Intel, Facebook). Furthermore, it would be invaluable to uncover the in-depth reasons behind the discontinuation of specific brands from Interbrand's list, offering potential lessons for both emerging and established brands striving for sustained relevance. Secondly, understanding the broader contextual influences on brand equity is crucial. Future studies could investigate how cultural factors, such as collectivism and power distance, might influence High-Tech brand equity trends differently in Asian markets compared to the United States. Given the significant dominance of US brands within Interbrand's top rankings, exploring the specific barriers that might impede Asian and European brands from achieving similar growth in brand equity would provide critical strategic insights. Thirdly, a more granular analysis of brand equity dynamics is required. Beyond cumulative trends, future research could provide insights into brand volatility, examining year-to-year changes and identifying periods of significant instability or rapid growth. This could lead to the development of robust brand resilience mechanisms, investigating how specific brands adapt and thrive during global crises, and identifying replicable strategies for navigating turbulent market conditions. Finally, integrating brand equity analysis with broader market dynamics holds significant promise. Future studies could explore how brand equity insights can directly inform investment decisions or improve market predictions. Furthermore, overlaying these brand equity trends with financial market data (e.g., stock prices) could provide valuable validation and uncover stronger correlations between brand strength and market performance, as well as facilitate comparisons of High-Tech brand equity trends with other industries to identify unique strengths and areas for improvement.

5.4. Growth in Asian Hardware Brands Cluster

The Asian Hardware Brand Cluster includes brands from Asia offering consumer electronics and computer hardware. This cluster showed a moderate growth rate in brand equity, reflecting a steady increase in market value and presence.

5.5. Resilience of Japanese Companies Like Sony, Nintendo, and Panasonic

Japanese tech giant Sony's brand equity started at \$15 B in 2001, dropped to \$8 B in 2015, and again increased to \$20 B in 2024. Similarly, another gaming giant Nintendo's brand equity started from \$8 B in 2001 and dropped to \$4 B in 2014. Again in 2018, Nintendo appeared in the list with a brand equity of \$5 B and rose to \$12 B in 2024. Panasonic's brand equity remained relatively stable, with some fluctuations, peaking at \$6 B in 2024. Japanese companies have shown resilience over decades but face challenges in consistent growth due to market competition and technological shifts.

6. Declarations

6.1. Data Availability Statement

The data presented in this study are openly available in Mendeley Data at: <https://doi.org/10.17632/y8cv8hncf9.1>.

6.2. Funding

The author received no financial support for the research, authorship, and/or publication of this article.

6.3. Institutional Review Board Statement

Not applicable.

6.4. Informed Consent Statement

Not applicable.

6.5. Declaration of Competing Interest

The author declares that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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