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What if brand equity was alive? Proposal of a dynamic measure through social networks

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Abstract: There are two significant trends in the literature regarding evaluating a company's brand equity: the financial approach and the customer-based brand equity. However, the findings point out that the 'financial' approach is incomplete, and the 'consumer' method is difficult to generalise for a population. A new living conceptualisation of brand equity and its measure to address these shortcomings are proposed. More than 4,500,000 tweets from 23 companies that make up the Dow Jones Index have been collected daily over three months. The results show that a new approach based on social media to measure brand equity correlates with the different rankings of brands carried out by marketing agencies. Some indicators also significantly correlate with the company's stock market performance. As a result, a new valid measure of a brand's equity based on social media was born, covering both the consumer and financial perspectives simultaneously.

Keywords: brand equity; measurement; social network; stock market; brand valuation; notoriety.

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1 Introduction

There are different ways to evaluate brand equity. While several theories have been proposed throughout academic literature since Farquhar's (1989) work, there does not appear to be a consensus on an ultimate measure to assess brand equity (Christodoulides et al., 2015; Christodoulides and Chernatony, 2010; Davcik et al., 2015; Yoo et al., 2000; Yoo and Donthu, 2001). Brand equity is an aggregate of a brand's positive and negative effects on product performance (Aaker, 1991, 1996; Keller, 1993; Yoo and Donthu, 2001). Thus, despite much research, there is no consensus as to whether brand equity should be assessed from the company's point of view (by considering, for example, the increase in sales volume, the price strategy, the cash flow, projected sales, profit, and income) (Simon and Sullivan, 1993) or from the customers' point of view (by assessing their perception of the brand, their level of loyalty and awareness, their attitudes and beliefs) (Aaker, 1996; Ailawadi et al., 2003; Keller, 1993; Yoo and Donthu, 2001). Indeed, the measure of brand equity with industry metrics makes it possible to isolate the value of brand equity from a company's market value and capture its fluctuations (Hinestroza and Lions, 2017; Simon and Sullivan, 1993)[1].

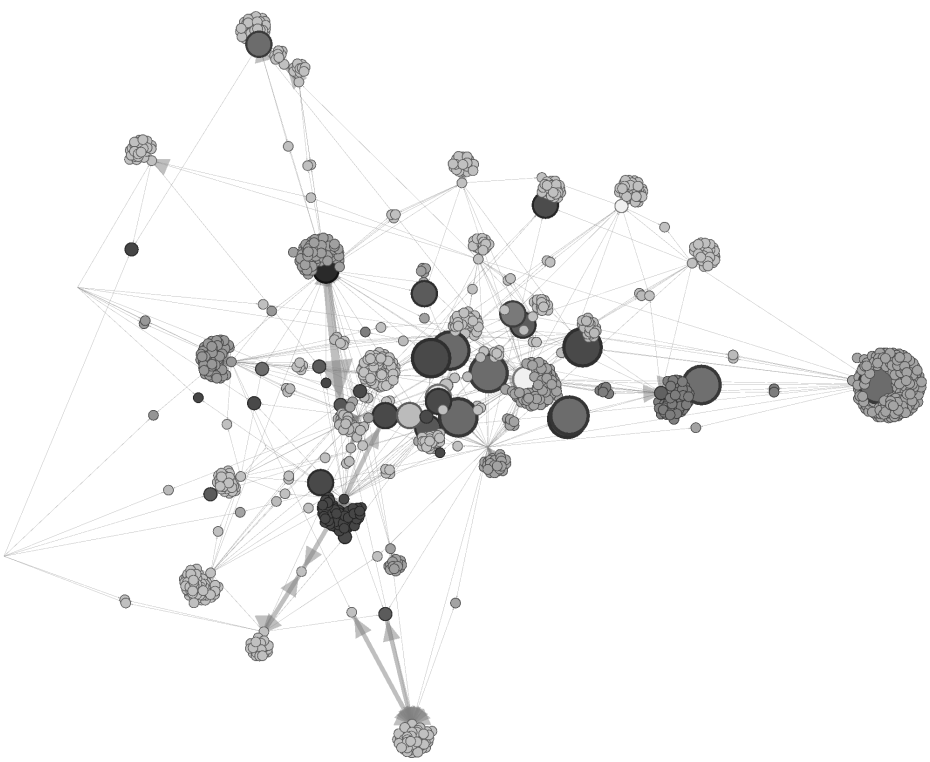
On the other hand, the cause of these fluctuations depends mostly on consumers' perception of the brand (Keller, 1993; Trespeuch et al., 2021). Therefore, should brand equity not combine consumer perception and the financial approach? The study of social networks seems ideal for capturing this globally. Social networks have a few weaknesses, but they also offer the advantage of gathering a large amount of data on consumers' perceptions. In this research, we hypothesise that a portion of brand equity may be captured by analysing interactions on social networks. Inspired by previous work, we present a new approach to measure the brand equity components influenced by consumers and linked to the companies' economic indicators. This article follows a

classic outline and concludes with theoretical, methodological, and managerial findings and implications.

2 Literature review

The brand is a broad area of marketing research. To put forward a holistic view of the brand concept, connections between 1,904 research articles on the topic have been analysed with the software Gephi. Gephi is a graph visualisation software with built-in graph algorithms. All paper bibliographies of peer review articles related to the brand have been aggregated. The graph is composed of 1,904 nodes and 2,130 edges. Then, the algorithm of AtlasForce 2 was used to give the graph shown in Figure 1 (Jacomy et al., 2014). The node size in figure A represents the level of importance of the article by the number of times it was cited in other documents. Looking only at the bigger node, the graph shows that the most important paper theorising about brand and brand equity are similar base on the sources they used since they are close. One exception appears on the right of the graph. The paper: 'Possessions and the extended self' by Belk (1988) is different from others brand theories as it explores how consumers use brands as an extension of themselves.

Figure 1 Graph representation of the similarity of articles analysed in this study via the Gephi software using the Altafoce2 algorithm



This method makes it possible for key articles to be rated according to the level of notoriety of other research on the concepts investigated in this study: brand and brand equity. Additional manual literature research has been done to complement this technique. In summary, the graph presents the main papers published in the field of brand equity not only based on the number of times a given article was cited in other research but also considers the importance of the paper it was cited on.

A bibliographic literature review on brand equity Rojas-Lamorena et al. (2022) shows that most of the literature on brand equity was produced in 1990. Few new definitions regarding the measure of brand equity have yet to emerge. It this possible to categorise all the definitions into two approaches: the financial or corporate perspective and the consumer-based perspective.

2.1 Brand equity in a corporate perspective

Simon and Sullivan (1993) have put forward a measure of brand equity based on the positive impact of cash flows generated by marketing efforts on the company's competitive advantages. This measure links the value of brand equity to the company's market capitalisation by excluding all tangible assets to obtain a value: the value of brand equity (Lander and Reinstein, 2003). However, there are limitations to this measure. It can only be applied to publicly traded companies that are sufficiently well-known to the public. It would also appear that only major announcements analysts do not expect a visible effect on a stock's price. Finally, the company's minor actions or gradually announced changes seem extremely difficult to capture and quantify with this analysis technique. Despite this, this theory is fascinating as marketing actions impact the company's brand equity and market value (de Mortanges and van Riel, 2003).

Another technique, halfway between the company's and the customer's approach to brand equity valuation, is to determine the willingness to pay, i.e., what prime price a consumer is willing to pay for a branded product compared to a competing or private brand product (Ailawadi et al., 2003). This amount represents the product's brand equity value. However, one of the limitations of this approach is that the choice of a national brand product versus that of a private label will be based on the perceived quality difference and consumer willingness to pay to make up for that difference (Sethuraman, 2000). This technique also does not consider differences in quality, which are often higher for more expensive products (Simon and Sullivan, 1993). Finally, as many authors point out, a significant shortcoming of assessing brand equity from an industry perspective is that there is no natural way for managers to influence brand equity easily: these actors give the measure but not the cause (Ailawadi et al., 2003; Keller, 1993; Simon and Sullivan, 1993). When carrying out corporate mergers or acquisitions, the managers responsible for the negotiations will place a high value on their coveted company's market share or customer loyalty (Mahajan et al., 1994), while others will acquire a business to take advantage of its superior brand equity (Lee et al., 2011). It is, therefore, essential to understanding what influences brand equity. To do so, we need to study the other point of view that has been documented in the literature.

2.2 Consumer-based brand equity

Aaker (1991, 1996) has developed a model based on ten measures to assess brand equity from the consumer's point of view. Most elements of Aaker's model (1991, 1996) are

based on the consumer's brand perception. Keller (1993, p.8) defines brand equity as: "the differential effect of brand knowledge on the consumer's response to the brand's marketing mix". Keller's (1993) major contribution has been to propose a model that links marketing mix actions to the elements influencing the value of brand equity consumers perceive. However, one of the main problems with these models is that there is a need to distinguish between three types of consumers (consumers who are loyal to the brand, consumers who are loyal to another brand, and consumers who change their preferred brand), and to evaluate brand equity in isolation for these three consumer segments (Aaker, 1996). Moreover, these measures are static, the findings appear to vary depending on the number of resources invested, and these two proposed measures are subjective from one individual to another.

However, Yoo and Donthu (2001) were the first to develop a global scale to measure the value of brand equity seen by the consumer. Their findings were to distinguish and confirm, notwithstanding the type of consumers, and their nationality, the three main dimensions that make-up brand equity, i.e., loyalty, perceived quality, and brand awareness. Despite this, more recent research shows that the different definitions of dimensions that make up the various visions of brand equity seen by the consumer are blurred and lack a clear distinction between the dimensions proposed by Aaker (1991) and those of Keller (1993) (Agarwal and Rao, 1996; Cummings and Worley, 2008; Mackay, 2001; Pappu et al., 2005; Raggio and Leone, 2007; Romaniuk et al., 2017). The measures proposed by Aaker (1991) also have a weakness in the territory. The brand's value may vary according to its international presence and where the study is carried out (Christodoulides et al., 2015; Christodoulides and Chernatony, 2010; Lee et al., 2008; Romaniuk et al., 2017). With market globalisation, there is a need to address this shortcoming and measure brand equity as a whole.

Other research, such as the works of Kamakura and Russell (1993) and Park and Srinivasan (1994), defined brand equity as the amount consumers are willing to pay for a product. Park and Srinivasan (1994) proposed three measures to capture this value. In short, their research differentiates between the tangible and intangible aspects of brand equity and establishes a measure based on aggregated industry data from specialised firms (e.g., Nielsen). However, this approach only allows for an assessment of the brand's value in the past. It does not provide forecasts for its current or future value (Simon and Sullivan, 1993).

A method based on customers' actual choices would make it possible to move away from the subjective aspect of surveys. Still, it does not allow findings to be generalised across different product categories (Kamakura and Russell, 1993). The advantage of studying brand equity from the customer's point of view is that it makes it much easier to develop marketing actions to influence brand equity (Faircloth et al., 2001; Keller, 1993). The customer-based brand equity highlights the aspects of the brand that need to be studied and the actions the manager can take to strengthen or change their company's brand equity value. The downside is that the measure is easily influenced by the company's marketing actions and competition and is challenging to generalise (Austin et al., 2003).

Baalbaki and Guzmán (2016) proposed the development of a scale for measuring brand equity based on customer perception. The dimensions identified by the consumer are quality, preference, social influence, and sustainability. These measures are like the

concepts already put forward by previous studies, but Baalbaki and Guzmán's (2016) contributions confirm their relevance in the eyes of consumers.

2.3 Brand equity seen by customers and social networks

Social networks allow two-way communication between the customer and the brand. This 'bidirectional communication' translates into increased loyalty and strengthens the consumer's link and attachment to the brand image conveyed by a company (Dessart et al., 2015). Customers who have committed to a corporate Facebook page are more positive in their assessment of brand awareness, engage in positive word-of-mouth activities, and have more favourable purchase intentions (Hutter et al., 2013; Seo and Park, 2018). The study by Bruhn et al. (2012) also determines that communications on social networks significantly impact brand image compared to traditional media.

A survey among young university students shows that their perception of a brand is influenced by its image on social networks (Sasmita and Mohd Suki, 2015). Similarly, a study by Seo and Park (2018) demonstrates a significant link between the brand's communications on social networks and the dimensions of brand equity in the aviation industry. Studies by Karamian et al. (2015) and by Handayanto (2016) confirm the influence of social networks on all dimensions of customer-based brand equity. Virvilaite et al. (2015) highlight the positive impact of word-of-mouth activities on evaluating brand equity from the customer's perspective in the luxury products industry. These studies are encouraging to confirm a relationship between brand equity and social networks. Still, they have one central limit: they have been carried out on small samples and/or in a highly targeted industry.

They are also many other ways that influence the measure of brand equity. Igles et al. (2019) show that the sensory experience customer receives interacting with the brand can ultimately impact brand equity. Arya et al. (2022) show that brand communication through a social network can influence consumer-based brand equity. They were also many different industries in which studies have been carryout.

In summary, the differences in stakeholder valuation reflect the intangible and speculative nature behind establishing the value of brand equity. The consumer approach captures the differential effect of brand knowledge on the consumer's response to the marketing mix. The effects are the foundation of the financial brand equity valuation using the financial approach. This approach captures the intangible value resulting from the difference between the acquisition price and the value of a company. This difference is dependent on all the consumers' actions and perceptions. As a result, a large portion of the fluctuations in brand equity value is due to the recognition and image of a brand in the customer's mind. At the same time, the living character of the brand according to consumers and marketing actions has received little attention in most marketing research that provides a picture of brand equity at a given time. To address these issues, this research proposes the following definition: The brand is a living concept that evolves according to consumers' perceptions and companies' marketing actions. Therefore, the best way to account for the brand's life is to analyse the interactions between consumers and businesses.

3 Methodology

To build and test the proposed brand equity measure, 4,500,000 tweets from 23 Dow Jones companies (present in Table 3) were collected from 1 September to 30 November 2019. The data have been aggregated daily and obtained via Twitter. The data was collected right before COVID-19 became a worldwide crisis. Tweets were filters to remove spam and commercial products associated with the brand without being about the brand.

All hashtags (#), user mentions (@), and 'cashtags' ($) related to the selected companies have been captured. The choice to use Twitter as a data source was mainly because consumers actively 'talk' about brands on this platform (Abney et al., 2017; Jansen et al., 2009; Parmar, 2015). In addition, 'cashtag' ($) captures the conversation around financial security. It is used by people or organisations that are financially involved in tracking the company's economic value (Hentschel and Alonso, 2014). For all these reasons, Twitter is the social network best suited to capture the value of brand equity that combines the perspective of both the customer and the industry.

The remaining seven companies from the Dow Jones have not been considered. They were not generating discussion online mostly because they were not related directly to consumers (e.g., Honeywell, UnitedHealth, and others.), or they were operating under too many names (e.g., Walt Disney). The list of companies that composed the Dow Jones changed over time. The composition of the index as of September 2019 was retained.

Only tweets in English were kept regardless of their geographical location. Then spam or commercial tweets were removed from the dataset. All tweets with more than six hashtags or four user mentions (@) were considered spam and removed. Also, all duplicate tweets were removed. Variables were created when the data was aggregated by day.

4 Analysis

4.1 Customer-based brand equity

To assess the relevance of this measure against other 'customer' measures, a ranking of the 23 companies was carried out and compared with the rankings produced by reputable agencies. There are substantial disparities between the various rankings, so four sources have been combined to create an average ranking. Analysing the data obtained via Twitter makes it possible to create a ranking with the sum of the number of tweets issued about a brand.

The sum of all interactions with a brand (i.e., the number of unique users that had tweeted about the brand) on Twitter can be used to rank brands in order of significance regarding brand equity. We grouped and counted the users who 'talked' about a brand on Twitter daily. Even if a user talks multiple times about a brand in a day, it was considered for calculation only once. The results in Table 1 show a high correlation between the selected companies and their average ranking by the different marketing agencies. The average ranking was obtained by calculating the average of the other rankings. If a company is absent from a ranking, it is assigned the last position in the ranking from which it is absent. Given the high level of variation between agencies rating the

companies' brand equity, a position of plus or minus three is deemed correctly ranked. Thus, the results are consistent with those of the industry; 15 out of 23 companies have a similar ranking to that offered by specialist firms.

Table 1 Findings of the ranking of companies with the consumer approach

Company	*Interbrand (2019)*	*Forbes (2019)*	*Financial Times (2019) (agency: BrandZ)*	*BrandFinance (2019)*	*Average rank*	*Ranking by number of tweets*
	Top 100	*Top 100*	*Top 100*	*Top 500*		
Apple	1	1	2	2	1	**1**
Microsoft	4	3	4	4	2	**2**
Mcdonald's	9	10	9	43	3	**4**
IBM	12	20	13	40	4	**7**
Nike	16	14	21	41	5	**3**
American Express	23	27	33	53	6	18
Visa	55	25	5	52	7	13
Verizon	Ø	19	11	9	8	**6**
Cisco	15	15	42	72	9	**10**
Walmart	Ø	26	32	11	10	5
Home Depot	Ø	32	19	22	11	**11**
Chase	25	56	67	37	12	**12**
Intel	Ø	13	36	50	13	9
*Boeing**	Ø	Ø	Ø	42	14	8
Chevron	Ø	Ø	Ø	99	15	20
JNJ	86	Ø	Ø	120	16	**16**
Goldman Sachs	53	80	Ø	174	17	**14**
Exxon Mobil	Ø	Ø	80	129	18	**15**
3M	64	Ø	Ø	209	19	23
Caterpillar	76	87	Ø	262	20	**19**
Pfizer	Ø	Ø	Ø	421	21	**21**
United Technologies	Ø	Ø	Ø	464	22	**22**
P&G	Ø	Ø	Ø	Ø	23	17

Notes: Ø – if a company is absent from a ranking.
In bold – significant data.
**Boeing* was at the heart of a scandal when the data was collected. Therefore its ranking score is not valid.

4.2 Financial Approach

To verify the validity of this study's brand equity construct, a correlation test between daily grouped dimensions of the brand's living equity grouped and the daily stock market performance indicators of the Dow Jones has been created. Financial data was obtained

with a financial data provider (Algoseek)[2]. Financial markets are not open every day. Only the day that the market was open was retained for the financial approach. Data were aggregated by day, and the financial metric used for testing correlations was the stock price variation in a day. The dataset used in this study is composed of 2,070 observations.

- X_1: stock price variation of the Dow Jones in a day

Using SPSS, Pearson correlation tests have been produced between the stock performance (financial data) and concepts of brand equity represented by social media metrics. Pearson correlation makes it possible to measure the strength of the linear association between variables of two datasets (Pearson, 1895; Schober and Schwarte, 2018).

The equation used to express the correlation between the Dow Jones and concepts of brand equity measure from social media can be expressed as follows:

$$r_i = \frac{cov(X_1, Y_i)}{\sqrt{s_{X_1}^2 s_{Y_i}^2}} \tag{1}$$

where

$$cov(X_1, Y_i) = \frac{\sum (X_1 - \bar{X}_1)(Y_i - \bar{Y}_i)}{2{,}069} \tag{2}$$

Tree categories of variables were used to represent different facets of brand equity as described by Aaker (1991). Notoriety is represented by the number of tweets each day. The more tweet related to the brand, the more notorious the brand became on social media. However, one user can tweet multiple times in a day. The number of users that had tweeted about the brand is an alternative measure to consider the brand's notoriety on social media:

- Y_1: number of tweets about the brand
- Y_2: number of users that had tweeted about the brand.

Alternative variables are proposed to measure the notoriety. Regardless of the frequency, the number of tweets emitted by a verified user can influence the level of notoriety the brand gets. Users can obtain verified status by requesting Twitter. This status will be granted if the Twitter account is of public interest (Twitter.com, 2020). Notoriety can be influenced when notorious people or organisations are talking about your brand (Ante, 2023):

- Y_3: number of tweets from users having a verified status

Finally, using a hashtag (#) is an alternative for the notoriety evaluation of a brand on social media. The previous variable measured notoriety by capturing tweets containing the brand's name anywhere inside the tweet. Maybe people who use hashtags to talk about a brand are affecting it differently. Therefore, those variables are proposed:

- Y_4: number of tweets that have the brand name as a hashtag (#)
- Y_5: number of users that tweet the brand name in a hashtag (#)

To assess the brand association concept of brand equity (Aaker, 1991), the number of tweets that have @ (user mention) of a brand were aggregated by day. Some users use the @ more than once a day, trying to interact with the brand. To distinguish the effect, two variables were designed:

- Y_6: number of times a brand was mentioned (@) in a day
- Y_7: number of users that mentioned a brand (@) in a day.

Finally, customer-based brand equity could be captured using a sentiment analysis of the text that composes the tweet. To do so, the software Vader designed for analysing the feelings expressed in texts and adapted to social networks was used (Hutto and Gilbert, 2014). The Vader software provides multiple sentimental analysis scores. The compound score was retained in this study as it is the most used by researchers using the software (Hutto and Gilbert, 2014):

- Y_8: sentiment analysis (Vader compound).

Table 2 Correlation between the brand's equity capital elements and the financial data

		Pearson correlation	*Sig. (two-tailed)*	*Tweets (n)*
Y_1	Number of tweets about the brand	0.081	0.010	2,070
Y_2	Number of users that had tweeted about the brand	0.800	0.012	2,070
Y_3	Number of tweets from users having a verified status	0.087	**0.006**	2,070
Y_4	Number of tweets that have the brand name as a hashtag (#)	0.089	**0.005**	2,070
Y_5	Number of users that tweet the brand name in a hashtag (#)	0.078	0.014	2,070
Y_6	Number of times a brand was mentioned (@) in a day	0.065	0.040	2,070
Y_7	Number of users that mentioned a brand (@) in a day	0.086	**0.007**	2,070
Y_8	Sentiment analysis (*Vader Compound*)	0.057	0.071	2,070

Notes: In bold – significant results.
The correlation tests were conducted with the daily market change of the Dow Jones index. Weekends and public holidays were excluded from this analysis, i.e., 2,070 = 90 days * 23 companies.

The results presented in Table 2 show that several social network indicators correlate with a brand's stock market performance. The indicators 'number of tweets from users having a verified status', 'number of tweets that have the brand name as a hashtag (#)', and 'number of users that mentioned a brand (@) in a day' have a significant correlation with the price variation of its share on the stock market. Two of the variables that significantly correlate to brand equity represent notoriety.

Brand awareness is the most important factor in attributing value to brand equity (Romaniuk et al., 2017). An additional experiment has been done to see if there was a direct link between companies and brand awareness. Social media is the ideal place to capture brand awareness and engagement with a brand (Bilgin, 2018). Additional Pearson correlations tests have been conducted using SPSS to validate further that brand equity concepts from Twitter correlate to the financial brand equity of the brand.

- X_{2j}: stock price variation of a brand (j) in a day
- Y_2: number of users that had tweeted about the brand.

Table 3 Correlation between social media brand equity and financial data

Business	*Pearson's correlation*	*Sig. (two-tailed)*	*n*
3M	0.076	**0.001**	2070
AmericanExpress	–0.020	0.396	2070
Apple	0.113	**0.000**	2070
Boeing	0.256	**0.000**	2070
Caterpillar	0.090	**0.000**	2070
Chase	0.149	**0.000**	2070
Chevron	0.055	**0.017**	2070
Cisco	0.208	**0.000**	2070
DowJones	0.146	**0.000**	2070
ExxonMobil	0.038	0.095	2070
GoldmanSachs	0.182	**0.000**	2070
HomeDepot	0.078	**0.001**	2070
IBM	0.142	**0.000**	2070
Intel	0.065	**0.003**	2070
JNJ	0.205	**0.000**	2070
McDonald's	0.102	**0.000**	2070
Microsoft	0.133	**0.000**	2070
Nike	0.021	0.341	2070
P&G	0.106	**0.000**	2070
Pfizer	0.266	**0.000**	2070
UnitedTechnologies	0.056	**0.025**	2070
Verizon	0.052	**0.025**	2070
Visa	0.027	0.226	2070
Walmart	0.077	**0.001**	2070

Notes: In bold – significant data.
The correlation tests were conducted with the daily market change of the Dow Jones index. Weekends and public holidays were excluded from this analysis, i.e.: 2070 = 90 days * 23 companies.

Each business correlations between its notoriety, represented by the number of tweets, and its stock price representing its value, can be expressed as follows:

$$r_j = \frac{cov\left(X_{2j}, Y_2\right)}{\sqrt{s^2_{X_{2j}} s^2_{Y_2}}} \tag{3}$$

where

$$cov\left(X_{2j}, Y_2\right) = \frac{\sum\left(X_{2j} - \bar{X}_{2j}\right)\left(Y_2 - \bar{Y}_2\right)}{2{,}069} \tag{4}$$

The correlation between each brand that composes the Dow Jones using the 'number of users that had tweeted about the brand' (representing awareness) with its stock market performance is present in Table 3. This reinforces the link found in Table 2. Notoriety concepts from brand equity theory measured with Twitter metrics are correlated to business value individually.

5 Discussion

5.1 Theoretical implications

This research has made it possible to demonstrate the intrinsic link between consumer perception and the financial value of brand equity. Contrary to the pioneering work of Aaker (1991), Keller (1993), Agarwal and Rao (1996), and consistent with the more recent results of Mackay (2001), Sasmita and Mohd Suki (2015), Seo and Park (2018) and Karamian et al. (2015), this study highlights that brand awareness is the most important element for ranking brands from a customer perspective. For their part, influencers, brands with 'verified' status, and interactions specific to the social network Twitter (#, $, and @) significantly influence brand equity's financial value, as correlations have been observed with daily stock market variations. This is consistent with what has been presented in the literature. Users with verified status are primarily public figures and amplify their effect on a company's brand equity (Dwivedi et al., 2015). The number of hashtags impacts the share price in most of the cases studied in Hentschel and Alonso's study (2014), and a correlation of the same nature (between the number of tweets and the stock market variation) has been observed in the data analysed in this study. Using user mentions (@) increase the interactivity and reach of messages on Twitter and thus affects the awareness of the message (Burton and Soboleva, 2011).

Only tweets posted during the stock market's open days were collected to obtain this correlation. Therefore, weekends and public holidays were excluded. Other social media (Facebook and Instagram) have been used to compare the results and see if the results could be reproduced with other social media. Table 4 present the results of the aggregated data from other social media. The result shows that only Twitter has correlated variables with the stock market performances and gives results highly like what other agencies present. Twitter gives better results mainly due to extracting interaction from a specific period. Other social media provide a sum of the total like or interactions.

The dynamic nature of brand equity can be captured by intraday variation of its popularity on Twitter and can be used by managers to evaluate and understand brand equity. This research has made it possible to demonstrate the intrinsic link between consumer perception and the financial value of brand equity. In connection to what Simon and Sullivan (1993) have put forward and de Mortanges and van Riel (2003), the awareness level influenced by marketing actions is much more significant than expected in establishing brand equity value. This study also highlights the heavily theoretical aspect of brand equity value. In future research, it would be relevant to distinguish between stock market speculation and speculation related to the value of brand equity in a concrete way.

Table 4 Other social media

Business	*Number of tweets*	*Number of 'likes' on Facebook official page*	*Number of 'fans' on Instagram*	*Number of publications associated with the # of the brand on Instagram*
Apple (1)	906,815	12,772,426	23.6M	32,968,395
Microsoft (2)	484,439	13,962,723	2.7M	3,289,366
Mcdonald's (3)	326,903	80,576,999	3.8M	7,664,661
IBM (4)	149,811	1,097,548	353K	372,193
Nike (5)	395,798	35,111,718	120M	104,569,999
American Express (6)	65,284	7,928,683	409K	203,200
Visa (7)	57,328	22,786,154	NA	NA
Verizon (8)	134,473	7,284,696	226K	339,500
Cisco (9)	91,551	NA	386K	455,934
Walmart (10)	299,228	34,216,050	2.4M	3,253,714
Home Depot (11)	74,315	5,154,401	1.1M	880,906
Chase (12)	91,810	3,981,759	176K	1,578,182
Intel (13)	92,790	37,441,783	1.5M	955,242
Boeing (14)	193,746	1,471,428	1.4M	5,387,130
Chevron (15)	26,894	1,189,108	44.1K	1,270,503
JNJ (16)	48,255	826,504	27.2K	112,420
Goldman Sachs (17)	65,221	244,773	133K	53,649
Exxon Mobil (18)	58,935	3,107,882	63.8K	47,098
3M (19)	74,099	4,295,226	169K	1,995,601
Caterpillar (20)	26,770	1,796,271	625K	2,534,488
Pfizer (21)	29,470	373,477	35.8K	46,809
United Technologies (22)	19,721	43	7K	1,349
P&G (23)	29,710	5,649,153	146K	7,696

Note: In parentheses () the position number from the top 100 brand equity publish by brand marketing agencies.

5.2 Methodological implications

From a methodological point of view, this study demonstrates that the analysis of freely available big data provides a much more comprehensive real-time overview. More specifically, it captures the perceptions of a population (those who use social networks) on a given subject. This modern, borderless approach is based on instant data collection. It does not replace other information-gathering tools (Matz et al., 2017), but it should be seen as a new complementary instrument. It proposes a new valid alternative to measure brand equity at any moment without relying on an external marketing firm or being based on financial data. It opens the door to assessing the value of brand equity for smaller businesses and industries that are hard to evaluate with standard procedures. This methodology addresses the problems of territorial boundaries and the differences between the methods of brand equity analysis raised by Romaniuk et al. (2017) and

Christodoulides et al. (2015). In addition, research criteria can be applied to compare brand perception by territory following the methodology of Lee et al. (2008).

5.3 Managerial implications

This study suggests that companies should be on social networks to monitor trends affecting them or their industry (Vernette et al., 2012). Following the work of Dessart et al. (2015) and Sasmita and Mohd Suki (2015), strategic monitoring of interactions on social networks makes it possible to increase consumer engagement and, therefore, the level of awareness. In addition, this study highlighted that the influence of public figures affects the value of brand equity. Consequently, it is advisable to include influencers' strategies in their marketing plan. Brands that interact directly with the community on Twitter greatly increase the number of user mentions (@) and thus the value of their brand equity. Brands on social networks are encouraged to listen to the community and generate discussion around their brand. Indeed, this research shows the impact of user-brand interactions on the valuation of brand equity. As argued by Bruhn et al., (2012) states that consumer communications do not need to be positive to increase brand awareness. Different customer interactions with a brand enhance the brand's value from a customer perspective (Robinot et al., 2021). Furthermore, increasing the number of posts, including a (@) or a (#), or having a more significant number of tweets from a verified user significantly increases the reach of the message and therefore impacts electronic word-of-mouth and the chances of the company's message being picked up by other users (Soboleva et al., 2017).

5.4 Limits

This study is not without its limits. For example, the data were collected over three months. A more extended collection period and a larger sample of companies in different industries could strengthen the study's external validity. This model is also only valid for companies that generate online discussions. The study's findings consider brand awareness, which may be over-represented. Also, to improve the study's external validity, it might be interesting to compare the results of this approach against questionnaire-based measures (Fournier, 1998; Nyffenegger et al., 2014). In addition, it would be appropriate to distinguish the impact of communications by multinationals [e.g., Proctor and Gamble (P&G)] on its subsidiaries (e.g., Pampers) and subsidiary-specific communications on the value of brand equity. The 'standard API' of Twitter was used to obtain the data, which introduces a source of bias. As mentioned by the company, the data source is incomplete; "it is important to know that the standard search API is focused on relevance and not completeness" (Twitter.com, 2019). On the other hand, the 'standard API' is generally sufficient to prove a concept (Morstatter et al., 2013). Finally, since Twitter was bought by Elon Musk, many people have left the platform, and a debate is occurring about how many bots are producing content (Alsmadi and O'Brien, 2020). This led to even more scepticism about scientific discoveries made possible with this tool as manipulation of the data is possible (Ante, 2023).

6 Conclusions

This research has laid the foundations for a new and living approach to brand equity by proposing a new and alternative way to assess brand equity. The main advantage is to offer a real-time view that integrates the different events of a brand's life that move according to the perception of customers toward brand actions. To go even further, it would be interesting to analyse brand interactions with their customers on Twitter to gather what is essential for them regarding business sustainability. With environmental and social challenges becoming mainstream, brand managers are integrating sustainability principles into their practice, and sustainability matters are now part of the brand characteristics (Clément et al., 2022). Specific elements that define the brand could be the focus of further research using the methodology proposed in this paper. Ultimately, this research provided a novel way to evaluate brand equity and is an additional tool for managers or academics who want to measure business brand equity.

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Notes

1 For example, the Interbrand Agency (2018) reports that a single marketing campaign by Nike backed by Colin Kaepernick has allowed them to increase their market value by 6 billion dollars, and to increase the value of Nike's brand equity by 11% that year.

2 AlgoSeek is a financial data provider: https://www.algoseek.com.