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When are apps worth paying for? An analysis of the market performance of mobile apps

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When Are Apps Worth Paying For?

An Analysis of the Market Performance of Mobile Apps

Abstract

Through the use of established marketing laws such as the brand usage and image relationship and the Double Jeopardy effect, this research shows how to analyze the market performance of different types of mobile apps. The key empirical findings are as follows: apps linked to an offline/online brand attract more users and obtain stronger brand image if made available to consumers at no cost; apps branded independently attract more users and obtain stronger brand image if offered at a price. These outcomes significantly add to existing knowledge about branded apps, and demonstrate that longstanding marketing laws support the understanding and evaluation of market trends in the mobile digital context. These findings also translate into practical guidelines relevant to managers of existing brands wanting to launch an app, as well as managers wanting to market apps as stand-alone digital products.

Key words: *Mobile apps, brand usage, brand image, Double Jeopardy.*

1. Introduction

Benefiting from the high levels of penetration of mobile digital technologies (over 2.6 billion smartphones and two hundred million tablets worldwide, Gartner, 2015), mobile apps (thereafter *apps*) are widely available to large masses of consumers. To date, there is approximately 1.6 million apps marketed through the leading app stores (Statista, 2015), and the overall industry of apps contributes to about 3.8% of the GDP in the US alone (e-marketer, 2014) and \$16.5 billion of Europe's GDP (The Guardian, 2014). It is therefore not surprising that apps feature in the promotional mix of many organizations, and are a 'go-to' option for new ventures and start-up initiatives.

A key reason for the relevance of apps is that they function as 'brand in the hand' (see Sultan and Rohm, 2005), enabling consumers to access products and services anytime and anywhere (Wenzel et al., 2012). As such, they can be used as owned media to successfully promote existing brands. For example, Tiffany and Co. (jewelry brand) experienced an increase of 20% in sales after launching their 'ring finder' app (Paceco, 2016); similarly, Domino's pizza franchising experienced a 19% increase in revenues after introducing their app (The Independent, 2015). Apps can also be successfully marketed and branded as a stand-alone digital product, as exemplified by the great success of the Whatsapp app, which was valued at \$19 billion US dollars when recently acquired by Facebook (Forbes, 2014).

As apps become more widely available and embedded in market strategies of both existing as well as new products and services, the need for theoretical and practical guidelines emerges. Specifically, from a theoretical perspective, it becomes necessary to determine whether established empirical marketing laws are suitable to understand and evaluate the performance of apps in competitive settings. Similarly, it is of paramount importance to have practical guidelines that can support strategic marketing decisions in relation to apps, and identify how to optimize the market potential of apps (see also Bellman et al., 2011).

The present study answers this call and focuses on addressing two key research questions, as follows: Rq1: *How can we understand and evaluate the market performance of different types of apps?* And Rq2: *What types of apps are likely to attract more users and to obtain a stronger brand image?* Specifically, we draw on existing research on the brand usage and image relationship (Bird and Ehrenberg, 1970; Bird, Channon and Ehrenberg, 1970) and Double Jeopardy pattern (Ehrenberg and Goodhardt, 2002) to reveal some new knowledge and fundamental facts about apps. These well-established empirical marketing laws enable researchers to assess brand performance in competitive settings (Barwise and Ehrenberg, 1985), to understand consumer response to positioning and differentiation strategies (Low and Lamb, 2000; Dillon et al., 2001; Myers, 2003; Stocchi et al., 2015) and to model the mental availability of brands (Romaniuk, 2013). In the context of this study, these laws provide the basis for generating novel theoretical and practical insights in relation to how businesses can understand and evaluate the market performance of different types of apps, i.e. apps linked to an offline/online brand vs. branded independently; and free vs. paid apps.

To pursue the above objectives, we calculate a series of performance metrics linked to brand usage and brand image for individual apps falling into each category of apps examined, and appraise them against expectations based on the two key marketing laws considered. The metrics originate from a large set of consumer panel data ($N = 2,473$) gathered in Italy by a commercial provider (Nextplora) and featuring 47 apps, which we analyze and compare through the use of a mathematical model embedding the two key marketing laws considered (the Dirichlet, *see* Sharp et al., 2012), sample testing and regression techniques, while taking into account the potential influence of apps' characteristics such as ease of use and usefulness (e.g. Cyr et al., 2006) and the consumers' reasons for choosing apps that they need to pay for.

Importantly, the present work differentiates itself from existing research in two ways. In respect to existing works on the empirical laws considered, it warrants further analysis

because it shows how to use these laws in a fundamentally new and unique industry (apps); this expands the confines of current knowledge of consumer buying behavior regularities, which thus far has been primarily based on offline non-digital contexts. In terms of existing research on apps and mobile commerce, published works have focused on understanding the drivers of technology adoption (e.g., Tojib and Tsarenko, 2012) or examining consumer attitudes and usage intentions at a general level (e.g., Gao et al., 2013) or for a very limited range of apps (e.g. Bellman et al., 2011). No existing research has examined specific types of apps or individual apps. In fact, most research on apps is an adaptation of technology uptake models (e.g. Bauer, et al., 2005; Pedersen, Methlie and Thorbjornsen, 2002; Pagani, 2004; Wu and Wang, 2005; Cyr, Head and Ivanov, 2006; Sultan et al., 2009; Shankar et al., 2010). Although important, understanding what underpins the uptake of apps does not offer any guidance on how to understand and evaluate the performance of apps in competitive settings. In contrast, the present research offers these insights.

2. Relevant literature

2.1 Brand usage, brand image, and empirical marketing laws

Brand usage – or the ‘*usage factor*’ as per Castleberry and Ehrenberg’s (1990) words – refers to the number of consumers who buy or use the brand, as inferred from claimed recency or frequency of use of a given brand in the context of consumer surveys. Brand usage is important because it provides an indication of current purchase behavior and it underpins how consumers perceive brands (Barnard and Ehrenberg, 1990), which refers to the concept of *brand image*.

Existing research offers multiple definitions of brand image, which are often revisited according to the conceptual (and/or analytical) approach used (Bian and Moutinho, 2011).

However, this research embraces Keller's (1993) work and definition of brand image, i.e. the network of brand-related information that consumers retain in memory, whereby the brand represents the focal concept and the information linked to the brand is classified as *brand image associations*. When conceptualized in this way, brand image will typically vary from brand to brand in *strength* (quantity and quality) and *uniqueness* (uniquely attributable to one specific brand by the majority of consumers) of brand image associations (Keller, 1993). As such, it constitutes an important concept that is theoretically sound (it is based on the psychological principles of memory and learning) and practically relevant. Importantly, *brand image strength* is particularly relevant, because it captures the consumer's differential response to marketing initiatives, including branding, communications and advertising. The differential response includes "preferences, and behaviors arising from marketing activities" (Keller, 1993, p.8), whereby behaviors typically include buying and using the brand.

Brand usage and brand image are at the heart of some longstanding empirical marketing laws, which yield theoretical as well as practical relevance. Bird and Ehrenberg (1970) and Bird, Channon and Ehrenberg (1970) identify a positive and systematic relationship between brand usage and brand image. That is, current usage provides the consumer with greater chances to retain a wide range of brand image associations. As a result, brand image is usually stronger among the users of a specific brand as opposed to non-users.

Later extensions of these original studies by Barwise and Ehrenberg (1985), Castleberry and Ehrenberg (1990), and Barnard and Ehrenberg (1990) analyze brands with different levels of market share, revealing another empirical marketing law, as follows. The relationship between brand usage and brand image differs across brands in line with their market share, with brands with a small market share obtain far lower levels of brand image than brands with a large market share (Barnard and Ehrenberg, 1990; Dall'Olmo-Riley et al., 1997). This trend mimics purchase behavior and is known as the Double Jeopardy effect,

given the twofold penalization that small brands experience, as they attract fewer users who are also somewhat less loyal than the many users of large brands (Ehrenberg, 1972; Ehrenberg, Goodhardt and Barwise, 1990; Ehrenberg and Goodhardt, 2002).

Regardless of the context of application (see also Bandyopadhyay and Gupta, 2004), the Double Jeopardy yields theoretical and practical relevance, because it can assist the understanding and appraisal of the performance of different types of brands. For instance, Kahn et al. (1988), Fader and Schmittlein (1993) and Bhattacharya (1997) show that it can be used to examine niche brands, brands pursuing price premium strategies, and brands meeting variety-seeking needs.

In addition, more recent research has demonstrated the usefulness of both the relationship between brand usage and image and the Double Jeopardy effect, illustrating how to use these two empirical laws to understand and evaluate the effectiveness of brand positioning, branding and advertising strategies (see Romaniuk and Sharp, 2000; Low and Lamb, 2000; Dillon et al., 2001; Myers, 2003; Stocchi et al., 2015). Recent work by Romaniuk (2013) also shows that it is possible to draw on these laws to calculate and model mathematically metrics such as a brand's *mental market share* (the proportion of brand image associations of a given brand out of the whole product category), *associative penetration* (how many consumers can provide at least one brand image association) and *associative rate* (the average number of brand image associations a brand has). These metrics derive from consumer survey data and are indicators of the chances of 'thinking of a brand' in purchase situations; they also reportedly show a positive correlation with brand loyalty (Romaniuk and Nenycz-Thiel, 2013). As such, these metrics provide valuable theoretical insights into how consumers consider and evaluate brands for purchase. They provide valuable managerial insights. Above all, they inform how to evaluate and improve the performance of brands over time, which is useful to detecting the effectiveness of promotional activities.

The present research draws on the stream of literature discussed so far to generate much needed new knowledge relevant to understanding and evaluating the market performance of apps. Specifically, it uses the two empirical laws described (the brand usage and image relationship, and the Double Jeopardy effect) to set expectations of how different types of apps should perform in relation to the number of users that they attract and the relative strength of brand image that they obtain. That is, this research follows Ehrenberg's (1995) recommended approach and mimics a controlled scientific experiment whereby all known conditions are kept unchanged except one novel unknown element (apps). When doing so, it addresses two key research questions, which are: Rq1: *How can we understand and evaluate the market performance of different types of apps?* Rq2: *What types of apps are likely to attract more users and to obtain a stronger brand image?*

3. Research hypotheses

This research applies the concepts of brand usage and brand image to apps, treating each individual app as a brand. This is consistent with Bellman and colleagues' (2011) recent definition of branded apps as “software downloadable to a mobile device which prominently display a brand identity”, either via the actual name of the app or the use of a logo (p. 191). It is also consistent with current marketing practices whereby apps are either linked to a pre-existing offline (or online) brand – e.g. Facebook app; or branded independently – e.g. WhatsApp Messenger app. Accordingly, this research defines app usage as the proportion of consumers currently using a given app, e.g. those who downloaded or used it in a given time period. Similarly, it conceptualizes the strength of the brand image of an app as the quantity and quality of overall collection of brand image associations that consumers retain in memory in relation to that app vs. other apps.

In line with Rq1, the idea is to identify a way to compute and examine the values of brand usage and brand image strength for a range of branded apps, to determine how to understand and evaluate apps' market performance. In relation to Rq2, this research takes into consideration another key characteristic of apps: i.e. being available for free or at a price (albeit generally low). Specifically, this research compares the performance of free vs. paid apps in each of the two aforementioned categories (apps linked to a pre-existing brand vs. branded independently). The ultimate goal is to evaluate the feasibility of the key options that businesses have in relation to apps: anchoring them to existing brands or launching them as a new digital product; and, for each scenario, whether to do so making them available for free or at a price. To address this aspect, this research presents and tests two research hypotheses, as follows.

Comprehensively, the brand usage and brand image relationship and the Double Jeopardy pattern corroborate to: i) brand usage-levels acting as key driver of market performance; and ii) a concrete underlying market advantage for brands that attract more users. These are two robust empirical trends to be expected in any context where it is possible to choose from a number of alternatives differing in popularity (Ehrenberg and Goodhardt, 2002). The context of mobile apps is a highly fragmented and broad competitive field (to date, there are approximately 1.6 million apps available to consumers, Statista, 2015), whereby most of the alternatives available to consumers are free (more than 60% of existing apps are free to download, according to the App-builder's blog, 2015). As such, it is plausible to assume that free apps will be generally more popular and attract more users than paid apps, simply because there are so many more free apps than paid apps.

Furthermore, when considering apps in relation to being linked to existing offline or online brands vs. being branded independently, existing research on brand extensions suggests that it is reasonable to expect a set of market advantages for extended brands,

including a *spill over* of brand equity dimensions (especially brand image) and the facilitation of trial and use among existing customers of the parent brand (Sullivan, 1990; Aaker, 1990; Aaker and Keller, 1990). Apps branded independently are unlikely to benefit from such a market advantage, as by definition they would not have any existing base of users or brand image to build upon. In fact, there is some evidence specific to apps linked to major retailing and services brands, which shows that app usage impacts app purchase intentions, attitudes towards the app and in-app advertising effectiveness (Bellman et al., 2011); there is no such evidence for apps branded independently.

In light of the above reflections, the ranking from best to worst of app market performance in relation to attracting users and brand image strength to be expected should be:

1. Free apps linked to an existing offline or online brand
2. Free apps branded independently
3. Paid apps linked to an existing offline or online brand
4. Paid apps branded independently

More formally, it is reasonable to expect the following:

H1: Free apps linked to existing brands attract more users and obtain stronger brand image than free apps branded independently.

H2: Paid apps linked to existing brands attract more users and obtain stronger brand image than paid apps branded independently.

We now explain the methods and data that enabled us testing these hypotheses, together with the analytical outcomes and the resulting implications from a theoretical and practical perspective.

4. Methods

4.1 Data

This research is based on the analysis of a large set of Italian panel data (sample $N = 2,473$), with a demographic profile that reflects the population actively involved in the use of mobile digital technologies. Specifically, the sample included 56% males and 44% females; 52% were over 30 years of age, and 48% were between 18 and 30 years old. All respondents currently owned one or more smart phones. They also claimed to access the Internet from their device (80% of them claimed to do so on a daily basis, mostly five or more times every day, for an average time spent per day ranging between 40 minutes and one hour) and to have at least one mobile app installed on their devices. The data are from 2014 and are derived from an online survey by Nextplora, a market research company specializing in the analysis of consumer behavior in the digital mobile context.

The survey included over 30 questions, ranging from general demographic questions to specific questions about the use of mobile phones and tablets for the purpose of web navigation, and specific questions about apps. Of particular interest to this research, the survey captured current levels of usage and brand image associations of 47 mobile apps¹, including free apps (22 out of 47) and paid apps (25 out of 47), apps linked to an offline/online brand (16 out of the 47) and apps branded independently (31 out of 47).

Brand image associations for all apps included in the data were obtained using a ‘pick-any’ method (Driesener and Romaniuk, 2006) whereby respondents are prompted with a list of apps and a list of possible app characteristics, and then asked to provide as many associations as they wish. The app characteristics prompted for measurement purposes were based on literature on consumer perceptions of mobile technologies (see Pedersen, et al., 2002;

¹ Nextplora selected the apps featured in the survey, as they were representative of the most popular apps in the Italian market at the time of survey, according to their commercial insights. The unequal number of apps across the various types of apps considered is therefore a representation of market structure and consumer preferences, as assessed by the provider that manages the research tool.

Bruner and Kumar, 2005; Wu and Wang, 2005; Lin and Wang, 2006; Cyr, et al., 2006), and included: *ease of use, convenience, fun, suiting one's needs, being aesthetically pleasing and being an app one would recommend.*

4.2 Metrics and empirical tests

This research is based on the calculation of a series of brand and category level statistics (see Table 1), modeled to understand and evaluate the market performance (Rq1), and compared across different types of apps to determine which apps are likely to attract more users and obtain stronger brand image (Rq2).

Insert Table 1 about here

To address Rq1, this research follows Romaniuk's (2013) guidelines for the analysis of brand performance and applies them to all brand image metrics considered, while ranking apps in line with brand usage. Such guidelines include inputting the observed metrics for each app in Kern's software (2009) to generate the theoretical equivalents of the observed metrics through the use of a mathematical model, the Dirichlet (Goodhart et al., 1984; Sharp et al., 2012). Then, in line with earlier research in the offline context (see Wright et al., 2002), this research compares the observed and theoretical metrics by calculating the values of the *mean absolute deviations*, i.e. the difference between the observed and theoretical metrics in absolute value. More specifically, deviations greater than five percent represent potential exceptions to the Double Jeopardy effect (Wright et al., 2002). This analytical approach yields several theoretical as well as practical advantages. Above all, it is unparalleled to understand and evaluate brand performance in competitive settings (see Sharp et al., 2012 for a comprehensive discussion of the advantages of this approach).

To address Rq2 and test H1 and H2, this research presents a 2x2 comparison of all metrics reported in Table 1, including sample testing, the analysis of descriptive statistics and the evaluation of the outcome of a linear regression.

5. Results

5.1 How to understand and evaluate apps' market performance

Table 2 and 3 present individual apps' performance ranked by percentage of usage, featuring only the macro-distinction between free and paid for simplicity. Generally, the results reveal a close fit between the values of the observed and theoretical metrics considered (most MADs values are smaller than five percent and never greater than 10 percent). This outcome in itself sheds light on the possibility to understand and evaluate app market performance by calculating brand usage and brand image metrics for each app on the basis of consumer survey data and modeling these metrics with the Dirichlet. Furthermore, results reveal specific details of how apps perform, as follows.

*** Insert Table 2 about here***

*** Insert Table 3 about here***

All deviations from the expected Double Jeopardy pattern are apps branded independently and there are far more deviations from the Double Jeopardy pattern among paid apps. Among free apps, there are only three instances of apps obtaining higher than expected levels of brand image associations (Candy Crush, Instagram and AroundMe); using Stocchi et al.'s, (2015) re-purposed terms, these are all 'niche' apps or apps with an excess strength of brand image

relative to their percentage of usage. Among paid apps, there are seven instances of apps obtaining higher/lower than expected levels of brand image: one ‘niche’ app (Shazam) and six ‘change-of-pace’ like apps (apps with a weaker than expected brand image given their level of usage, e.g. Cut The Rope, Battery Doctor and Calcolone).

Taken together, these results suggest that apps branded independently systematically deviate from the Double Jeopardy pattern and reveal: i) niche-like patterns for free apps; vs. ii) change-of-pace patterns for paid apps. That is, free apps rarely deviate from expectations of market performance, mostly in the instance of apps branded independently and used by a relatively small number of consumers who ‘know a lot’ about the app and retain in memory a wide range of brand image associations about it. In contrast, paid apps deviate from expected patterns more frequently, with several apps branded independently being used by a relatively large number of consumers who, however, ‘know little’ about the app and are most likely using it because of seeking variety.

On a more general level, these results highlight the possibility to generalize the theoretical and empirical principles of well-known marketing laws from the offline buying behavior contexts to the digital context of mobile apps. That is, it is possible to extend many of the principles about how brands compete, grow and decline to the context of apps (see Sharp et al., 2012). Above all, market performance of apps is underpinned, to a great extent, by the apps’ ability to attract as many users as possible. This will result in the app obtaining greater brand image strength, thus greater mental availability over competing apps.

5.2 Comparison of market performance across apps’ type

All results that this section presents are underpinned by a statically significant difference ($p < .01$, two-tailed t -test) in the level of brand usage of free vs. paid apps, apps linked to an existing brand vs. apps branded independently.

Table 4 summarizes the descriptive statistics of all brand usage and brand image metrics for the different types of apps considered.

Insert Table 4 about here

When considering free apps, apps linked to an existing online or offline brand attract more users, on average, than apps branded independently (32.3% vs. 6.6%) albeit with greater variance ($SD = 23.0$ vs. 7.7 ; $CI = \pm 12.5$ vs. 5.1). Free apps linked to an existing brand also show stronger brand image, especially in relation to mental market share and associative penetration (6.8% vs. 1.3% for mental market share; and 28.4% vs. 5.8% for associative penetration), although, again, with greater variance.

In contrast, paid apps reveal the exact reverse pattern. That is, paid apps branded independently attract, on average, more users than paid apps linked to an existing offline or online brand (4.4% vs. 2.3%), although with relatively more variance ($SD = 9.1$ vs. 0.6 ; $CI = \pm 3.8$ vs. 0.7). The same pattern occurs for all three brand image metrics considered; for example, paid apps branded independently show an average percentage of mental market share equal to 4.4 and an average percentage of associative penetration of 7.6, whereas paid apps linked to existing brands show an average percentage of mental market share equal to 1.3 and an average percentage of associative penetration of 3.5. Taken together, the comparison of the descriptive statistics of the metrics across the four types of apps considered provides a first indication of empirical support for H1, but not H2.

The results of the linear regression analysis (see Table 5) offer further insights that corroborate the analysis of the descriptive statistics, as follows.

*** Insert Table 5 about here***

For free apps, the R^2 values and regression coefficients show very similar values for apps linked to existing brands vs. branded independently (there is a considerable difference only in the R^2 of the associative rate, which is .78 for apps linked to existing brands vs. .44 for apps branded independently). When considering paid apps, the outcomes of the regression analysis are consistently opposite, with paid apps branded independently revealing a stronger underlying relationship between brand usage and brand image. Specifically, R^2 values and regression coefficients are always greater for paid apps branded independently (R^2 values ranging from .71 to .99 v. R^2 values ranging from .29 to .9; regression coefficients as high as 1.88 for associative penetration and 1.43 for mental market share vs. 1.13 and .35, respectively). Taken together, these results are consistent with those of the descriptive statistics and support H1, but not H2, given that paid apps linked to an existing brand show a weaker brand usage and brand image relationship than paid apps branded independently.

Comprehensively, the validation of H1 and the lack of support for H2 lead to one key overarching counterintuitive outcome: *while apps linked to an offline/online brand can attract more users and obtain stronger brand image if made available to consumers at no cost, apps branded independently attract more users and obtain stronger brand image if offered at a price*. This finding adds to existing knowledge on branded apps, which thus far lacks in exhaustive explanations of apps' market performance, and in thorough distinctions across different types of apps.

5.3 Post-hoc checks

There are two possible factors that could have underpinned the results obtained in relation to H2 that this research checks: i) possible differences in the claimed reasons for purchasing a

paid app, and ii) possible differences in the sheer number of brand image associations obtained by each app at the level of individual app (brand) attributes.

In relation to the first aspect, Table 6 shows that, other than the price-quality perception (indicated by 1 in 2 buyers of paid apps), the main underlying reasons include a sense of necessity and uniqueness (i.e. the absence of free alternatives and ‘coolness’ of the app, as stated by more than one in three buyers), and value co-creation (i.e. the possibility to support developers, as claimed by one in four buyers). Since the results of the analysis presented in relation to H2 showed that paid apps branded independently attract, on average, more users and obtain stronger brand image than apps linked to existing brands, it is therefore possible to confirm that for paid apps being branded independently establishes strong associations in relation to price and quality, relevance to consumer needs (usefulness and necessity) and the possibility to co-create value via supporting the developers.

*** Insert Table 6 about here***

In line with the above, it seems clear that for paid apps it is not convenient to be associated with an existing offline or online brand. As a final confirmation of this conclusion, this research compares the percentage of the sample that associated each individual app with each attribute against the average for all apps. It then looks at the difference from the average in absolute terms, reading values greater than five percent as an indication of specific apps that many respondents associated with the attributes considered over the other apps.

Results reveal that there are seven free apps linked to existing offline/existing brands (Facebook, Google Maps, Google Search, Instagram, YouTube and Twitter) and one paid app branded independently (Whatsapp Messenger) that systematically outperform all others

across all individual brand image attributes considered. Hence, it is plausible to conclude that there is a general and more explicit ‘spill-over’ of brand image for free apps in being linked to existing offline/online brands than for paid apps. For paid apps, the only app outperforming others on brand image also showed high level of usage (about 45% of the sample). Thus, it is paid apps branded independently that will manage to attract a large number of users will also see benefits in terms of the strength of brand image, without having to be necessarily linked to existing brands.

6. Discussion

The present research shows that drawing upon the brand usage and brand image relationship and the Double Jeopardy pattern it is possible to understand and evaluate the market performance of mobile apps. In particular, it is possible to: i) compare observed vs. expected app performance metrics (e.g. with the use of models encompassing the brand usage and image relationship and the Double Jeopardy pattern, such as the Dirichlet); and ii) compare vis-à-vis the performance of different types of mobile apps (e.g. free vs. paid apps, and apps linked to an existing brand vs. apps branded independently). When combined, these two aspects provide a first comprehensive empirical assessment of which type of apps is likely to attract more users and obtain a stronger app (brand) image.

From a theoretical perspective, the added value of this research resides in the fact that it expands the generalizability of empirical marketing laws from the conventional offline buying behavior contexts to the digital context of mobile apps. This reinforces a long-standing tradition of scientific marketing research; it also opens the domain of mobile technologies to countless additional assessments that could be established to verify the extent to which known offline trends characterize, in fact, the most up-to-date fields of consumption.

Contextually, to date, existing research in relation to understanding and evaluating the market performance of branded apps is rather limited. With the only exception of recent works such as Bellmann et al.'s (2011), the great majority of existing research examining apps has looked at technology uptake and general behavioral outcomes (e.g. Tojib and Tsarenko, 2012; Gao et al., 2013); it has not examined in sufficient detail what attracts app usage or how apps can obtain strong a brand image. In contrast, this work appraises and compares app market performance for different types of branded apps.

The main findings that this research provides also yield useful practical implications, as follows. Comprehensively, the main counterintuitive outcome of this work is that apps linked to an offline/online brand can attract more users and obtain stronger brand image if made available to consumers at no cost, but apps branded independently attract more users and obtain stronger brand image if offered at a price. These represent the most attractive options for businesses to pursue and imply that there are distinct implications for managers of existing brands looking at launching an app vs. managers of stand-alone independently branded apps. In the first instance, managers should treat the app as a brand extension and 'add-on' to its promotional mix, as a way to appeal to the existing customers of the brand. In the second instance, managers should by default make the app available to consumers at a price, as a way to convey a price-quality advantage and a sense of uniqueness over the many free apps available.

7. Conclusions, Limitations and Future Research

This research has contributed to revealing and explaining some fundamental aspects pertaining to the market performance of different types of mobile apps. Specifically, it has illustrated how to measure app market performance, and how to benchmark expected and

actual levels of app usage and app image, relying on well-established marketing laws such as the brand usage and image relationship, and the Double Jeopardy pattern. Above all, the present work revealed an important difference in how apps perform, highlighting that: apps linked to an existing brand should be made available for free to consumers in order to attract users and obtain a strong brand image (partially ‘spilled-over’ from the parent brand), but apps branded independently should be offered at a price, because this might lead to consumers making inferences about the quality and uniqueness of the app. These insights offer useful guidance to all sorts of businesses: existing ones wanting to add an app in their promotional mix as well as organizations looking at introducing new-to-the-world apps, such as start-up initiatives.

Nevertheless, there are some limitations worth discussing, which represent valuable venues for future research. The current analysis is restricted to one data set and market; thus, further replication across different contexts is desirable. Similarly, the analysis is not differentiated across the demographic profile of respondents; future research could therefore explore differences across various consumer segments – e.g. to uncover potential differences for digital natives. Additionally, the research design focused on brand image dimensions that are in line with literature on the key characteristics of mobile apps and a given set of apps. Hence, future research could examine different types of brand image associations and/or a different set of apps. Finally, this research focused on two well-established marketing laws. The findings suggest that there is scope for exploring other known trends, to continue creating new knowledge for apps.

Tables and Figures

Table 1 – Key metrics examined

Brand usage	For each type of apps considered, the percentage of <i>category usage</i> ; that is, the proportion of the total sample reporting that they downloaded and/or used the app in the past 30 days ($n = 2,405$).
	For each individual app, the percentage of <i>app usage</i> ; that is, the proportion of the total sample reporting that they are currently using the app ($n = 1,313$).
Brand image (adapted from Romaniuk, 2013)	For each individual app, the percentage of <i>mental market share</i> ; that is, the proportion of total brand image associations scored by an app out of the total number of brand image associations scored by all of the apps of the same kind.
	For each individual app and for the whole category for each type of apps considered, the percentage of <i>associative penetration</i> ; that is, the proportion of respondents providing at least one brand image association.
	For each individual app and for the whole category, the <i>associative rate</i> ; that is, the average number of brand image associations by respondents providing at least one brand image association for the app.

Table 2 – Brand performance analysis of free apps (ranked by usage)

	Associative Penetration (%)		Associative Rate		Mean Absolute Deviations	
	Observed	Theoretical	Observed	Theoretical		
Facebook	68	63	2.3	2.5	5%	0.2
YouTube	63	63	2.5	2.5	0%	0.0
Google Maps	55	57	2.4	2.3	2%	0.1
Google Search	43	48	2.3	2.1	5%	0.2
Candy Crush Saga	25	32	2.3	1.8	7%	0.5
Facebook Messenger	29	31	2.0	1.8	3%	0.2
Instagram	24	31	2.3	1.8	7%	0.5
Google Translator	26	28	1.9	1.7	3%	0.2
Twitter	18	21	1.9	1.7	3%	0.3
eBay	18	20	1.8	1.6	2%	0.2
TGCOM24 (news)	13	16	1.9	1.6	3%	0.3
Fruit Ninja Lite	7	8	1.8	1.5	1%	0.3
La Scopa (card game)	6	7	1.8	1.5	1%	0.3
Yellow Pages	6	7	1.6	1.5	0%	0.1
Find my iPhone	5	6	1.8	1.5	1%	0.3
Emoji Free!	4	5	1.9	1.5	1%	0.4
HD Battery	4	5	1.9	1.5	1%	0.4
AroundMe	3	4	2.2	1.5	1%	0.7
PAC-MAN Lite	2	2	1.5	1.5	0%	0.1
Paper Toss	1	1	1.3	1.5	0%	0.2
BollaiHandy (game)	1	1	1.6	1.5	0%	0.1
Dragon Dictation	1	1	1.4	1.5	0%	0.0
AVERAGE	19	21	1.9	1.7	2%	0.3

Table 3 – Brand performance analysis of paid apps (ranked by usage)

	Associative Penetration (%)		Associative Rate		Mean Absolute Deviations	
	Observed	Theoretical	Observed	Theoretical		
WhatsApp Messenger	83	84	4.5	4.5	1%	0.0
Shazam Encore	9	11	3.1	2.6	2%	0.5
Angry Birds	9	10	2.6	2.5	0%	0.1
ilMeteo Plus (weather forecast)	8	9	2.7	2.5	1%	0.2
Fruit Ninja	7	7	2.3	2.5	1%	0.2
Camera+	4	5	2.9	2.5	1%	0.4
Angry Birds Rio	6	5	2.0	2.5	1%	0.4
iSuoneria (ringtones)	4	4	2.3	2.5	0%	0.2
UNO	4	4	2.2	2.5	0%	0.2
MONOPOLY	3	3	2.5	2.5	0%	0.0
Tunein Radio Pro	3	3	2.5	2.5	0%	0.0
Angry Birds Seasons	3	3	2.3	2.5	0%	0.1
Cut the Rope	4	3	1.7	2.5	1%	0.7
TruccaiIlTuoSchermo (wallpapers)	3	3	2.4	2.5	0%	0.1
SvegliaiHandy Pro (alarm clock)	3	3	2.5	2.5	0%	0.0
Trivial Pursuit	3	3	2.3	2.5	0%	0.2
Credito per Tre (banking)	3	2	2.1	2.5	0%	0.4
Doodle Jump	3	2	2.0	2.5	1%	0.5
Panoramatic 360	3	2	2.0	2.5	1%	0.5
Crash Bandicoot Nitro Kart 3D	2	2	2.3	2.5	0%	0.2
Il Test del Tontolone (game)	2	2	2.1	2.4	0%	0.4
Battery Doctor Pro	2	2	1.8	2.4	1%	0.6
iBirraSpeziale (game)	2	1	1.9	2.4	0%	0.6
Calcolone (game)	2	1	1.5	2.4	1%	0.9
Hipstamatic	1	1	2.1	2.4	0%	0.3
AVERAGE	7	7	2.4	2.6	0%	0.3

Table 4 – Comparison of app level statistics across types of apps

Metrics	Descriptive Statistics	Free apps linked to an offline/online brand	Free apps branded independently	Paid apps linked to an offline/online brand	Paid apps branded independently	Hypotheses testing
Brand usage	<i>Mean</i>	32.2	6.6	2.3	4.4	H1 ✓
	<i>SD</i>	23.0	7.7	0.6	9.1	H2 X
	<i>CI*</i>	± 12.5	± 5.1	± 0.7	± 3.8	
% of mental market share	<i>Mean</i>	6.8	1.3	1.3	4.4	H1 ✓
	<i>SD</i>	6.0	1.9	0.3	13.1	H2 X
	<i>CI*</i>	± 3.2	± 1.2	± 0.8	± 5.5	
% of assoc. penetration	<i>Mean</i>	28.4	5.8	3.5	7.6	H1 ✓
	<i>SD</i>	22.1	7.7	0.7	17.1	H2 X
	<i>CI*</i>	± 12.0	± 5.0	± 0.3	± 7.2	
Associative rate	<i>Mean</i>	2.0	1.8	2.3	2.4	H1 ✓
	<i>SD</i>	0.3	0.3	0.1	0.6	H2 X
	<i>CI*</i>	± 0.1	± 0.2	± 0.2	± 0.3	

* CI = Confidence interval calculated at the 95% confidence level

Table 5 – Comparison of regression analysis' outcomes across types of apps

Metrics	Regression values	Free apps linked to an offline/online brand	Free apps branded independently	Paid apps linked to an offline/online brand	Paid apps branded independently	Hypotheses testing
% of mental market share	<i>b-coefficient</i>	.25	.25	.35	1.43	H1 X
	<i>R²</i>	.97	.99	.66	.99	H2 X
% of assoc. penetration	<i>b-coefficient</i>	.96	.99	1.13	1.88	H1 X
	<i>R²</i>	.99	.99	.90	.99	H2 X
Associative rate	<i>b-coefficient</i>	.01	.03	-.13	.06	H1 ✓
	<i>R²</i>	.78	.44	.29	.71	H2 X

Table 6 – Claimed reasons for buying paid apps
(multiple response question; sheer counts ranked from highest to lowest)

	<i>n</i> out of 386 buyers	% of buyers of paid apps
Price-quality perception	173	45
I needed the app	133	35
I couldn't find a suitable free alternative	118	31
It's a unique, cool app	88	23
To support developers	79	20
I saw an ad	71	18
To get rid of ads	69	18
To have support and customer care	66	17
Average	-	26

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