# The Role of Big Data and Digitization in Just-In-Time (JIT) Information Feeding and Marketing

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*Marketing management is racing to keep up with the technological advances that are disrupting how consumers connect and interact with business' brands. Marketing today needs to design and run an explosion of continuous marketing touchpoints that evolve rapidly. Speed, adaptability, and capability in marketing to balance innovation are crucial to business. Scalability in highly dynamic digital environment is also a key factor in businesses' competitiveness. Now, modern marketing uses many contemporary software developments. In this paper on the Marketing Science Institute (MSI) Research Priority Two, delivering integrated, real-time, relevant experiences in context, Just-In-Time (JIT) information feeding via agile and lean digital marketing are discussed. How companies continuously innovate using big data and big testing are discussed as future implications for marketing practitioners and researchers. Keywords: agile marketing, big data, innovation, Just-In-Time (JIT), lean marketing.*

## INTRODUCTION

While agile and lean management have been used in the manufacturing sector for nearly six decades, it was not until the 1990s that they began to find their way into other sectors, most notably the software industry (Heredia, Garcia-Guzman, Amescua-Seco, & Velasco-Diego, 2014). Since then, its use has expanded significantly in software development, as new management formats have been, and continue to be, developed to expedite the modification of existing software as well to develop newer applications. The focus for agile and lean in this setting is customer centric. For both, the emphasis is on solving customer needs quickly in response to very rapidly, ever changing environments wherein constantly needed modifications to existing products and new applications altogether is the norm (Wright, 2014).

In this paper on the Marketing Science Institute (MSI) Research Priority Two, delivering integrated, real-time, relevant experiences in context, Just-In-Time (JIT) information feeding via agile and lean digital marketing are discussed. Over just the last few years, researchers have encouraged the application of agile and lean practices to other industries as well, including healthcare, airlines, and grocery, just to name a few (Gupta, Malhotra, Czinkota, & Foroudi, 2016). This paper discusses a brief description of agile and lean practices as well as its abbreviated historical overview. It then looks at its transition into the software industry and its current and unique digital marketing environment. The paper concludes the

discussion by identifying some promising practitioner and research concepts in marketing, which are to continuously innovate via testing big data on a large scale.

**Digital Marketing**

Marketing touchpoints in the real world are increasingly connected to the digital world (Kotler, Kartajaya, & Setiawan, 2016). Bluetooth technology, installed in stores and at live events, triggers offers and other location-based services for consumers on their mobile devices automatically. Electronic identifiers attached to tangible products using radio-frequency identification (RFID) technology make them digitally visible for channel management, point-of-sale promotions, and post-sale customer relationship management (Efrat, Gilboa, & Yonatany, 2017; Junge, Severgnini, & Sørensen, 2016; Conforto & Amaral, 2016). Mobile apps produced by airlines, hotels, and retailers act on a consumer's global positioning system (GPS) location to enable special features and benefits (Croll & Yoskovitz, 2013; Eyal, 2014). Wifi-enabled appliances are creating new marketing interfaces involved in consumers' lives (Smart, 2016). For example, Amazon Dash, a button that consumers can press to reorder groceries can be affixed to their refrigerators at home. Thus, formerly non-digital marketing channels are acquiring digital dimensions for businesses to manage (Smart, 2016).

Digital business transformation of taking a non-digital business and remaking its offerings and operations to take advantage of digital technologies affects nearly all industries (Efrat et al., 2017; Zang & Li, 2017; Junge et al., 2016; Gupta et al., 2016). Some of the intriguing examples include digital aspects meshed with the physical world that have disrupted major markets. Uber entered the taxi industry by using mobile apps, location data, and digital payments and profiles to arrange drivers and users in a creative transportation network (Kotler et al., 2016). There are more examples where consumers expect to be able to learn detailed information about a business and its offerings and resolve customer service issues on the Internet or through a mobile app (Zang & Li, 2017). Digital business features go beyond marketing, but it is now the marketer's role to understand and promote the digitally enabled customer experiences (Lamoureux, 2017).

Because of the advent of search engines and social media, even businesses with nothing inherently digital about their actual products or services are affected by the way their organizations are represented on the web (Kotler et al., 2016; Wang, 2017). It is not merely about what one officially publishes online, but more about what customers, investors, stakeholders of all kinds comment about the business on their blogs, in online reviews, and across social networks (Kotler et al., 2016; Wang, 2017). Opinions of one's business can be shared instantly and last nearly forever in a Google search result. Almost everything an individual does in marketing now is subject to the digital feedback effects (Gupta et al., 2016). One can spend months creating a high-end television advertising campaign, but within minutes, the audience can praise or criticize it on social media, with greater impact than the airtime being purchased (Kotler et al., 2016). Marketing needs to be tuned into these digital conversations in order to interact effectively with the audience in real time (Grimpe, Sofka, Bhargava, & Chatterjee, 2017).

Marketing relies heavily on the digital infrastructure to manage its operations now (Grimpe et al., 2017). Presently, marketers are inundated with software applications. They use specialized software for analytics, campaign and content management, programmed advertising, customer relationship, and resource management (Grimpe et al., 2017). Marketing is affected by the digital dynamics of these digital technologies and tools, which offer digital leverage in speed, scale, adaptability, and precision in operations and processes (Gupta et al., 2016).

**Agile and Lean Digital Marketing**

The search for greater agility in marketing, and more largely in business, is driven by the digital dynamics of speed and adaptability (Wright, 2014). Digital speed enables a business to act and reach new opportunities and threats quickly, shifting circumstances and feedback. This digital adaptability allows a business to change the content and service with digital scale and precision with relative ease in comparison to the traditional marketing (Wright, 2014).

**Applications of Agile and Lean to Digital Marketing**

Agile in project management and software development is characterized by the division of tasks into phases of work and frequent reassessment of plans (Conforto & Amaral, 2016; Gothelf & Seiden, 2016). To achieve agility, an organization needs to enforce concrete changes in its operations (Gothelf & Seiden, 2016). Agile management methods were first used in the software industry toward the end of the twentieth century (Conforto & Amaral, 2016; Heredia et al., 2014). The software industry learned that with exponential changes in speed and scale, due to Moore's law, the general rule is that computers double in processing power every two years (Olajiga et al., 2017). The acknowledgement of software's adaptability forced the software industry to face the complexities of continuously changing requirements at a rate that no other field has experienced previously (Gupta et al., 2016). The agile software development movement started to build momentum in 2001, when a group of agile developers produced the manifesto for agile software development (Conforto & Amaral, 2016; Smart, 2016). It declared a set of values, including delivering software that stakeholders could interact with and responding to changing environment and needs, which were accepted by the software community (Gothelf & Seiden, 2016).

The scrum agile methodology was developed by the innovators credited for the agile manifesto (Olajiga et al., 2017). It prescribed a specific process for project management in software development. It revolved around short cycles of work called sprints (Smart, 2016). Scrum promoted sets of prioritized work to be done. Cross-functional teams are delegated to control their planning for each sprint, and what and how it was accomplished are reviewed to improve the next sprint (Smart, 2016).

Another important agile management method has been Kanban (Williams, 2012). The most notable concept from Kanban is a Kanban board for visualizing workflow and progress (Piercy & Morgan, 1997). It was inspired by the Just-In-Time (JIT) inventory system for manufacturing that Taiichi Ohno pioneered at Toyota Motor Corporation in the 1980s (Piercy & Morgan, 1997; Ries, 2011; Williams, 2012). A Kanban system for software was developed shortly thereafter (Ries, 2011). It emphasized visualizing workflow, progress, process, and continuous and incremental improvement (Piercy & Morgan, 1997). Kanban is considered a lean management method as well as agile.

These two philosophies are complementary (Ries, 2011). Lean is focused on optimizing the efficiency of a given process and to eliminate waste, whereas agile is focused on increasing the speed and adaptability of a project, which encourages change and customer feedback (Ries, 2011; Williams, 2012). As agile and lean practices grew in popularity in software development in the 2000s, marketers at software companies began to take notice (Ries, 2011). A number of high-tech marketers started using agile management and agile marketing in 2006 (Ries, 2011). In 2012, numerous marketers gathered to draft an agile marketing manifesto which added to original agile manifesto. It proposed small experiments rather than fewer large tests, collecting data rather than opinions and conventions, focused customer groups rather than impersonal mass markets, and engagement rather than official posturing (Olajiga et al., 2017). Since then, the concepts of agile marketing have evolved and spread. Presently, marketers flexibly mix techniques from various agile and lean methods (Efrat et al., 2017).

**Agile Digital Marketing as Customer-Centric Experience**

Marketing has had a close relationship with innovation. Agility provides the ability to navigate in a world of fast-paced, digital dynamics (Gupta et al., 2016). The goal of agility is to achieve innovation. A business not only wants to compete but also thrive over time. Innovation in products and services allows differentiation and promotion of a business. Historically, marketing was about communicating a company's innovations, rather than innovating itself. However, digitization changed this with an advent of marketing-led interfaces with customers (Gupta et al., 2016; Vollrath & Lloyd, 2019). An important catalyst for new opportunities for marketing innovation includes marketing's expanded design and delivery of communications to the design and delivery of experiences (Grimpe et al., 2017).

Much of the innovation in marketing over the last few decades can be attributed to the creative interplay between messages and media (Gupta et al., 2016). Digital media brought new aspects to the expression of messages. The most noted breakthrough was the use of hyperlinks, which provided marketers a new way to create messages (Grimpe et al., 2017). Search engine optimization (SEO) allowed

interconnectedness and information architecture in website design. Adaptability, the ability to personalize digital media, has changed how marketers create and deliver messages, making them more fluid, scalable, and customizable (Zang & Li, 2017). Messages are what is communicated. Media is how and where it is communicated. Mechanisms are the underlying functional capabilities of the medium itself. For instance, the Internet technically lets users click, scroll, and type; those capabilities become useful only when they are linked into an experience. These meaningful interactions are mechanisms. Just as messages become entangled in the media through delivery, mechanisms become an integral part of communicating ideas to audience (Wang, 2017).

To get a better idea of marketing-led experiences in contrast to traditional marketing communications, the emerging field of interactive content is a good example to consider (Zang & Li, 2017). Interactive content is participatory in nature. The audience needs to actively do things with interactive content to fully experience games, workbooks, quizzes and so on. Research has shown that interactive content is more effective than passive content at differentiating a company's marketing, educating prospects, and converting them into customers (Zang & Li, 2017). The interactive content pulls participants into a more immersive storytelling around a company's service. Because of this, it is also more likely to be shared by prospects through social media (Vega-Jurado, Juliao-Esparragoza, Paternina-Arboleda, & Velez, 2015).

As marketing moves beyond communications towards creating experiences in the digital environment, it increasingly overlaps with the discipline of software development (Efrat et al., 2017). The crafting of great experiences on the Internet, mobile devices and other digital interfaces are the same as the art and science of great software design (Efrat et al., 2017). Now a business can map the model of media, messages, and mechanisms in marketing to the user interface, data, and code in software (Holiday, 2014). Messages are data, the medium is the user interface, and mechanisms are implemented through code. The intersection of code, data and user interface is where the collective user experience of software is used (Lamoureux, 2017). The intersection of messages, mechanisms, and media in marketing defines customer experience in the buyer's decision-making process (Holiday, 2014). Because many experiences in the digital environment are created by software, customer experience (marketing) and user experience (software) are blending (Holiday, 2014). This means marketing can look to methods of innovation in software development to inspire creative ways of connecting with its audience (Kotler et al., 2016).

This does not mean that marketers need to become software engineers. Many digital customer experiences can be designed and implemented using software tools that do not require the marketer to do coding (Christensen, 2016; Berger, 2013). However, logic, flow, input and output, data processing, and other programmatic concepts (user interface and user experience) are applied by marketers to create these experiences, using interactive content to marketing automation (Berger, 2013; Conforto & Amaral, 2016). In the digital world, marketing is the user experience. Modern marketers are more similar to product managers than marketing managers. Each of the touchpoints that a marketer is accountable for could be seen as a small product. Social media such as Facebook, LinkedIn, YouTube, Twitter, Yelp and numerous other specialized websites triggered a global explosion of information sharing (Kotler et al., 2016). A marketer takes responsibility for such a social media touchpoint. One focuses on studying what the users and customers want from that touchpoint and craft a possible user experience for them that meets their needs (Christensen, 2016; Berger, 2013).

Like any product manager, the owner of this marketing interface pays attention to trends in the market that affect users' expectations (Christensen, 2016; Berger, 2013). By examining the touchpoints with the audience as product experiences more than mere marketing communications, one has a more customer-centric environment on which to innovate (Christensen, 2016; Berger, 2013).

**Digital Marketing with Innovation**

As innovative marketing channels, strategies, and tactics are invented, they generally will perform as expected at first, but in a while the effectiveness tends to degrade (Gothelf & Seiden, 2016). For instance, display advertising on the Internet started with many click-through rates, but it dropped over time also (Gothelf & Seiden, 2016). Email marketing initially had noticeable open rates, which is the rate of recipients who actually read the message, but this declined over time as well (Gothelf & Seiden, 2016).

This trend did not only apply to click-throughs but also applied to most marketing programs (Gothelf & Seiden, 2016). Reasons, such as the novelty of a new type of marketing, often catch an audience's attention at first, which gives a performance enhancement, but it eventually wears off (Gothelf & Seiden, 2016). Also, when pioneering marketers are having success with a new innovation, other marketers will follow and competition increases. Then, as marketing ideas that have worked with a small audience, when target audience are scaled up, it often reaches less qualified prospects (Gothelf & Seiden, 2016). These factors complemented with one marketing strategy can yield temporary success. Marketing needs to accelerate the pace at which it discovers new tactics. Agile marketing is a method for moderating the rate required to accomplish this through incremental implementation of ideas informed by short feedback loops (Smart, 2016). Agile marketing gives marketers a way to manage risk by quickly trying small versions of ideas to gauge their potential. However, it puts the onus on managers to encourage new ideas and to be willing to use time and resources to take risks. When one's company culture is risk-averse rather than risk-taking, agile marketing might be a difficult change in thinking to embrace (Smart, 2016). But risk needs to be taken because in a changing digital environment; the status quo is unstable.

Before the Internet became the primary channel for software delivery, software products generally went directly from beta test to final release (Wang, 2017). But in today's constantly connected digital environment, where updates to software can be immediately pushed live to a website or mobile app, the line between beta testing and final release is unclear. At any given time, some new feature of the product might be in beta test, even while the rest of the product is effectively as stable as a final release (Grimpe et al., 2017). This constant testing of new features is referred to as perpetual beta (Wang, 2017). Many marketing touchpoints such as websites, social media, email marketing and marketing automation are now constantly updated because things are meant to innovated and change (Wang, 2017).

**Innovative Marketing Collaboration**

The philosophy many software development teams embrace is that almost anyone can innovate (Wright, 2014). Rather than isolate responsibility for innovation in a specialized group, every developer is encouraged to contribute new ideas to the team and to pursue within reason, intriguing new possibilities as an integral part of accomplishments (Wright, 2014). Marketing can benefit from this democratized thinking of innovation. Though in larger companies it may make sense to have selected individuals who are focused on particular emerging business and touchpoints, any company can construct a much broader innovation group by allocating time and money for exploratory activities across existing marketing teams (Wright, 2014).

Because modern marketing has become operationally intense, it is tempting to manage the team at one hundred percent capacity with the work of the status quo (Efrat et al., 2017; Grimpe et al., 2017; Gupta et al., 2016; Conforto & Amaral, 2016). It is appealing to squeeze out as much work as possible for short-term gains without wasting time on things that have a less certain longer-term payoff. That can be practical in short bursts, when it is truly crunch time. However, when this becomes a constant way of one's work life, it leads to problems such as employee burnout (Wright, 2014).

The strategic issue is it assumes that the status quo will continue (Efrat et al., 2017; Grimpe et al., 2017; Gupta et al., 2016; Conforto & Amaral, 2016). It assumes that the performance seen from today's marketing tactics can be extrapolated into the future. Christensen (2016) identified this assumption of status quo as one of the biggest innovation killers. Often, when managers calculate net present value (NPV) to decide whether a proposed new investment is worth it, they mistakenly compare it against existing cash streams (Christensen, 2016). This assumes those cash streams will continue indefinitely. Instead, they need to weigh new investments against the more likely probability that existing cash streams will likely erode if the company fails to pursue change (Christensen, 2016). This problem can be avoided by building marketing schedules with a little more time and money for innovation and spread that across many of marketing activities. For example, at Facebook, employees are encouraged to set aside time for hackathons where workers build architypes for new ideas. Many successful Facebook's products came out of hackathons (Moore, 2014). The vital point is to make investment and to encourage everyone to

apply one's intellect and imagination to innovation and discovery. It is not just about what they work on, but also about how they work on it that can be an opportunity for innovation (Christensen, 2016).

Giving individuals on the marketing team the freedom to explore new ideas on their own is one way to foster innovation across a wider team (Christensen, 2016). Another approach is to engage marketing teams in more collaborative design sessions. In the field of user experience design, the design studio method has become popular for tapping a broader range of perspectives in the process of creating new products and features (Efrat et al., 2017; Kotler et al., 2016; Conforto & Amaral, 2016).

## CONCLUSION

Use of data has become critical to marketing. The digital environment has generated an exponential explosion of data, also known as big data, to describe this phenomenon (Kotler et al., 2016). Big data is characterized by its volume, velocity, and variety. However, data by itself is inactive (Kotler et al., 2016). Data can inform the actions one takes, but it is up to marketers to make it actionable (Kotler et al., 2016). One of the most powerful ways to activate data is through testing. Businesses and researchers can find interesting patterns in data, use them to form hypotheses, and run experiments to determine whether those hypotheses can be effectively used in the marketing. The results of those experiments are generally the most valuable inputs into data-driven decision making (Zang & Li, 2017; Grimpe et al., 2017).

Testing is immensely important at a business where the executive manager emphasizes it in his or her communication with shareholders (Vega-Jurado et al., 2015). For instance, Jeff Bezos shared that Amazon had run nearly two thousand experiments to improve its website and products in 2013 (Julian, 2016; Kotler et al., 2016). Digitally native companies like Amazon and Google run quantity of experiments (Julian, 2016; Olajiga et al., 2017). However, the principle driving them applies to all businesses in the digital environment. Although big data is important to today's marketing, a larger opportunity is big testing, an organizational capability to test ideas on an ongoing, large scale (Heredia et al., 2014; Conforto & Amaral, 2016; Gupta et al., 2016; Grimpe et al., 2017; Morris, n.d.). Big testing maximizes the volume, variety, and velocity of experiments, similar to the defining characteristics of big data. It is the mechanism of innovation to validate the new ideas (Morris, n.d.).

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