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Defining and identifying disruptive innovations ☆

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ABSTRACT

Three essential questions about innovations prevent academics from helping managers determine if a new technology is a disruptive innovation to their organization. First, what is a disruptive innovation? Second, how can a disruptive innovation be disruptive to some and yet sustaining to others? Third, how can disruptive innovations be identified before a disruption has occurred in an organization? This paper proposes answers to these three questions by redefining disruptive innovations through use of innovation adoption characteristics. Through the relative nature of innovation characteristics, a heuristic, or Baedeker, to better determine if an innovation could be disruptive to an organization is proposed. Illustration of the approach is presented to show how potentially disruptive innovations could be identified before an organizational disruption has occurred.

1. Defining and predicting disruptive innovations

How can managers determine if a technology will disrupt their organization? In the article "Disruptive Technologies: Catching the Wave," the authors (Bower & Christensen, 1995) described an idea that has long affected business sustainability: the notion that new technologies can create new markets or radically change, or disrupt, the status quo in existing markets. Although they were not the first to identify the creative destruction caused by new innovations, identification of new market and low-end innovations provided researchers constructs with which to examine effects of new innovations on marketplaces (Bower & Christensen, 1995). Characterizing innovation effects on marketplaces spawned a movement to enhance understanding and improve prediction of such technologies on marketplaces (Adner, 2002; Christensen, 2006; Christensen & Raynor, 2003; Danneels, 2004; Hang, Chen, & Yu, 2011; Schmidt & Druehl, 2008). The primary goal of this stream of research appears to be *prediction* of marketplace disruptions caused by new innovations.

Predicting disruptiveness of an innovation is important for market incumbents so that they avoid inimical consequences from ignoring a disruptive innovation. These adverse outcomes include reduced market share, decreased status, or even bankruptcy or death of an organization (Bower & Christensen, 1995). But how is an organizational manager to know if a given technology will result in a marketplace disruption or even affect their organization? A commonly held belief is that, if managers could identify disruptive innovations before these technologies have affected markets, managers could take actions to turn a potential marketplace disruption into a new opportunity—or at the very least, prevent the failure of their organization. Because the ability to predict disruptive innovations can have far-reaching effects, researchers have essayed to predict disruptions caused by new innovations. These studies, though, have at least three common problems: (1) the definition of a disruptive innovation is vague, as the definitions focus on market impacts; (2) how can disruptive innovations be disruptive to some, but not to all organizations; and (3) data generally are generated only after a disruption has taken place (Govindarajan & Kopalle, 2006; Hang et al., 2011; Myers, Sumpter, Walsh, & Kirchhoff, 2002; Paap & Katz, 2004; Schmidt & Druehl, 2008). The foregoing issues have put pressure on researchers to more clearly and accurately *define*, *or identify*, what a disruptive innovation is.

Because Christensen and Bower characterized marketplace disruptions, or the effects new technologies can have on existing marketplaces, an opportunity exists to define how new technologies facilitate these market changes. In other words, technology characteristics that can contribute to marketplace disruptions can be identified to extend disruptive innovation theory. Indeed, at least six articles have sought to identify or define disruptive innovations from an innovation perspective as opposed to a marketplace perspective (Adner, 2002; Christensen, 2006; Christensen & Raynor, 2003; Danneels, 2004; Hang et al., 2011; Schmidt & Druehl, 2008), yet the ensuing definitions fall short of identify specific innovation characteristics that conceivably could clarify the concept of a disruptive innovation. Unambiguously defining a disruptive innovation is essential for both academic and practical reasons. Academically, unequivocally defining a disruptive innovation is critical to address causal theory of reference (Kripke, 1977; Putnam, 1973). As philosophers of business, researchers assign meaning with terms in

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their fields; as experts in business, they provide references for "disruptive innovations," as the business discipline has proposed the term (Bower & Christensen, 1995). This academic ownership of terms is common. For example, the term "lion" is defined by the community of zoologists; the definition of an "elm tree" is defined by the community of botanists; and if academics of the business community seek ownership of the idea of the "disruptive innovation," they need to proffer a clear definition of what a disruptive innovation is. Otherwise, the term will likely not have a specific definition, thus possibly leading it to become merely another business buzzword.

From a pragmatic perspective, a refinement of the definition of a disruptive innovation is essential for managers. How can a business decision maker analyze a technology to predict whether a new technology has the potential to be disruptive to a marketplace or to their organization? After all, Christensen has identified the "disruptive to some, but not to all" effects of innovative technologies. Accordingly, might an innovation revolutionize a marketplace or an organization, thus having drastic changes or even contributing to the failure of the business? Will business professionals operate blindly in a rapidly changing technological environment?

Given the above-mentioned dialectic, this paper seeks to answer the following three essential questions surrounding disruptive innovations so as to provide managers a lens through which to view new innovations and answer the three longstanding questions about this typology of technology: (1) what is a disruptive innovation? (2) how can disruptive innovations be disruptive to some adopters and yet be incremental or sustaining to others? and (3) how can disruptive innovations be predicted before an organizational disruption has occurred? These questions will be answered by *shifting the focus* of the definition of a disruptive innovation. Existing disruptive innovation theory focuses on market characteristics, new market, and low end innovations. By using innovation adoption theory, three *innovation characteristics* are identified to ground disruptive innovations in a technology, not a marketplace—an innovation's (1) technical standard, (2) functionality, and (3) ownership (justification for undergirding the definition with these features will be subsequently offered). Then, through this redefinition, an examination of an innovation's characteristics, as compared to existing technologies used by an organization, can be used potentially to identify relative effects of an innovation on an organization. Finally, through use of the value chain, impact of a potentially disruptive innovation can be better understood vis-à-vis an organization: the innovation and its effects could be rated, going from its disrupting primary or secondary operations, to its sustaining primary or secondary operations, to its having no effect. This paper will first review germane literature to assist in defining what a disruptive innovation is. Second, an explanation about the relative effects of disruptive innovations is offered. Third, a method for potentially identifying disruptive innovations before the disruption occurs is proposed. Fourth, case that highlights how this method can be used with emerging technologies is proffered. The paper concludes with a discussion about the benefits of the redefinition, potential applications for practitioners, and future research areas.

2. Literature review

What is a disruptive innovation? Although identifying *effects* of a disruptive innovation on an organization or marketplace is relatively easy, creating a pellucid definition of a disruptive innovation has been elusive. Perhaps this is because Christensen identified two different types of disruptive innovations: new market innovations and low-end innovations. The effects of these two types of disruptive innovations on markets are different.

New market innovations act, as their name implies, by creating new demand for a new technology, resulting in consumers demanding this new product. Conversely, low-end innovations provide similar characteristics to existing technologies but cost substantially less. Compounding the effects of these two different types of innovations, Christensen has stated that despite some innovations' being disruptive to one group, the same innovations could be sustaining to another group (Adner, 2002; Christensen & Raynor, 2003; Christensen, Bohmer, & Kenagy, 2000a, 2000b; Danneels, 2004; Schmidt & Druehl, 2008). Although the literature agrees that disruptive innovations cause a market to behave differently, what about these disruptive innovations changes to marketplace behavior? In other words, which innovation *characteristics* cause marketplaces to disrupt? A definition for disruptive innovations that is grounded in innovation characteristics would provide insight into what innovation characteristics result in marketplace changes. Without a consistent definition, grounded in innovation characteristics, academics and practitioners alike are chasing phantoms: the ontology, or the nature of disruptive innovations, and epistemology, or knowledge surrounding disruptive innovations, are difficult to move forward without agreement as to what is being studied (Bryman & Bell, 2011; Guba & Lincoln, 1994).

Instead of having a *stipulated* definition, or a definition based on precisely defined concepts, academics and practitioners are left with an extracted definition, or a definition based on common usage of the word (Kripke, 1977; Putnam, 1973). Unfortunately, common usage of the word allows for contextual inference and potentially variegated meaning: in other words, a disruptive innovation may or may not be disruptive, depending on how the word is used.

A stipulated definition is a definition in which a term is given a specific meaning for the purposes of a given argument in a context. For a disruptive innovation, it should be grounded in an innovation's characteristics. This foundation is needed because the topic of discussion is the innovation itself, and the disruptive component of that innovation. Any definition of a disruptive innovation that does not address innovation characteristics would appear to be discussing something other than the innovation itself. Therefore, a definition for a disruptive innovation that is grounded in the innovation itself is needed to move this body of knowledge forward. The need for a stipulated definition has been recognized by other business scholars as a fundamental criticism surrounding disruptive innovations (Markides, 2006, Schmidt & Druehl, 2008). Accordingly, two different definitions of a disruptive innovation have been proposed (Adner, 2002; Danneels, 2004; Schmidt & Druehl, 2008; Thomond & Lettice, 2002).

One definition of a disruptive innovation focuses on the *functional quality* and *cost* of an innovation. This definition defines disruptive innovations as an innovation with "good enough" functionality that has a low cost (Christensen, Baumann, Ruggles, & Sadtler, 2006; Christensen, Bohmer, & Kenagy, 2000a; Christensen, Horn, & Johnson, 2008; Paap & Katz, 2004; Thomond & Lettice, 2002). Theoretically, the lower quality and lower priced innovation incrementally improves until eventually the innovation competes with market leading products, thus disrupting the market status quo (Bower & Christensen, 1995). Defining disruptive innovations as lower quality products that compete on price does not appear to be an appropriate innovation characteristic with which to define a typology of technology. Indeed, price changes reflect a variety of factors from organizational processes and materials, to marketplace conditions. "Good enough quality" is a function of comparing two or more innovations that complete a similar task. Price and perceived quality are not innate innovation characteristics; rather, price and perceived quality are redolent of business strategy decisions. Further, competition on price and quality is a commonly accepted *business* strategy—but neither price nor perceived quality are innate innovation characteristics—on which to ground a definition of a typology of technology (Besanko, Dranove, & Shanley, 2009). As such, this definition essentially focuses on business strategies regarding market entry and overlooks *specific* innovation characteristics. This is important because an innovation's characteristics that create changes in customer expectations could disrupt existing, or potentially create new, markets, not a price point or entry strategy.

The other definition of disruptive innovations focuses *not* on an innovation's cost or quality but on *market characteristics*. Danneels

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