

Assessing the Disruptive Potential of Massive Open Online Courses

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ABSTRACT

The massive open online course (MOOC) innovation has generated remarkable momentum and interest, but has received scant attention in the literature. The innovation is surrounded by uncertainty, particularly with respect to its possible implications for the higher education industry and its various stakeholder groups. This paper addresses a gap in the academic literature and assesses the disruptive potential of the MOOC innovation in the context of the higher education industry. Through analysis of emerging evidence with respect to disruptive innovation theory, it evaluates the MOOC innovation against the following three archetypal ex-ante characteristics and early marketplace behaviours of disruptive innovations: 1) reconfiguration of value delivery along performance dimensions relative to mainstream offerings; 2) entry into a new or low-end market; and 3) ability to improve to the point of mainstream market acceptance. It concludes that whilst the MOOC innovation seemingly embodies these three archetypal ex-ante characteristics and early marketplace behaviours that imply its disruptive potential, the realisation of any such potential is likely to be constrained by its innovators – incumbent higher education institutions – which appear to be pursuing MOOCs with intent to sustain their current businesses, rather than to disrupt them.

Introduction

Since its inception in 2008, the massive open online course (MOOC) innovation has generated remarkable momentum and interest. The three biggest MOOC platforms – edX, Coursera and Udacity (The New York Times, 2012) – currently host 671 courses from 135 globally and academically diverse, high-ranking higher education institutions (Coursera, 2013; edX, 2013a,b; Udacity, 2013). Coursera, the largest, has alone enrolled more than 5.6 million students (Fowler, 2013). Moreover, investors who anticipate a global market consisting of more than *two billion* potential consumers have repeatedly injected capital worth tens-of-millions of dollars into fledgling MOOC platform providers (Bersin, 2013; The Economist, 2013). Perhaps most significantly, the MOOC phenomenon has garnered the attention of national governments concerned for the sanctity of their education systems (Austrade, 2013; Kolowich, 2013a; UK Department for Business, Innovation and Skills, 2013) and principal international development organisations that anticipate potential impacts from MOOCs in the domain of poverty alleviation (World Bank, 2013).

Such momentum coupled with the novelty of the MOOC innovation has instigated intense uncertainty and debate (Hommel, 2013). Concerns include the impacts that the innovation may have on the higher education industry and its various stakeholder groups such as students, academics and employers, whether MOOC providers can develop sustainable business models, how higher education institutions should strategize in light of the MOOC phenomenon, and whether the MOOC constitutes a potentially disruptive innovation (Cooke, 2013; Dellarocas and Alstyne, 2013; Farmer, 2013; Judson, 2013).

The latter concern is particularly pertinent and profound for two reasons. Firstly, the MOOC innovation has arisen following the recent and rapid digital transformations undergone by other content industries including publishing, music and advertising (Bhattacharjee et al., 2011; Dellarocas and Alstyne, 2013; Moreau, 2013; Overdorf and Barragree, 2001; Palfreman, 2009). The transformations of such industries – and the associated weakening of their respective longstanding incumbent firms and business models – have been instigated by digitally enabled disruptive innovations in goods and processes that disaggregated and digitised the production and distribution of content. They have set a precedent for the disruption of other content industries, such

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as higher education, by innovations that similarly disaggregate and digitise content, such as the MOOC. Whether the MOOC innovation possesses disruptive potential in the context of the higher education industry thus deserves serious consideration. Secondly, determination of whether the MOOC innovation embodies disruptive potential might enable better-informed consideration of other concerns associated with it, such as those aforementioned. From the point of market introduction, disruptive innovations routinely diffuse and evolve to impact industries along distinct and typical trajectories. Disruptive innovation theory thus facilitates the derivation of ex-ante predictions concerning the future impacts of potentially disruptive innovations *relative to events that occur in the marketplace* following their introduction, providing that potentially disruptive innovations are aptly identified as such (Christensen, 2006; Christensen et al., 2004). Accordingly, emergent academic literature has noted the importance of determining “whether [...] MOOCs can be categorized as disruptive innovations” (Wellen, 2013: 2).

Prior assertions that the MOOC innovation is “disruptive” (Anderson, 2013: 1) or even “definitely a disruptive innovation” (Skiba, 2012: 417) have seemingly been made in the absence of references to disruptive innovation theory or the higher education industry’s degree of susceptibility to disruption. They should thus arguably be treated with scepticism – the term “disruptive innovation” is commonly misunderstood and misapplied (Markides, 2006), specifically in the higher education context (Straumsheim, 2013). Moreover, whilst early identification of an innovation’s disruptive potential may be advantageous given the predictive power of disruptive innovation theory, *erroneous* identification may harbour negative consequences as such can provoke implementation of suboptimal strategies and targeting of non-existent markets (Christensen, 2007; Parvarandeh, 2013). Aptly, Yuan and Powell (2013: 14) state that “using disruptive innovation to explain the phenomenon of MOOCs in HE [higher education] should be applied with caution to avoid superficial conclusions”.

Given that disruptive innovations exhibit common characteristics and marketplace behaviours from their inception, which enable their ex-ante identification (Christensen, 2006; Hang et al., 2011), this paper evaluates the disruptive potential of the MOOC innovation to address a gap in the literature and facilitate better-informed discussion of the phenomenon. It draws upon emerging evidence to consider the MOOC innovation against the following three archetypal ex-ante characteristics and early marketplace behaviours of disruptive innovations: 1) reconfiguration of value delivery along performance dimensions relative to mainstream offerings; 2) entry into a new or low-end market; and 3) ability to improve to the point of mainstream market acceptance. It subsequently considers the extent to which the innovators themselves – incumbent higher education institutions – are fostering the disruptive potential of MOOCs, before concluding.

The MOOC as a Potentially Disruptive Innovation

A disruptive innovation may be defined as:

An innovation that [initially] cannot be used by customers in mainstream markets. It defines a new performance trajectory by defining new dimensions of performance compared to existing innovations. Disruptive innovations either create new markets by bringing new features to nonconsumers or offer more convenience or lower prices to consumers at the low end of an existing market (Christensen et al. 2004: 293).

Their converse, sustaining innovations, offer superior performance along markets’ traditionally valued performance dimensions and are typically introduced by industry incumbents to target mainstream customers. By offering substandard performance against these dimensions and instead delivering customer value in new ways (often through increased simplicity and lower prices), disruptive innovations enter markets comprised of low-end consumers and / or traditional nonconsumers who appreciate their reconfigured value propositions and for whom mainstream products offer superfluous performance (Christensen and Raynor, 2003; Dombrowski and Gholz, 2009; Schmidt and Druehl, 2008). These innovations induce industry “disruption” by evolving in ways that 1) retain their superior performance along newly emphasised dimensions relative to traditional offerings; and 2) improve their performance along traditional dimensions to the level required for adoption by mainstream market consumers (Christensen and Raynor, 2003; Christensen et al., 2004; Hang et al., 2011).

Prior to discussion of the MOOC innovation relative to disruptive innovation theory, the constitution of the mainstream market, industry incumbents and traditional offerings in the higher education industry context must be defined. Contemporarily and despite the increased prominence of distance learning and online and part-time study modes, the vast majority (69%) of undergraduate and postgraduate students study full-time on higher education institution campuses (Higher Education Statistics Agency, 2013). The mainstream market is thus herein defined as comprising full-time, campus-based higher education students. Incumbents are campus-based higher education institutions. Traditional higher education offerings are full-time, campus-based degree programmes.

Reconfiguration of Value Delivery along Product Performance Dimensions

The preliminary antecedent to disruption is reconfiguration of value delivery along dimensions of product performance relative to mainstream offerings (Dombrowski and Gholz, 2009). Whether the MOOC innovation satisfies this prerequisite may be evaluated by mapping its value curve – alongside that of traditional higher education offerings – against the

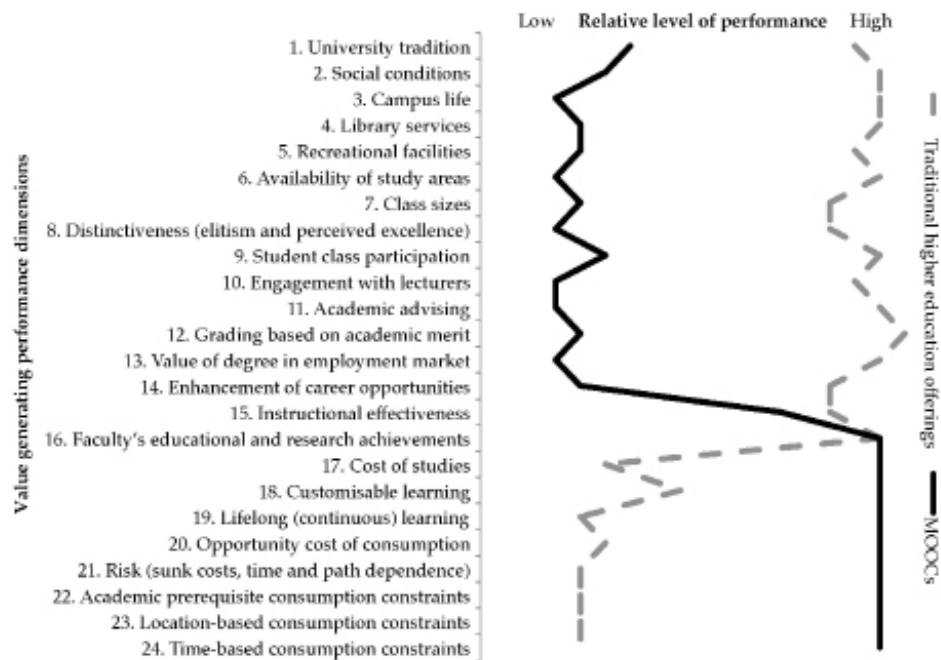


Figure 1: Value Curves of MOOCs and Traditional Higher Education Offerings
Author's analysis; figure adapted from Kim and Mauborgne (1997)*

performance dimensions most valued by mainstream consumers and most emphasised by MOOCs (Kim and Mauborgne, 1997; Parvarandeh, 2013). A distinct curve would indicate underlying disruptive potential, as illustrated in Figure 1*.

In summary of the value curves illustrated in Figure 1, the disaggregated and digital delivery of higher education content offered by MOOCs provides consumers increased flexibility in consumption with respect to space and time relative to traditional higher education offerings, which deliver live, perishable content, consumption of which is therein constrained (dimensions 23 and 24). Simultaneously, digital content delivery to decentralised individuals and the lack of a physical campus sees that MOOCs perform poorly against dimensions associated with social interaction and campus facilities (dimensions 1 to 6). Moreover, the open and free (or low cost) nature of MOOCs (dimension 17) all but eliminates barriers to entry and exit (dimensions 20 to 22) (UK Department for Business, Innovation and Skills, 2013) and thus facilitates choice in consumption and lifelong learning (dimensions 18 and 19) (Chen et al., 2013; Skiba, 2012), though also engenders large class sizes and indistinctive educational experiences (dimensions 7 and 8). Finally, dimensions concerned with student learning, assessment and outcomes (dimensions 9 to 15) are those against which MOOCs are most commonly considered to perform inadequately against relative to traditional higher education offerings (Laplante, 2013; Mazoue, 2013; Rubin, 2013; Yuan and Powel, 2013). Critically, MOOCs do not lead to the award of degrees (Lawton and Katsomitros, 2012). With respect to these dimensions, the San José

State University Philosophy Department (2013: 1) contends that MOOCs compromise such “essential components of a good quality education”. Such arguments and the distinct value curve of the MOOC innovation demonstrates its compliance with this first characteristic of disruptive innovation: MOOCs reconfigure value delivery along performance dimensions relative to traditional higher education offerings and underperform against traditionally valued performance dimensions. This engenders the MOOC innovation’s disruptive potential – providing that MOOCs are subsequently able to improve along traditionally valued performance dimensions to the point of mainstream market acceptance (Christensen et al., 2004; Hang et al., 2011); a matter to be subsequently discussed – and also has implications for the innovation’s *initial* market entry.

The Market: Entry and Characteristics

Upon their introduction, disruptive innovations enter low-end or new markets since their inadequate performance along traditionally valued dimensions renders them unsuitable for mainstream market consumption (Christensen et al., 2004; Schmidt and Druehl, 2008). Two factors indicate that MOOCs have embarked on a trajectory of new-market disruption. Firstly, piecemeal data on MOOC participants is emerging[†], suggestive that MOOCs are attracting a psycho-demographic of consumers distinct from the mainstream market. Demographically, MOOC consumers are highly educated: most (70.3 to

* Performance dimensions derived from Athiyaman (1997); Chen et al. (2013); Elliott and Healy (2001); Li and Bray (2007); Mai (2005); Ming (2010); Sojkin et al. (2011); UK Department for Business, Innovation and Skills (2013)

† G. Christensen et al. (2013) report data on 34,779 respondents enrolled on at least one of 32 University of Pennsylvania MOOCs (24 unique MOOCs with the remainder being repeat sessions). Huhn (2013) reports data on 8,459 respondents enrolled on at least one of four University of Wisconsin–Madison MOOCs. Kolowich (2012) reports data on 14,045 respondents enrolled on a single MOOC offered by Stanford University. University of Edinburgh (2013) reports data on 45,182 respondents enrolled on six MOOCs offered by the University of Edinburgh.

79.4%) hold bachelor level degrees and a substantial proportion (40.2 to 44.2%) hold advanced level degrees (G. Christensen et al., 2013; Huhn, 2013; University of Edinburgh, 2013). Most (50 to 62.4%) are in full-time employment (G. Christensen et al., 2013; Huhn, 2013; Kolowich, 2012). This indicates a market that is demographically distinct from the mainstream higher education market comprised of full-time students, and one with less need and capacity to consume traditional higher education offerings. Regarding psychographics, MOOC consumers possess consumption motivations that contrast with those of mainstream higher education consumers. Few partake in MOOCs to facilitate the obtention of a degree (13.2%) or a new job (17%) (G. Christensen et al., 2013), which represent two primary determinants of traditional higher education consumption decisions (Li and Bray, 2007; Maringe, 2006; Ming, 2010; Sojkin et al., 2011). Most (50.05%) do so to satisfy curiosity or “just for fun” (G. Christensen et al., 2013: 11).

These data imply a psycho-demographic of consumers likely excluded from the traditional higher education market by the high opportunity costs of consumption, complexity and major performance overshoots of traditional higher education offerings relative to their consumption requirements. Such is archetypal of new-market disruption: the innovation takes root among nonconsumers excluded from the mainstream market by traditional offerings rendered unfit for their consumption typically by high prices, complexity and superfluous performance (Horn and Staker, 2011). The second indication that MOOCs have embarked on a trajectory of new-market disruption is their apparently absent impact on the size of the traditional higher education market, which continues to undergo strong and steady growth despite the enrolment of millions of students to MOOCs. Demand for traditional higher education is rising and outstripping supply in countries across the world, leading to calls for increased capacity (Association of Universities and Colleges of Canada, 2013; Gibney, 2013; Islamic Development Bank, 2013; Kokutse, 2013; Oxford Business Group, 2013; Paddock, 2013; UNESCO Institute for Statistics, 2013).

The distinct characteristics of the MOOC market and the continued growth of the traditional higher education market seemingly indicate that MOOCs have embarked on a trajectory of new-market disruption by attracting nonconsumers. Wellen (2013: 10) supports this argument, stating that “in most cases, MOOCs are used...by nontraditional learners”. Notably, new-market encroachment can prove particularly damaging to an industry’s incumbents since, in contrast to low-end encroachment, the absence of an immediately apparent threat to incumbents’ market shares is more likely to stimulate inertia and unresponsiveness among them (Hang et al., 2011). Unusually, in the case of the MOOC innovation, the innovators are the industry incumbents – a matter that will shortly be discussed. Since they appear to have established a new-market foothold, MOOCs adhere to the market entry characteristic of disruptive innovation. As earlier alluded, their potential to

diffuse beyond this market and induce industry disruption depends on their ability to improve along traditionally valued performance dimensions to the level required by mainstream consumers.

Performance Improvement

Once a reconfigured value proposition and an initial market foothold have been established, an innovation’s disruptive potential lies in its ability to improve to the point of mainstream market acceptance whilst retaining its benefits relative to traditional offerings. Two factors are therein determinant. The first is competition among players, which must be sufficient to stimulate performance improvement (Hang et al., 2011). The second is the innovation’s “extendable core” (Wessel and Christensen, 2012) – that is its defining features that engender its advantages along particular performance dimensions relative to mainstream offerings, and by extension, its disruptive potential (Dombrowski and Gholz, 2009; Wessel and Christensen, 2012). An innovation’s extendable core constrains its improvement along *incompatible* performance dimensions – specifically, those that require it to be altered such that its relative advantages are destroyed. These two factors may be respectively interpreted as *competitive pressure* and *scope* to improve performance. Regarding the former, there exist ample well-financed, established competitors and new entrants to the MOOC space to stimulate performance improvement (UK Department for Business, Innovation and Skills, 2013). With respect to the latter factor, the scope for the performance of MOOCs to be improved along traditional performance dimensions is defined by the MOOC innovation’s extendable core, central to which are the concepts of massive, open and online and the resultantly superior performance of MOOCs along value curve dimensions 17 to 24 relative to traditional higher education offerings. Although the deficiencies of MOOCs relative to mainstream market requirements are multiple (cf. Figure 1), many higher education experts (Daniel, 2012; Hill, 2012; Laplante, 2013; Rubin, 2013; UK Department for Business, Innovation and Skills, 2013; Yuan and Powel, 2013) imply that MOOCs’ relative advantages may enable them to begin garnering wider acceptance upon: 1) improving to provide assessments that facilitate student authentication and eliminate plagiarism (corresponding to value curve dimension 12); and 2) granting academic credit that leads to a degree or other valuable signifier of completion recognised by employers (corresponding to value curve dimensions 13 and 14).

MOOC providers are indeed introducing proctored examinations at test centres worldwide at a low consumer cost of approximately \$80 (Lawton and Katsomitros, 2012). Such improvement falls within the scope of the MOOC innovation’s extendable core: it does not destroy any of the relative advantages of MOOCs along value curve dimensions 17 to 24. Subsequent to adequate assessments, there is “no inherent reason why MOOC-acquired learning cannot be accredited” (Boxall, 2012). Performance

improvement along this dimension thus appears to depend not on the MOOC innovation's extendable core, but rather on the higher education institutions that administer them.

Higher Education Institutions and the Disruptive Potential of MOOCs

Suggesting that the MOOC innovation bears "the early hallmarks of a disruptive innovation", Horn and Christensen (2013) highlight as curious that "the market leaders [incumbent higher education institutions ...] are the ones pioneering it". Whilst incumbent-led disruption is atypical, this in itself should not trigger the conclusion that the MOOC innovation does not possess disruptive potential. Such is dependent on the characteristics of the innovation itself, not those of the innovating firms (Schmidt and Druehl, 2008). That MOOCs are attributable to industry incumbents may, however, implicate the *realisation* of their disruptive potential. Compared to entrants, incumbents are more likely to be constrained from successfully instigating disruptive change by inertia engendered by myriad organisational factors including excessive bureaucracy, path dependencies and commitments to dominant product or business model designs, existing un-learnable competencies and routines, protectiveness of current customers and aversion to risk and cannibalisation, and myopic dominant logics with respect to existing and potential customers' current and future requirements (Assink, 2006; Gilbert, 2005; Gulati and Garino, 2000). Significantly, extant successful mainstream business and revenue streams may render incumbents incapable of allocating resources to successfully market disruptive innovations, the current returns from which are often relatively negligible (Christensen and Overdorf, 2000). This issue is compounded if the innovation and new market demand the adoption of cost-structures and processes incompatible with those of mainstream businesses (Bower and Christensen, 1995). Such limiting conditions are salient in the case of MOOCs (Jackson, 2013; Lucas, 2013; Waldrop, 2013), and surmounting them to drive disruption requires that higher education institutions pursue MOOCs in independent business units protected from the potentially inhibiting influences of their core activities (Christensen and Raynor, 2003; Schmidt and Druehl, 2008). Armstrong (2012) and Daniel (2012) suggest that this *is* being practiced, at least by some higher education institutions.

Whilst higher education institutions may have organised to exploit the disruptive potential of MOOCs, their motives for doing so scantily support Horn and Christensen's (2013) excitement that they are strategizing to drive disruption. Conversely, the apparent twofold motives of higher education institutions suggest that they are pursuing MOOCs in order to *strengthen their core businesses*. One of these motives comprises brand projection and engagement to bolster the recruitment of potential students worldwide to paid traditional degree programmes (Garrett, 2013; Lawton and Katsomitros, 2012; UK Department for Business, Innovation and Skills,

2013; University of Edinburgh, 2013). The other is to undertake pedagogical experimentation to improve the efficiency of traditional, campus-based instruction, with a possible view to therein integrate online provisions whereby students watch pre-recorded lectures online in advance of classes that may subsequently be dedicated to group discussion (a concept known as the "flipped" classroom) (Lavelle, 2013; Lawton and Katsomitros, 2012; UK Department for Business, Innovation and Skills, 2013; Waldrop, 2013; Yuan and Powel, 2013).

Summarily, Rice University's vice provost for interdisciplinary initiatives notes that "we see MOOCs as a way to innovate our classroom experience" (quoted in Jackson, 2013). Indeed, MOOCs may offer unique opportunities for higher education institutions to achieve such business-sustaining objectives. MOOCs generate brand awareness among potential recruits worldwide through repeat engagement (Pirani, 2013) and emerging piecemeal evidence suggests that higher education institutions may be benefiting from increased student enquiries as a result of offering MOOCs (Jackson, 2013). They also yield rich data that higher education institutions have begun mining to inform both student recruitment and on-campus pedagogical development (Austrade, 2013; Finkel, 2013). Further evidence suggests that higher education institutions are pursuing MOOCs in order to sustain their current business models. Higher education institutions have expressed that their MOOC activities are not aimed at developing sustainable business models or monetisation opportunities (University of Edinburgh, 2013), with a recent Babson Research Group survey indicating that most chief academic officers do not believe that MOOCs can provide a sustainable channel for offering courses (Pirani, 2013).

Since they are apparently employing MOOCs as a tool to strengthen their existing businesses, it stands to reason that higher education institutions will inhibit their disruptive potential. Indeed, this dynamic may be underway as "universities are deciding not to provide credit for a MOOC unless a participant later enrolls in a paid program" (Finkel, 2013). Moreover, scarce examples of credit-bearing MOOCs, such as the University of Georgia's, are localised to in-house students (Haggard, 2013). Some observers imply that the disruptive potential of MOOCs may only be realised when students receive academic credit regardless of whether they are enrolled with the providing institution – specifically, when the provision of education becomes unbundled from accreditation and the traditional higher education business model is truly reformed (Kolowich, 2013b, Lawton and Katsomitros, 2012). The validity of this argument remains unproven, though by using MOOCs and their accrediting powers – which Horn (2013) argues constitute a self-governance mechanism that the higher education industry employs to protect itself from disruption – in manners that reinforce their current business models, higher education institutions are arguably inhibiting the disruptive potential of MOOCs.

Conclusion

Through analysis of emerging evidence relative to disruptive innovation theory, this paper has assessed the disruptive potential of MOOCs and the extent to which that potential might be realised. It has revealed that MOOCs embody the archetypal ex-ante characteristics and early marketplace behaviours of disruptive innovations: the MOOC innovation 1) underperforms against the mainstream higher education market's traditionally valued performance dimensions; 2) has attracted a market comprised of traditional nonconsumers whose characteristics and requirements exclude them from consumption of traditional offerings; and 3) embodies an extendable core that allows performance improvement *where it is seemingly most needed* in order for them to begin garnering mainstream market acceptance. Notably, the claim of this paper is not that MOOCs constitute a disruptive innovation, as expressed by Skiba (2012) and others. Such an ex-ante assertion would necessarily incorporate predictions concerning future marketplace events, which are uncertain (Yu and Hang, 2009); arguably, an innovation cannot be labelled disruptive ex-ante of its evolution and inducement of industry disruption. Rather, the claim is that MOOCs embody the characteristics and early marketplace behaviours that typify disruptive innovations and are thus indicative of their ex-ante disruptive *potential*.

Yet such potential is unlikely to be realised whilst incumbent higher education institutions, as the innovators of MOOCs, pursue them as a tool to sustain their current business models, rather than as an innovation to challenge them. Citing Christensen (2003), Yuan and Powel (2013: 14) note that "all technologies can be applied to sustain or disrupt any industry's incumbents". Whilst disruption does not absolutely necessitate the displacement of incumbent firms (Wessel and Christensen, 2012), it typically requires business model innovation, organisational renewal and "asymmetric incentives between existing healthy business and potentially disruptive business" (Yu and Hang, 2009: 437). Such asymmetries seem to remain absent in the case of MOOCs. Accordingly, Garrett (2013) notes that universities "certainly do not want their core business...disrupted, and clearly they do not think they are doing so by investing in MOOCs".

It must be recognised that the MOOCs innovation remains in its infancy, and that any analysis of its disruptive potential at a given point in time should not stimulate a foregone conclusion as to the subsequent realisation of any such potential. Analyses should be conducted on an on-going basis relative to marketplace events: realisation of disruptive potential may be influenced by myriad general (such as lifestyle, legislative and sociodemographic change) and industry-specific drivers (Hang et al., 2011) and can be a slow and staggered process characterised by barriers (cf. Wessel and Christensen, 2012). Such dynamics may be particularly significant in the analysis of potentially disruptive innovations

in the higher education context. In many respects, the industry appears more susceptible to digital disruption than any that preceded it. Concerns from across society concerning the ability of the traditional higher education business model to meet social and economic objectives – given rapidly rising costs, unmet demand and calls for open access – have never been more salient (Breneman, 2011; Kelly and Hess, 2013; Meyer, 2010; Rubin, 2013). Yet the industry has exhibited significant resilience to disruption or reinvention by other forms of online distance learning (Lenox, 2013; Meyer, 2010) for nearly a quarter century following the introduction and subsequent proliferation of such courses in 1989 (Eisenbarth, 2002). Invariably, any digital disruption is likely to evolve slowly. Higher education is characterised by tradition (Long, 2013) (in some respects, centuries' worth) and significant government intervention to ensure its efficacy in the public interest, to which the on-going existence of incumbent institutions is perceived to be crucial (Breneman, 2011). Thus moreover from the apparent desire of incumbent higher education institutions to avoid self-disruption, it is noted that "when public entities and public policy enter the mix, resistance to disruption can be fierce" (Kelly and Hess, 2013: 3). Such will likely slow the diffusion of unproven disruptive innovations.

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