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Economies of scale versus small is beautiful – a business model approach based on architecture, principles and components in the beer industry

Abstract

This paper defines business models for sustainability as contested and contextual, and provides a novel framework in terms of the architecture of the business, its principles and components for the analysis of such models. With this framework a preliminary comparison using the engaged scholarship methodology is made between microbreweries and large multinational brewers. It is concluded that defining and determining comparative sustainability performance based on different business models results in ambiguities and contradictions that are not readily resolved, but a key determinant in the broad definition of business sustainability in the brewing sector is the degree of localism that the business model exhibits.

Keywords

Brewing; beer; microbreweries; sustainability; localisation; scale; multinational brewers; Life Cycle Analysis; business models.

1. Introduction

The purpose of this paper is to explore the meaning of business models for sustainability in the context of microbreweries in the market for beer, drawing on evidence from the UK and the US. From an immersed scholarship approach to the subject, the paper seeks to offer insights to the emergent properties of business models for sustainability that may subsequently be subject to greater empirical scrutiny in the brewing and other sectors. The focus is on the business models of microbreweries and whether, via the framework of architectures, components and principles, they may be considered sustainable. Discussion of the large multinational brewers is offered by way of a binary contrast only, and it is recognised that such a contrast is not fully reflective of a more nuanced reality.

There is a distinct and growing stream of work around the theme of business models for sustainability, motivated by the general sense that organisational innovation is as crucial as technological innovation if more sustainable production and consumption practices are to be realised (Schaltegger et al., 2012a). It is apparent from the business models literature that while superficially compelling and plausible the concept is also rather elusive and imprecise, and can vary widely across different locations, times, and areas of economic activity.

Attempts at categorising and codifying the literature on business models generally (as in Zott and Amit, 2010) or business models for sustainability (Bocken et al., 2014; Short et al., 2014) are illustrative of attempts to impose some intellectual order on this rapidly expanding field. Additionally, sustainability in business or in the wider field of production and consumption is contextual and relative; a process or social discourse rather than a defined end state (Hajer, 1995).

Section two of this paper outlines the approach of understanding business models for sustainability from the perspective of organisational architecture, operational principles and functional components that may (or may not) be present and hence allow us to make judgements as to whether a particular case is (relatively) more sustainable than the preceding situation or that of the majority of other business models in the same contextual setting (time, place and area of business activity). This approach develops further that outlined in Wells (2013) and has links with the literatures on business sustainability and on industrial ecology. The theoretical framework discussed in section two is in part derived from the literature, but also emerges out of the engaged scholarship methodology discussed in section three. As is elaborated there, the particular form of engaged scholarship adopted is described as the extensive co-production of knowledge.

The fourth section of the paper then applies the architecture, principles and components to the case of microbreweries and large multinational brewers, drawing on a range of secondary data to illustrate the main points of discussion. It is argued that microbreweries exhibit some, but by no means all, of the architecture, principles and components for business models for sustainability while simultaneously exhibiting some aspects that could be argued to be distinctly unsustainable. Nonetheless, the starting point of the discussion is the proposition that microbreweries a) exhibit different business models to large-scale production and b) that as a consequence of the models adopted the microbrewery approach is more sustainable. The final section of the paper therefore explores the implications of the ‘architecture, principles and components’ approach. It is argued that business model evaluation needs to be firmly grounded in applications because the meaning of sustainability is highly contextual.

2. Business models for sustainability: Architecture, principles and components

In broad terms, a business model can be defined as having three constituent elements: The value network and product / service offering that defines how the business is articulated with other businesses and internally (i.e. how value is created); the value proposition that defines how products and / or services are presented to consumers in exchange for money (i.e. how value is captured); and the context of regulations, incentives, prices, government policy, etc. (i.e. how value is situated within the wider socio-economic framework). The mainstream (non-sustainability) literature on business models tends to have a focus on the architecture of the business for value creation and capture within which processes are adopted that allow a product and / or service to be delivered (see Richardson, 2008 for a slightly different formulation in which the value proposition, value creation and delivery, and value capture are the main elements of the business model), and around which a strategy may be formulated to enable the business to compete (Baden-Fuller and Morgan, 2010; Teece, 2010; Schweizer, 2005; Shafer and Smith, 2005). In this sense, the business model concept is ‘nested’ within other concepts and does not in itself provide a complete explanation of the business in question. Business model innovation, in isolation or in tandem with other forms of innovation such as technological or managerial, may then be understood as a means of providing the framework for competitive differentiation – although it still requires execution in order to be an operational success. Teece (2010) argues that business models are not static blueprints, but rather are emergent phenomena whose form may stabilise but equally may continue to morph in the face of contextual developments. Business model innovation as seen by, for example, Zott and Amit (2010) is thus an ongoing process rather than a one-off event. A successful business model is in this view one that better articulates a fit between value capture, value

creation and value context in a process of dynamic stability (Demil and Lecocq, 2010) - but this does not necessarily qualify the business to be described as sustainable.

When sustainability concerns are overlaid on traditional business concerns then the issue of the business model becomes both more complex and more contentious. For Lüdeke-Freund (2010) sustainable business models must simultaneously confer competitive advantage through the creation and capture of superior customer value while also contributing positively to the enhanced sustainability of the business itself, society in general and to the physical environment. Such a perspective may not necessarily mean the business founders, managers or decision makers consciously decide to seek this simultaneous outcome (though equally they may), but allows some clarity on evaluating whether a business may be understood as more sustainable.

One possible stimulus to business model innovation from incumbents is that the 'demand' for sustainability as articulated through the business model context becomes increasingly disassociated from the value creation system; hence the production system is less and less aligned with the value context system. Schaltegger et al. (2012) identified in their typology three strategies with respect to business model innovation and sustainability: Defensive; accommodative; and proactive. Defensive strategies seek to retain the existing business model by reducing risks and costs through a process of business model refinement and process improvement. Accommodative models ameliorate impacts through adjustments to the business model. Proactive strategies effectively involve the redesign of the core business logic in a manner that fundamentally shifts how the business creates and captures value. Put another way, the literature has tended to focus on how incumbent or existing businesses

might be on a journey of transformation (Winn and Pogutz, 2013) or evolution (Zollo et al., 2013) through a series of experimental model innovations towards a new relative stability or maturity (Massa and Tucci, 2013) and with a bias towards environmental concerns (Beltramello et al., 2013).

The approach adopted here seeks to achieve two elements. First, a shift from the concept of competitive advantage in defining a business model for sustainability; and second the explicit incorporation of normative (sustainability) values into the design of the business model that in turn inform both the overall architecture of the business and the operational execution of that architecture. The approach therefore echoes and reinforces that adopted by Short et al. (2014) in which it is argued that current approaches to sustainability tend to reduce the unsustainability of certain business practices but do not actually enable long-term sustainability in alignment with the core business purpose. In this paper, a sustainable business model is one which is both sufficiently profitable and that results in a process of comparative absolute or relative reductions in environmental and socio-economic burdens through the delivery of socially-relevant products and services. Sustainability is not an absolute end-point, but rather an improvement process whereby future generations are progressively less prejudiced by contemporary practices. For business management this means embedding sustainable development into other business improvement practices such as quality improvement (Asif et al., 2011a; 2011b; Siebenhüner and Arnold, 2007).

The architecture, principles and components approach deployed here has similar characteristics to that of the 'element archetypes' suggested by Short et al. (2012) from their literature review and from Klewitz and Hansen (2014) in their work on small and medium-

sized business, but also derives from the extended engaged scholarship approach discussed in more detail in section three. Architecture refers to the original structure of the business in terms of vertical integration, supply chain and value creation and capture as found in the mainstream literature on business models (items 2.1 to 2.3 inclusive). Principles refers to a series of ‘sustainability’ characteristics (items 2.4 to 2.9 inclusive) derived from the wider literature on business and sustainability (Wells, 2013), and from interactions with relevant actors. Components (items 2.10 to 2.12 inclusive) identifies three possible operational means by which innovative business models may seek to achieve competitive survival and sustainability targets. The architecture concept is closely related to long-standing definitions (such as the Porter value chain) of the boundaries of the business. There is no general presumption as to whether the degree of internalisation or vertical integration militates against sustainability: it is more a case of the empirical reality to be observed. The principles concept is different in that it articulates the idea of normative values underpinning the business model and materially influencing how that model is structured and operates. The components element refers to those features that might enable a business model to incorporate key sustainability metrics such as material and product re-use into the overall business model (see diagram 1). The theoretical framework presented here is co-emergent with the extensive scholarship discussed in section three. Initial concepts regarding sustainable business models thus informed exploratory research into activities such as microbreweries, while outcomes from that research and wider developments in the literature (both theory and data) elaborated the framework in a feedback loop.

Diagram 1: Architecture, principles and components in business models for sustainability

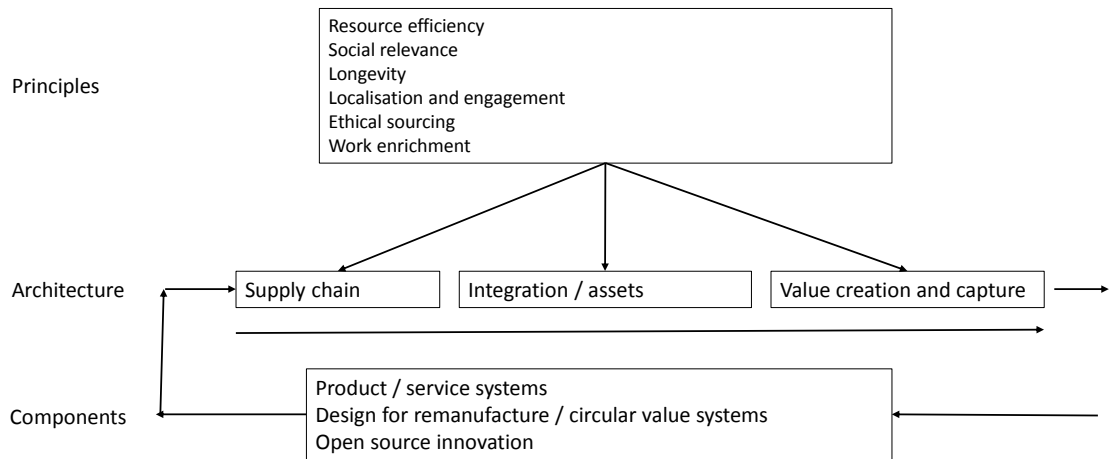


Diagram 1: Architecture, principles and components in business models for sustainability

2.1 Architecture: Integration and Assets

Defining the boundary of the firm constitutes an important element of the overall business model, determining which assets and capabilities are considered ‘core’ and which may be outsourced in various ways. From a sustainability perspective it is possible that higher levels of integration may allow greater control over those inputs and / or outputs that constitute a significant proportion of environmental performance. Similarly, ownership may be important in allowing independence and hence the ability to make decisions for environmental or social reasons that a profit-maximising or growth-maximising business run by professional managers on behalf of shareholders might not make. Alternatively, network or ecosystem

structures with low levels of vertical integration for the participants are increasingly prevalent (Lataifa, 2014).

2.2 Architecture: Supply chain

The corollary of the integration / assets decision is that of supply chain architecture that defines the membership and structure of backward and forward supply linkages in which the firm engages, and the logistics processes adopted to enable those linkages to function efficiently (Holweg and Helo, 2014). The mainstream business models literature recognises the significance of these relationships as key determinants of the ability to create and capture value. Green supply chain management has become a major area of concern for business and of research for academics, and is frequently fundamental to the overall sustainability performance of a business (Schrettle et al., 2014; Yu et al., 2014; Govindan et al., 2014).

2.3 Architecture: Value creation and capture proposition

To be sustainable a business must be profitable, or in other words able to survive sufficiently against entrenched and emergent competition, and the core of this ability lies in the manner in which the value proposition is created and captured (Gummerus, 2013). Of course, value creation and capture must be achieved cost-effectively or profits will not be generated. Perhaps more controversial is the issue of profit maximisation and, alongside this issue, the question of whether continued growth is desirable and achievable. Part of the value proposition may be the sustainability credentials of the business, though the ongoing debate on whether a 'green premium' can be charged suggests that capturing that value is not necessarily straightforward.

2.4 Principles: Resource efficiency

Resource constraints are likely to become increasingly significant in the future, creating the incentive to improve recycling technologies and to enable a search for alternatives under the broad rubric of sustainable materials (Allwood and Cullen, 2011; Allwood et al., 2011). Resource efficiency in the brewing sector is thus an area of concern (Olajire, 2012). The theme of ‘de-materialisation’ or of de-coupling economic growth from physical resource consumption growth that is emergent at a macro-policy level is indicative of resource concerns that might need to be considered in future business models. Resource constraints might in part be resolved by industrial symbiosis, circular value creation and capture systems, product-service systems, product longevity and remanufacturing strategies.

2.5 Principles: Social relevance

In principle, to be sustainable any product or service should contribute to the health and happiness of humanity, and should thereby serve social needs. It is not sufficient to say that a market for a product exists and therefore it is socially useful. Many products and services are inherently destructive both of humanity and wider environment. Some indication of how this idea may be applied is evident in the application of ethical investment funds (Berry and Yeung, 2013). Inevitably this is a highly contentious and equivocal ethical issue, as is explored somewhat in the case of microbreweries below, but this should not detract from an attempt to confront the issue.

2.6 Principles: Localisation and engagement

What is the relationship, if any, between localisation, scale and sustainability (Wells, 2012)?

Larger manufacturing facilities can generate economies of scale and higher resource efficiency per unit of output but the centralisation implied by economies of scale results in spatially diffuse markets accessed via long logistics lines at some resource cost. Moreover, locality is more than just an issue of spatial scale, it is where lives are lived and grounded. Localised production enables wealth generation to be circulated locally too, and this implies a degree of insulation against the turmoil of global economic change (Martin, 2012). There is scope at least for businesses to integrate locality into design and production in an effort to improve sustainability (Dogan and Walker, 2008). There is a tradition of militant 'localists' voicing the concern to link localisation with sustainability (Douthwaite, 2005). Hence, while not a feature of approaches such as that espoused by industrial ecology, localism could be argued to be part of the wider sustainability agenda that innovative business models could seek to reach.

2.7 Principles: Longevity

Longevity here is used in two senses: The more commonly applied product longevity and the rather under-researched issue of business longevity (Talonen and Hakkarainen, 2014).

Product longevity makes sense from an environmental perspective when the implication is that fewer new products are needed and hence resource use is reduced and has a social echo in ideas such as up-cycling, free-cycling, and other forms of search for a second life for products alongside the traditional actions of refurbishment, repair and remanufacturing as an alternative to disposal (Cooper, 2005; Hatcher et al., 2011; Kagawa et al., 2006; Mont et al., 2006; Mont, 2008). Clearly, product longevity in this sense has scant application to the

brewing business, although the longevity of particular brands or varieties of beer is an interesting version of this idea.

According to Gittleston (2012) a company in the Standard & Poor's top 500 list in the 1920s had an average life in the list of 67 years; by 2012 that had fallen to 15 years – suggesting that corporate volatility has increased over the years. Put another way, there is a sense that corporations are not particularly enduring. Gittleston (2012) further suggests in the case of Japan, which has an unusually high number of companies over 100 years old, that those companies that have endured exhibit several distinct characteristics. In particular there is a tradition of family ownership in which the emphasis is on passing on a viable business to the next generation rather than short-term profit maximisation, and a focus on serving local markets specific to certain Japanese cultural practices. From the perspective of mainstream management practice, it could be argued that these are businesses that are 'underperforming' but when a broader view is taken of the social contribution of business then the contribution of longevity in terms of say stability in employment and value creation, and of relevance to society, then these long-term businesses can be understood as having much to offer.

2.8 Principles: Ethical and sustainability-orientated sourcing

Ethical sourcing has become an extremely significant issue for many types of business, motivated by both regulatory concerns and the demands of the market or the watchful eyes of NGOs (Neilson and Pritchard, 2010). For this reason ethical sourcing is one of the components of business models for sustainability. However in terms of principles for business sustainability the question of ethical and sustainability sourcing is identified here

because it does not necessarily mean lower costs (although arguably it does mean lower risk in terms of reputational issues).

2.9 Principles: Work enrichment

The issue of work enrichment is also one that tends to be rather neglected by those interested in business sustainability. Work enrichment (sometimes also termed work enlargement) means seeking to provide variety in work tasks, training workers and widening the job descriptions in contrast to the narrow fragmentation of short-cycle times involved in mass production assembly plants for example (Hakanan et al., 2011). Giving workers a vested interest in the business and the latitude to introduce innovations may also contribute to work enrichment. It is usually considered that repetitive work results in mental stress which in turn can be manifested as elevated rates of absenteeism, poor quality, workplace accidents resulting in stoppages, low morale, and high staff turnover.

Alongside the above principles for business models for sustainability are three components, again derived from the literature and from the extended engaged scholarship approach. These are discussed in turn. Each may offer a part of the functionality that a business may need to operate a sustainable business model.

2.10 Components: Product / service systems

The idea of combined product service systems emerged as a business concept independent of the sustainability debate, but has been understood to offer significant characteristics for those

interested in reduced consumption of physical products (Wallner, 1999; Roy, 2000; Tucker, 2004; Pawar et al., 2009.) To date, product service systems have flourished most in business-to-business relationships (Gao et al., 2011), but are also seen to be emerging in e.g. car-sharing mobility schemes. In principle a product service system could be developed for the vast majority of items purchased by consumers for use in their own homes and offices, from washing machines and electric drills to cars and printers. Many of these objects remain under-used and depreciating assets. Despite this appeal, and an intensive research effort, the contribution of product service systems to sustainable production and consumption has remained limited (Tukker and Tischner, 2006).

2.11 Components: Design for remanufacture and circular value systems

Remanufacturing of a product in order to extend its useful life, and recycling and reuse of its packaging, have potential environmental benefits in terms of reducing raw material and energy consumption per product. It is possible to identify past instances of such practices – for example milk bottles would be collected, washed and re-used by dairies – which have largely disappeared today. Remanufacturing is also present in the capital goods sectors, where the very high value of the machines in question makes refurbishment (on or off site) a viable proposition. Most consumer products would appear to require that they are designed for remanufacture from the outset in order to reduce problems in the key areas of product cleaning and repairing (Sundin and Bras, 2005; Kumar and Putnam, 2008).

2.12 Components: Open source innovation

Open source design and innovation has become of growing interest to business academics (Chesbrough, 2003; Vujovic and Ulhøi, 2008). Open source design and innovation is a relevant consideration for sustainability in part because of some points of principle with respect to intellectual property rights (IPR), and in part because an open-source approach might allow entrepreneurial start-ups to compete against the in-house R&D capabilities of larger entities. Open source design is an area rather unexplored in the sustainability debate (though see Hansen et al., 2011; and Sessa and Ricci, 2014) but has some interesting resonance with themes such as crowdsourcing and collective commons. The link to IPR is equally intriguing. In a wide definition of sustainability the idea that one individual (or business) can have monopoly rights over an extended period of time at the expense of society is incompatible with the ideal of the collective interest. More prosaically the IPR is sometimes regarded as slow, expensive and ineffective whereas speed to market without IPR can yield a better result.

It is worth noting that Short et al. (2014) argue that a key element of business model archetypes for sustainability is to develop ‘scale up solutions’. However the approach adopted here is that the replication of multiple microbreweries represents a quite distinct and advantageous means to scale up through localisation – an approach termed ‘multiplying Davids’ by Hockerts and Wüstenhagen (2010).

Section three explains the methodology adopted for the research reported here into microbreweries, while section four provides some initial and exploratory findings from the process.

3. Methodology: An extensive co-production of knowledge approach

The debate on engaged scholarship has permeated business studies for many years, and is part of a wider debate in which there is a perception that there is a divide between the practical applicability of business research on the one hand, and scientific rigor on the other (van de Ven, 2007). Recent strengthening of concerns that research should have ‘impact’ have further emphasised the view that business academics should be able to demonstrate the contribution made to business, and one way to achieve this is through engagement.

The engaged scholarship approach (Cheney, et al. 2002; van de Ven and Johnson, 2006; van de Ven, 2007) is one in which ‘...researchers and practitioners coproduce knowledge that can advance theory and practice in a given domain’ (van de Ven and Johnson, 2006: 803). In the social sciences more broadly the inter-relationship between the researcher and the subject has also been known as ‘action research’ and ‘action-orientated research’ (Pain, 2003) and ‘participatory research’ (Pain, 2004). Others have talked in terms of ‘participative research’ (Heron and Reason, 2001), or ‘experiential research’ (Collins and Evans, 2002) and emphasised the co-production of knowledge. Sociologists sought to propose the idea of research in communities rather than on communities, and that ‘experts’ external to a situation may miss important aspects of phenomena under investigation (Collins and Evans, 2002). Importantly, all forms of engaged scholarship allow for reflexivity in the research process alongside multiple interactions (Orr and Bennett, 2009).

Engaged scholarship is a form of inquiry in which the researcher seeks immersion in and with the subjects, to learn from their particular insights and perspectives, and hence to obtain greater understanding of a problem domain (Evered and Louis, 1981). It is suited to exploratory research designs of interconnected problems in which there is considerable importance laid on the negotiation and mutual trust between the researcher and the subjects (Durose et al., undated). Engaged scholarship does not seek generalizability but rather is contextually embedded and seeks relevant theorisation and explanation for a specific situation. Hence the researcher is an actor rather than an observer, and learning is interactive and emergent as a result of this immersion.

There are, however, some important differences with the approach to engaged scholarship adopted in the research for this paper. First, the literature on engaged scholarship still tends to assume a linear process (albeit with iterations) with a single project (or case) during which the researcher is 'engaged' with the subject, develops an understanding, and then communicates the results back to the subjects and to wider audiences. In the case of the research for this paper, the engagement with relevant communities of practice extended beyond a single case within the brewing sector, and indeed the theorisation of business models for sustainability draws upon a much richer set of engagements with businesses outside the brewing sector (for example in steel production, in rapid prototyping, and in the automotive industry). These engaged research strands have extended over many years to varying degrees. Moreover, the engagement has also extended to other relevant stakeholders including NGOs in the field of sustainability (e.g. Greenpeace; WWF) and with a wide range of policy entities in regional, national and supra-national government. In this sense, the engaged scholarship has been more dynamic and open-ended as the researcher accumulated a broader expertise and the ability to talk the 'language' of the subjects. As Gulati and

Bartunek (2007) argue, discrete collaborative research projects may not be the best means to allow academia-business relationships to thrive.

Second, the literature has a tendency to assume that there is a problem to be solved, when actually in the first instance the 'problem' is merely to gain an understanding of a phenomenon. In the case here, the purpose of the research was to understand how the microbrewers have been able to establish and prosper in the face of economic logic, and to explore whether they are more sustainable than large breweries. In the course of this research specifically, breweries of varying sizes and organisational settings were investigated with interviews, plant tours, and mutual exchanges of view with a wide range of actors including owners, managers, plant operatives, distribution and marketing specialists, and of course retail outlets.

A final complicating factor is that clear, comparable and definitive information on the microbrewery sector is barely available, particularly with regard to the sustainability issues that are the subject of this paper. Hence the search for secondary data on issues such as life cycle analysis has, perforce, had to be satisfied with that which is available. This data may not be applicable to all cases, for example when it pertains to the US rather than the UK, and to this end it is clear that more systematic and comprehensive research is necessary. Broadly, the research focuses on the UK and the US, but field research included for example Brazil (home of Inbev) and Belgium.

4. Architecture, principles and components applied: the case of the beer industry

The discussion here is presented as somewhat crude dualism between brewpubs and microbreweries on the one hand, and large multinational company (MNC) brewers on the other. The caricature only provides a starting point for more considered research on the relationships between scale, business model and sustainability. The conflation of brewpubs and microbreweries reflects some ambiguities in the data and the definitions of these activities. Brewpubs are businesses that brew and sell their beer on the premises; microbreweries on the other hand are small-scale brewers (and scale here is open to some debate) that may sell on the premises but may also distribute their product to other retailers, sometimes over long distances. Both categories are sometimes also known as craft brewers or artisanal brewers. In this paper the term microbreweries is used, but it is recognised that they are not synonymous with brewpubs. Equally, the large multinational brewers are more than capable of running microbreweries; while the original 'small is beautiful' characteristic of some microbreweries is being lost as their very success impels further growth: hence the line over which a microbrewery is no longer 'micro' is somewhat difficult to determine with exactitude.

4.1 A brief history of the beer industry

As with alcohol in general, beer has a very long involvement in human history and can be traced back to at least ancient Egyptian civilisations. One aspect that is of interest is that beer can be made at almost any scale, from the household level through to huge multinational combines running vast centralised production complexes. For protracted periods of human history however, brewing of beer was conducted within a relatively stable spatial-economic structure that was defined by the cost of bringing the ingredients to the brewery and, crucially, the haulage cost of moving beer to the market. The result was stereotypically a

pattern whereby beer was brewed and sold in the one establishment; or brewed and distributed within a spatially confined market (say a town) that could be reached by a horse and cart. Beer production was, however, amenable to industrialised and capital-intensive mass production because the process could be scaled up and, crucially, with the arrival of bulk, low-cost transportation by rail, ship and then trucks it became economic to move beer significant distances. Related innovations in areas such as refrigeration, canning and bottling augmented the ability of manufacturers to move beer increasing distances, while innovations in marketing, branding and product positioning rewarded the increasing ability to produce a homogenised and repeatable product. Underpinning this centralisation of manufacture and increased outbound logistics of product, and the associated cold storage in many retail settings, was the availability of cheap power via low-cost petroleum. In turn, these characteristics allowed and further precipitated national and then international consolidation in the brewing industry, albeit tempered in many instances by strong government intervention for a variety of policy reasons (Bower and Cox, 2012; Sandberg, 2010). The consequence was, from the 1960s onwards, the steady erosion of local and smaller brewers and, in markets with bitter beers like the UK, the steady demise of ‘hand pulled’ keg beers. It is notable however that with this decline came the start of a resurgence in interest in keg beers, and a decline in the consumption of bland mass-produced beers (Gutzke, 2008) that laid the foundations for the niche market space to be captured by microbreweries.

The microbrewery business model is premised on the small-scale production of a high quality and distinctively-flavoured product which is sold at a price premium compared with ‘commodity’ beers (Mitchell, 2014). Start-up costs can be as small as £50,000 with initial batches of only 5 barrels at a time (Huddleston, undated).

4.2 A comparison of microbreweries and MNC brewers

Table 1 illustrates the application of the architecture and sustainability principles to microbreweries and multinational brewers based on a qualitative assessment of each.

Table 1: Architecture and Principles: Microbreweries versus multinational brewers

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Item	Microbreweries	MNC brewers
Architecture: Integration / Assets	Own the beer production process and retail premises; may also retail via third party distributors.	Often strong vertical integration though 'tied' pubs and other outlets; also widespread use of third party distributors and retailers.
Architecture: Supply chain	Small number of suppliers; may be geographically dispersed for key ingredients.	Strong control over the supply chain via purchasing power.
Architecture: Value creation and capture	Quality (as taste), locality and variety proposition with lower volume and higher margin than traditional beer.	Quality (as consistency), value for money and lifestyle branding proposition with high volumes and lower margins.

<p>Principles: Resource efficiency</p>	<p>Beer production is resource intensive but good opportunities for industrial symbiosis. Mostly local markets reduces transportation burden. Both small-scale and large-scale beer production carry burdens with regard to land use for barley and other ingredients. Ingredients are of course renewable.</p>	<p>Centralisation offers resource economies of scale offset by resource burdens of sourcing and distribution (including refrigeration). As visible brands there is a concern to achieve carbon reduction, resource efficiency etc. Potential (and reality) for industrial symbiosis. Various markets for waste from brewing e.g. yeast is used to make Marmite.</p>
<p>Principles: Social relevance</p>	<p>Often significant social relevance to user communities.</p>	<p>Declining social relevance to communities in terms of traditional pubs.</p>
<p>Principles: Longevity</p>	<p>Not a part of the model for microbrewery beers.</p>	<p>Some have been very enduring as production locations, but high levels of corporate turbulence.</p>
<p>Principles: Localisation and engagement</p>	<p>Bring skilled employment to a locality; part of the fabric of a community. May struggle with networks.</p>	<p>Some production locations highly dependent upon the plants for employment, etc. but these are concentrated sites.</p>

Principles: Ethical sourcing	Often a feature though not in all cases	Growing area of concern, particularly in the context of global food shortages.
Principles: Work enrichment	Brewing in this form is a craft industry requiring skilled multi-tasking. Owner-operators gain considerable enrichment in this sense.	The brewing industry suffers high levels of alcoholism, and the industrial process is not very suitable to work enrichment.

What table 1 seeks to show is that the respective ‘sustainability strengths and weaknesses’ of the two business models are asymmetric. In their study of New Belgium Beer and Budweiser Beer (Anheuser-Busch) it is notable that Ali et al. (2010) concluded the microbrewery was much more active and knowledgeable about environmental and resource concerns, whereas the MNC brewer was much stronger on philanthropy campaigns in communities and with respect to addressing the social costs of alcohol consumption. With a similar discussion McGrath and O’Toole (2013) argue that microbrewers often showed many factors that inhibited participation in (beneficial) networks, particularly the desire to control all aspects of decision making and the tendency to undervalue upstream and downstream supply linkages. Issues of social relevance and differing perceptions of local communities to alcohol use (for example guided by religious beliefs) may have a profound impact on the scope for microbreweries, as Baginski and Bell (2011) found in their study of the Southern United States.

While there has been some academic research in regard to the environmental impact of beer production (see for example Schaltegger et al., 2012b) it is notable, for example, that the US New Belgium Beer has undertaken a detailed Life Cycle Analysis (LCA) of their Fat Tire Amber Ale, and has detailed and ambitious improvement targets to reduce waste, energy consumption, water consumption and so forth. The LCA study encompassed the carbon equivalent emissions of the purchase and transport of raw materials, the actual brewing operations, business travel, employee commuting, transport and storage during distribution and retailing, the use phase, and disposal of packaging (TCC, 2008). A six-pack of their beer resulted in 3,188.8 g CO₂eq over the entire lifecycle. Interestingly, the brewing operation itself accounted for just 173.0 g CO₂eq or 5.4% of the total. The largest single item was electricity consumption in the retail phase (primarily for refrigeration), accounting for 829.8 g CO₂eq, while the production and transport of glass accounted for 690.0 g CO₂eq.

Evidentially, beer produced and sold on the premises would have significantly lower carbon emissions. Conversely, large MNC brewers operating high throughput plants must perform have much higher carbon emissions from the spatially extensive distribution of their product (Hospido et al., 2005). It is interesting also that Cordella et al. (2008) take this argument further to suggest it is significant from an LCA perspective how (and how far) consumers travel to get their beer, again indicating the importance of localisation.

Table 2 illustrates the application of components for sustainability to microbrewers and MNC brewers. As with the principles for sustainability, the table reveals some mixed messages in terms of business model architecture and the consequences of that architecture.

Table 2 Components: Microbreweries versus MNC brewers

Table 2 Components: Microbreweries versus MNC brewers

Component	Microbreweries	MNC brewers
Product / service system	When linked to their own retail venue, the product and the venue are part of a combined service experience.	When linked to their own retail venue, the product and the venue are part of a combined service experience, but the emphasis is on high volume product manufacture.
Design for remanufacture / circularity	Containers may be returned; consumption on the premises reduces packaging needs. Yeast may be re-used several times. An important issue is how human waste (urine) is processed in a locality.	Containers (especially barrels) may be returned. Distance and spread of markets may militate against bottle re-use.
Open source innovation	Not directly relevant but individual microbreweries are part of a wider community of brewers who share experiences and ideas.	Not a feature.

There are examples in brewing of smaller businesses with a long family tradition that are also at the leading edge of technological innovation and environmental performance (Nelson, 2009) so business longevity need not necessarily preclude continuing improvement. It is interesting that the owners of US microbrewery Black Husky Brewing claim on their website:

“When we started our brewery our idea was not to make a lot of money. And at this point we are doing great at not making money. You could even say it is our strength – but I digress. Certainly we wanted to be able to make a living but Toni and I were looking for something we could do together – we actually work very well together – and do something we were good at and believed in... We want to make really good beer and make a living at it, and be able to leave something for our kids so they don’t have to be a slave to the man. Give them some control over their future.” (Source:
<http://www.blackhuskybrewing.com/blackhuskybrewingdeephoughts.html>)

5. The implications of the architecture, principles and components approach

Are microbreweries running business models that are more sustainable than the large-scale MNC brewers? The initial characterisation based on the architecture, principles and

components approach suggests that an unequivocal answer is unlikely. In addition, the principles that the microbrewer models most speak to, such as insertion into local community and culture, are not easy to provide metrics for.

In terms of architecture, microbreweries are not vastly different to the large-scale MNC brewers. Both buy in the main ingredients and then manufacture beer; the main differences occur beyond that point. Microbreweries do not own distribution and retail facilities like the networks operated by some MNC brewers. In terms of components it is also reasonable to conclude that there are more similarities than differences between the microbreweries and the large-scale MNC brewers. Both are highly constrained in their ability to undertake circular production for example, though the microbreweries have more scope for a product-service system approach in that the production venue is also the point of retail (beverage) service delivery. More significant differences emerge in terms of principles, but again the picture is not unequivocal. In itself this is an important finding from the exploratory research, and it suggests that care is needed in coming to a judgement about the relative sustainability of different business models and that more detailed empirical research is needed.

Perhaps microbrewers have less scope or opportunity to capture the environmental benefits of industrial symbiosis in that their inputs and outputs are too modest in isolation to allow such practices either internally (inside the company) or externally (in a network of inter-related businesses – see Chertow and Ehrenfeld, (2012)).

With regard to corporate longevity it is apparent that mainstream businesses, and indeed entire industries, are rather ephemeral when set against the inter-generational concerns of sustainability. Organisational stability is arguably the exception rather than the norm, with much concern demonstrated with change and change management as a result. Hence a mainstream business may take up new locations (and abandon old ones), new product or service areas, new market spaces, and enter into new inter-relationships, or disappear entirely – and in the process there may be social costs as existing employees and markets are left redundant as the collateral damage of these turbulent and volatile processes. Still, many small-scale businesses are rather vulnerable too. Microbreweries rely upon distinctiveness and a degree of local loyalty to justify their premium prices and recover their higher costs; they could find their niche markets invaded other microbreweries or end up selling their business to MNCs. Alternatively, Schnell (2013) argues that American microbreweries are one of several manifestations of ‘neo-localism’ identity building in which a new and distinctive geography is emerging. Such arguments may apply with equal force elsewhere, particularly in the post-crisis ambience in which awareness of the costs of global economic integration is propelling a concern for economic resilience and local diversity. There are tensions between difference and localism, as explored by Maye (2012): If one town has one brewery then the inhabitants will not experience much variety; if more distant markets are sought then the environmental burdens imposed by beer will increase.

When considering how far an existing business model is sustainable there is a case to be made for some consideration of relative stability because this is a measure of social contribution: Stable businesses might contribute more to social stability in terms of

employment, wealth generation and product / service provision to a locality. It is not immediately clear how such stability might then be reconciled with concerns with business models and sustainable innovation (Boons and Lüdeke-Freund, 2013) or what is described as 'green growth' (Beltramello et al., 2013). Just as business models can exhibit change over time, so too can they exhibit durability: Indeed it must be a characteristic of a successful business model that it is enduring.

In addition, as was discussed in the section on principles, the issue of social relevance is difficult to establish in this case. While beer has a long and illustrious history within many cultures, it is also an addictive poison with many attendant social ills. Alcohol use is damaging to individuals and can often result in anti-social behaviour, the costs of which are carried by society at large. While microbrewers may seek to position their product as something to be savoured in moderation, rather than an efficient means of getting drunk, there is no guarantee that the consumers take the same view.

In conclusion it is reasonable to assert that an element of the microbrewery community has a strong evangelical undercurrent on issues of sustainability in general that may extend to worker participation and ownership, and avoid the 'growth at all costs' paradigm. The degree of localism in the business model has a strong bearing on environmental performance but also on some key ethical stances with regard to contributing to the community. Undoubtedly, high throughput breweries with process flow rather than batch production are more resource-efficient per unit of output than microbreweries, but some (and possibly all) of this is offset by greater environmental burdens in transport and storage. It may be suggested therefore that this exploratory study has illustrated how the metrics by which business models for

sustainability might be measured are more varied and more difficult to quantify than is the case for mainstream business models. Moreover, given the breadth and scope of sustainability issues, it is unlikely that any one business model is able to capture all the elements of a business model for sustainability. Perhaps more profoundly, the 'positive' elements of sustainable business such as localism and small scale may conflict with traditional business elements such as ubiquity and economies of mass production.

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