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Investigating demand-side stakeholders' ability to mainstream sustainability in residential property

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ABSTRACT

Current sustainability approaches in the residential property sector for new home construction are deficient, yet crucial in reducing reliance on finite resources whilst providing better social outcomes. At present, efforts to improve dwelling sustainability are inhibited: as sustainability is considered an overly expensive additional extra; there is poor implementation of energy efficiency regulations; unempowered consumers are unable to demand sustainability and consumers distrust the suppliers of sustainable initiatives. This research addresses an important issue to eliminate the "blame game" and transform the sustainability conversation, adoption and value in new home markets. It adopts an innovative demand-side approach to the residential property sector, in order to target large-scale standardised new home producers as the pivotal, demand-side player in mainstreaming sustainable solutions in new housing. By examining the sector from this new perspective, sustainability can be mainstreamed in the new housing property sector overcoming current inhibitors to sustainability adoption and implementation.

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Introduction

Currently in Australia, sustainability is not being adopted in the new residential property sector at the rate that is necessary to meet long-term aspirations for sustainability in the Australian built environment. Sustainability here means not just energy efficiency technologies that could be added to new and existing housing but the intrinsic features that can only be incorporated in new construction like siting orientation, window sizes, and construction detailing and materials. In this $33 billion per annum industry (Australian Bureau of Statistics, 2014), the adoption of broad-scale sustainability in new housing is limited with long-term environmental, social, and economic repercussions that will burden current and future generations. There are a number of reasons why this slow adoption might be the case.

First, the adoption and implementation of energy efficient and sustainability features in new houses are considered overly expensive additional extras due to limited consumer demand. The housing consumer (new homebuyer) is thought to not want to bear the brunt

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of the initial upfront investment from these features as part of their largest single investment, despite receiving long-term higher operational and social costs over a fifty-year residential service life from not making the investment.

Second, despite existing regulations and legislation to increase the level of energy efficiency and sustainability in new homes, these are proving ineffective (Pitt & Sherry, 2014). This is a result of a system that has been plagued with issues in regard to: assessment tool inadequacies and variability; a gap between the design ratings and actual housing performance; assessor skills and economic compensation; actual implementation of energy efficient initiatives or lack thereof by the builders; skill levels of installers; and building surveyor sign-offs or lack thereof. Although regulation has played a role in attempting to enhance and improve the energy efficiency of new homes, the issues noted by Pitt and Sherry have left the *real* sustainability of new homes in doubt. Sustainability approaches in the residential sector, such as they are, have focused on energy efficiency initiatives as a result of the requirements to meet a 6 Star Nationwide House Energy Rating Scheme (NATHERS), water tanks, and in some cases, re-use of water in the home (usually a result of local government requirements or development specifications).

Third, the traditionally perceived supply-led residential construction procurement model inhibits the homebuyers' ability as housing consumers to demand change. Furthermore, those same suppliers blame consumers for not demanding more sustainability. This points to a mis-match in current theorisation and practice when it comes to demand and supply sides (consumer and property and construction respectively). This demand–supply relationship is further complicated by current structural conditions in new housing supply that is dominated by an industry characterised by large-scale, standardised new home production, and competition by Volume Builders like Metricon, Simmonds, BGC, Burbank Homes, and Hotondo.

Fourth, because of these factors, there is a considerable level of distrust by consumers of new home providers in relation to sustainability; opening up opportunities for "green washing" where appearances of sustainability are applied, like add-on solar installations, but not the deep structural changes required to planning and construction methods. However, given the limited level of discussion, education and advice home owners receive in the building process per se, the sustainability considerations and advice are almost non-existent. This is because the providers blame the *uneducated consumer* for not considering sustainability a priority; are not willing to pay; and are uninterested. Given consumers' limited knowledge of the building process, how can providers expect consumers to be educated on sustainability? Furthermore, government schemes providing incentives have been plagued by implementation problems that have further engendered distrust by consumers of providers of potentially more sustainable initiatives for their homes. As a result, cost-effective energy efficiency and sustainability solutions are not being integrated into mainstream new house production. If they were, substantially more consumers would or could demand these features reducing energy and water consumption and increasing overall comfort and sustainability.

The absence of mainstreaming sustainability features is a problem because the built environment and in particular, the residential sector is a major consumer of finite resources in an Australian housing market adding approximately 180,000 new separate dwellings annually (Garrett, 2014) to an existing stock of 6.6 million dwellings (ABS, 2010). Also, housing is relatively long-lived with anticipated life span of 50 years. Consequently, the over-consumption of resources in new housing has economic repercussions in higher energy

costs, environmental considerations, and social implications for health and comfort for a long time into the future. The trends and styles for existing retrofits are often based on new housing, consequently, if more sustainable initiatives are integrated into new homes, this may catalyse investment during the retrofitting and renovation of existing homes. This paper focuses specifically at the new home market.

This research investigates two things. First, is how the theoretical arrangements between demand and supply of new sustainable housing impede sustainability's adoption as mainstream practice. Second, how reconceptualising the demand–supply relationship theoretically could be used as a way to achieve mainstreaming sustainability in the new home sector. This paper argues that the large-scale, standardised, new home producers (Volume Builders) are actually a strong demand-side stakeholder in a consumption-based demand framework that incorporates all major stakeholders in the acquisition of dwellings by housing consumers. Consequently, if an innovative demand-side approach targeting those Volume Builders and their interaction with consumers is adopted, their pivotal role as a demand-side player could assist in mainstreaming sustainable solutions in new housing.

State of the art

In order to address this issue, the state of the art must be examined across a number of aspects such as:

- Demand–supply relationships in new housing in relation to mainstreaming sustainability;
- Uncertainty around the role of housing consumers be they customers/clients/ consumers or users through the life cycle;
- Consumer demand for sustainability;
- Empowerment/disempowerment; and
- Sustainability as an innovation.

Demand–supply relationships

Demand–supply relationships are frequently conceptualised within construction management theory as "procurement", as in a purchaser of newly constructed property "procures" the property for their use. This procurement theory is largely conceptualised as being as one of four main methods though there are sub-variants and other methods as noted by (Love, 2002):

- Traditional;
- Design and Construction;
- Project management; and
- Management contracting (Wilkinson & Schofield, 2003).

This procurement theory is largely aimed at commercial construction managers who are major actors in this process, albeit from the supply-side (Love, Skitmore, & Earl, 1998). Where research does investigate stakeholder interactions this also strongly focuses on the supply-side – material suppliers, manufacturers and product delivery (O'Brien, London, & Vrijhoef, 2004). There is limited examination of the role of the client or user in much of

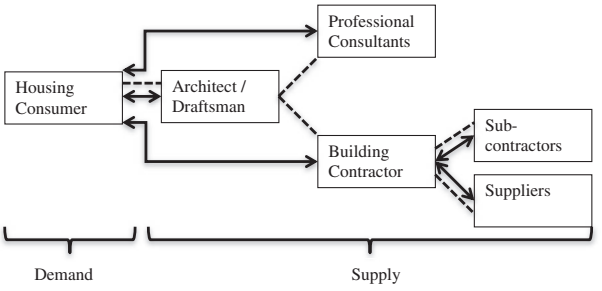

Figure 1. The traditional residential construction procurement approach.
Note: Solid lines demonstrate contractual relationships, whilst broken lines demonstrate managerial relationships. Source: Authors. See also revision notes in Reference list.

this theory which is why this is becoming a focus of construction management research (Haugbølle & Boyd, 2013).

In the Traditional model, as shown in Figure 1, a home buyer approaches an architect or draftsman to design a home for their use. The architect or draftsman then, essentially, takes control, managing the building process, organising the contractor and consultants. For the homebuyer, considered in this case as a client, a consumer and an end-user, they create demand by wanting a home and the supply chain delivering that is initiated through the designers' management of the other supply chain stakeholders. This process, which for the consumer is likely to be their largest investment in their lifetime, for the supply-side stakeholders is only a small "job" or consideration in the context of their business – the client is just one of many. Consequently, the power of the consumer–client in this approach is limited, with the majority of the power direction coming from the supply chain.

In considering innovation and sustainability's inclusion within this model, innovation can originate from the housing consumer but more usually the designer drives this, to an extent, "forcing" innovation on the consumer. However, for the innovation to be implemented, there is a requirement for the building contractor to be "on-board" with the designer's sustainability initiatives. Furthermore, the contractor also needs to be skilled and able to provide the required initiatives. It is unlikely, in this model that the building contractor would suggest sustainable initiatives up the supply chain to the designer.

This approach is utilised in a relatively small proportion of new housing creation with as little as 4% and optimistically as much as 10% being architect-designed, though when draftsmen are included as designers, this percentage increases somewhat.

Another commonly utilised approach in the residential sector is Design and Construct, whereby the homebuyer is still considered the housing consumer and end-user with demand still generated by them. Design and Construct provides a single point of contact between the supply-side and the consumer with design (architects or draftsmen) either provided in-house or outsourced (Figure 2). There may be varying degrees of contact between the consumer and the designer.

Hybrid variants of Traditional and Design and Construct include novated contracts (Ng & Skitmore, 2002). However, this is not as common in residential property as it is in commercial property construction.

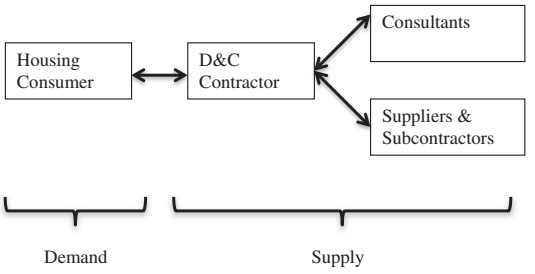

Figure 2. The design and construct (D&C) procurement approach.
Source: Authors. See also notes in relation to Reference list.

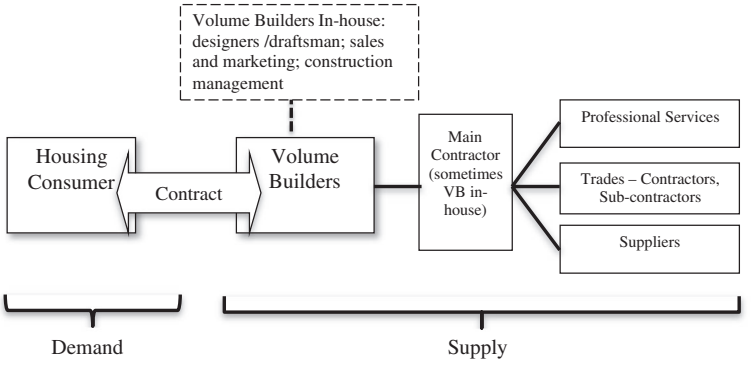

Figure 3. Current practice. Source: Authors.

Variations of residential Design and Construct range from small contractors meeting localised demand (the traditional "Master Builder" model) to large state or national businesses (Volume Builders) meeting consumer demand across a number of geographic regions. Innovation in this model, theoretically, can originate from consumer demand but more realistically is dependent on the contractor or to a lesser extent their design consultants. Consequently, the process that is applicable in mainstream practice for the building of new homes is represented in Figure 3.

The large Volume Builders have become dominant and volume suppliers of housing across Australia and include builders like: Metricon; Porter Davis Homes, Simmonds Group, G.J. Gardner Homes, Dennis Family Homes, and the like. One of Australia's largest builders, BGC, in the 2014–2015 financial year started 4413 new detached homes in Western Australia alone (HIA, 2015). Volume Builders as a sector are a powerhouse of providers, with the characteristics of an oligopoly makes them, in essence, the fundamental customer to the construction supply chains (Coiacetto, 2006). The oligopolic behaviour is evident in them telling housing consumers what they want, how they want it and they do this by providing limited choices to maximise efficiencies of scale and profits (Reardon, 2013).

Traditionally, Volume Builders are considered as a part of the supply chain (Figure 3), although their relationship and interaction with other stakeholders suggests otherwise.

Because of their size and dominance in the market, they can dictate to consumers and the other stakeholders in their supply chain (trades and suppliers) their needs, requirements and to an extent, price commanding cost efficiency, quality and timely delivery. The power relationship between the Volume Builders and their supply chain is established in the quantity and size of financial contracts. Due to the mass production, the contracts are not those for a single house, but a contract to build 100s or 1000s of homes. Consequently, for the trades and the suppliers, this large size contract may be their sole business. As a result, the requirement to perform in terms of cost, quality and time is imperative to maintaining their contracts. The Volume Builders also have a power position when there is choice of suppliers and trades, with a few notable exceptions where certain products, like Colorbond metal roofing material, have sole or limited suppliers.

Volume Builders have several variations in how they operate and manage the process. However, collectively, the majority of roles undertaken by the Volume Builders in-house will include responsibilities such as: design, marketing, sales and construction management. Depending on the size and style of Volume Builder (another area of the lead author's current research), different strategies have been adopted in terms of what components and services are in-house of the Volume Builder and what are the external relationships with the supply chain. For example, sometimes, a more comprehensive construction team is involved and consequently, the main contractor is actually in-house of the Volume Builder, and sub-contracts are let to the remaining supply chain stakeholders including: professional services, trades and material suppliers. Whilst demonstrating some aspects of the traditional procurement approach, current practice is reflected in Design and Construct procurement models, whereby there is a single point of responsibility, the Volume Builder, which has in-house expertise to deliver the product to the consumer. This makes the Volume Builders essentially the ultimate client according to Atkin and Flanagan (1995) as the Volume Builder is the initiator of the project and has the contracts with other parties for supply of construction goods and services. In this case, the Volume Builders act on behalf of the housing consumer, the end-user, who has, in effect, delegated the Volume Builder, the authority to provide them a dwelling.

Uncertainty around the role of housing consumers

A number of terms have been or are applied to the demand-side in new residential property. The situation is further complicated by the psycho-social aspects associated with housing such as the fundamental requirement for shelter, the concept of "home" which can have both internalities and externalities including: comfortable environment, security, privacy, amenity, lifestyle support, providing a profile and having symbolic value. In essence, a home is also an identity, and in consumer behaviour literature, this "identity signalling" has a strong influence and drives their choices.

The applicable terms for the demand-side include, and can depend on their role in the process: consumer[1], customer[2], client[3], and end-user[4]. Tombesi (2006) defined customers "by access to already-made or relatively customisable products, in other words, by the faculty to choose from what is available at different scales. In turn, it defines the 'commercialness' of markets reliant on typical rather than on idiosyncratic preferences" and a client is defined "by its theoretical ability to commission the execution of future work in line with specific and possibly unique needs" (p. 276). In examining the roles and terms, starting with the

Table 1. Roles and terminology in procurement processes.

Term	Traditional (Figure 1)	D&C (Figure 2)	Current practice (Figure 3)
Consumer	Homebuyer	Homebuyer	Homebuyer Volume Builder
Customer	Homebuyer	Homebuyer	Homebuyer is a customer of the Volume Builder; and Volume Builder is the ultimate customer to the supply chain
Client	Homebuyer	Homebuyer	Volume Builder
End-user	Homebuyer	Homebuyer	Homebuyer

homebuyer, they are the consumer, customer, client and end-user. However, depending on the approach, they take in order to acquire their dwelling means their position and role changes see Table 1. For example, in the case of the Traditional construction procurement approach (Figure 1), the homebuyer is the end-user, the consumer and client. They are also a customer of the construction supply chain. However, when considered in the context of current practice and the utilisation of a Volume Builder to acquire a dwelling (see Figure 3), the homebuyer is the end-user and what can be considered the *housing consumer.* The Volume Builder takes on the role of the client, the ultimate consumer and the customer of the supply chain.

For the purposes of this paper, we adopt "housing consumer" as the catch-all term but recognise that the other concepts are relevant. We do not provide a detailed examination of the semantics of these concepts and their implications for space and focus reasons.

Housing consumers as the scapegoat

Given new homebuyers' limited knowledge of the residential building process generally and sustainability opportunities in new homes, in particular; the ability to know of and ask for sustainability initiatives is constrained and perceived as a lack of awareness and interest by supply stakeholders. This often sees the consumer as a scapegoat for the poor adoption of sustainability, blamed for a lack of interest, adoption and willingness to pay by various stakeholders in the housing supply chain, including: developers, builders, architects, planners, designers, surveyors and product suppliers (Pitt & Sherry, 2014).

This is despite many studies examining consumer demand and engagement in sustainability finding that homeowners want to incorporate sustainability. However, they are inhibited by a lack of knowledge and education, insufficient communication, inadequate power to enforce or request options, complications and difficulties in access to professionals, contractors and suppliers, and uncertainty surrounding costs and benefits (a sample include: Warren-Myers, Carre, Vines, & Wakefield, 2012; Dalton, Horne, & Maller, 2008; Crabtree & Hes, 2009; Crabtree, 2006; Williams & Dair, 2007). Whilst studies examine barriers for sustainability from the construction supply-side, generally they focus on blaming other stakeholders, namely the consumer or client, for their lack of interest, consideration and engagement, and unwillingness to pay for sustainability. In addition to issues surrounding their own capabilities, education and communication of real and perceived costs and risk in regard to sustainability (a sample include: Häkkinen & Belloni, 2011; Pinkse & Dommisse, 2009; Williams & Dair, 2007). Consequently, the idea of the consumer creating the demand for sustainability and their ability to drive sustainability as an innovation in the residential property sector is, at best, questionable and, at worst, improbable.

Empowerment and disempowerment

To generate change in new residential property, consumers need to be empowered to demand more sustainable, energy efficient and resilient measures in their new homes. Empowerment and change comes through information, education, easily accessible options and adoption avenues that are desirable and rewarding, ensuring homebuyers will make value-based decisions and increase adoption of sustainability (Thøgersen, 2005; Unilever, 2011; Wathieu et al., 2002). Where consumers lack the knowledge in regard to sustainability, or generally, they are not confident about spending money on options they know little about, instead, they are reliant on others to guide them (McGregor, 2005).

This has created "Green wash", a sceptical consumer mentality and consequently, consumers find it hard to justify and demonstrate an interest in investing in sustainable technologies and initiatives (Delmas & Burbano, 2011). If homebuyers had the opportunity to develop knowledge of the costs and benefits of sustainability, the prospect of incorporating those in their new home and had confidence in provision, quality and successful operation of sustainability initiatives, why wouldn't they invest in sustainability? By creating the opportunity for choice, homebuyers could then engage and adopt sustainability into their homes with confidence. This would then feed back indirectly via consumer preference to the Volume Builder. However, the problem will continue to exist whilst homebuyers are uneducated, sceptical, and unsure of the outcomes of sustainability initiatives. Additionally, there is little or no choice in regard to sustainability options offered in current home building processes and reluctant engagement from the Volume Builders and subsequent supply chain providers.

The homebuyer is not without their wants or needs but is strongly guided by experts in the process. Typically, the process of buying from Volume Builders has been created to give new homebuyers a sense of empowerment while guiding them in their choices of dwelling, features, finishes and certainty of the price and product to be delivered (Barlow et al., 2003). This occurs within what is presented as a complete package in terms of end-to-end project management and delivery (Dowling, 2005). This strategy reflects Volume Builders' "dominant competitive strategy" (Barlow & King, 1992, p. 92) which is to create a standard set of plans, with some choice in materials, finishes and options enticing consumers to build with them, whilst providing what appears to a wealth of options. This makes homebuyers feel empowered in a process in which they are infrequent purchasers with limited knowledge of residential construction processes.

Consequently, the Volume Builders then drive homebuyer decisions in the new home market. In current practice, the homebuyer has limited power to choose sustainable options and embrace the benefits of sustainability. The power wielded by Volume Builders overshadows the ability of homebuyers to demand sustainability, as homebuyers are not an empowered consumer in regard to sustainability nor the building process.

Sustainability as an innovation in property

The engagement in innovation within the construction sector is commonly focused on supply-side initiatives, cost-benefit analysis, with relatively limited examining the consumer and client perspectives in the construction literature. Tombesi (2006) explores the procurement process, mainly in the context of the commercial sector, discussing stakeholders and their engagement in innovation, utilising mainly commercial examples of the different roles and

how innovation can be integrated into the supply-side. He also examines the different roles of consumers, clients and users and their roles in terms of engaging in innovation, which has implications for understanding the residential property sector and its adoption and production of new homes and integration of sustainability.

Opportunities for using sustainability in new homes benefit both the homebuyer and the Volume Builder. The Volume Builder by being able to utilise the marketing edge to attract more homeowners to the product, whilst the homebuyer enjoys long-term benefits. The range of sustainable solutions that can be incorporated into new homes is broad, however, some of the simpler cost-effective ones include passive solar orientation, building materials (internally and externally), window position and selection, insulation, low VOC products internally, water collection and recycling, and more common add-on type aspects like solar hot water, photovoltaic panels and storage batteries, wind turbines, ceiling insulation, external blinds to name a few. Some of these elements can be easily integrated and adapted into the dwelling with minimal costs, whilst some will incur additional cost. Many of these add-ons are also applicable for inclusion in extensions, renovations and retrofitting of existing homes.

This research focuses on the new residential property sector and the application of broad scale practice in the industry, which is predominately focused on the Volume Builders. Innovation in the residential property sector is either incremental, channelled indirectly from homebuyers preference for products; or mainstream in response to mandatory requirements and legislation. However, to engage in sustainability practices and initiatives to be incorporated into the mass production of housing, a new perspective needs to examine who are the key stakeholders that can enable change and drive efficiencies throughout the supply chain, whilst engaging the end-user, the housing consumer, and in the process to create latent demand. This involves understanding the roles and responsibilities of key demand drivers in the residential property sector and how, with a different perspective, levers can be utilised to drive sustainability as innovation creation in the sector.

What is needed

From a theoretical perspective, Volume Builders are typically considered part of the supply chain. However, this research, based on the review of the state of the art proposes that in new residential construction, Volume Builders actually operate as an integral key demand participant in the supply chain of construction stakeholders. This is due to their role in the provision of new housing as both experts and dominant market players. This is an important consideration because existing consumer behaviour theory believes to engage change, innovation and future sustainability and resilience of housing the demand stakeholders are the ones who will drive this. It is clear that the un-empowered consumer, in this situation, is not going to be able to drive change or innovation in the residential property sector. It is the Volume Builders who will drive change and will dictate to both the consumer and the supply chain the changes and requirements going forward. From the consumers' perspective, this will likely evolve into a Volume Builders competitive strategy in terms of innovation or product offerings whether legislated for or not and marketed to the consumer. The consequences for the supply-side is that there will be a directive or requirement to achieve or provide certain products, services or standards from the customer, the Volume Builders,

which will need to be adhered to, otherwise the Volume Builder will find another provider who will.

Contemporary Australian approaches to new housing resemble a modified *Design and Construct* process that has proven problematic in the mainstreaming of sustainability in new housing. However, if viewed with a different lens, opportunities can be identified where sustainability and innovation can be targeted and integrated into the system that drive change in products available to end-users and down the supply chain which may then achieve long-term change within the sector. If viewed from a perspective of power dynamics, the Volume Builder, who provides a "one-stop" service for homebuyers, shifts from being part of the supply chain as shown in typical *Design and Construct* models to a key demand-side stakeholder. The Volume Builder commands a substantial amount of power financially and contractually with the supply-chain stakeholders. Consequently, consumer demand theory supports this approach, in that, the Volume Builder as a key demand-side stakeholder will and does have the opportunity to drive change, in this case, the ability to mainstream sustainability into the volume housing sector.

This suggests that a revised model for the relationships in new housing is required and will be useful in mainstreaming sustainability. The research proposes that both the homebuyer and the Volume Builders are demand-side stakeholders; with the home buyer being the ultimate housing consumer or user. Then the Volume Builder actually operates as a sophisticated client in the supply chain in its relationships with the procurement of construction products and services (Figure). This alignment of key demand stakeholders has been adapted from a commercial property framework by Heywood and Kenley (2010), which identified an "Integrated Consumption-based Demand and Supply Framework". It has been modified here to reflect the residential property sector for the acquiring of new homes.

Exploring the applicability of a consumption-based demand framework: isolating opportunities for mainstreaming sustainability

The consumption-based demand–supply framework is applied to the residential property sector for the provision of new homes to the user in Figure 4. This represents the Volume Builder as the fundamental client and consumer. As a key demand-side participant, the framework suggests the opportunities for mainstreaming sustainability are enabled through the Volume Builder as the ultimate client. In doing so, the Volume Builder can provide a more sustainable product to the housing consumer utilising a marketing edge to entice the housing consumer to the client and volume housing provision to ensure cost minimisation and product quality. As the key demand stakeholder, the Volume Builder can direct sustainability requirements to the supply chain, the size, volume and contractual power over the supply chain will ensure cost efficiency and quality of product. To explain how these relationships work and how a consumption-based demand–supply framework can enhance sustainability adoption and implementation in the residential property sector: first, the roles and relationships between the stakeholders are considered; and second, the identification of the power in these relationships that will then enable sustainability to be mainstreamed in the provision of new housing.

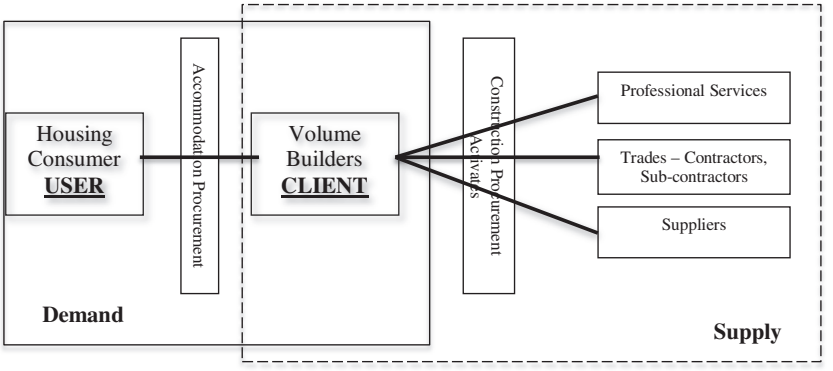

Figure 4. A framework for demand–supply players and relationships. Adapted from Heywood and Kenley (2010) Figure 1.

Roles and relationships: demand-side

The housing consumer (user) is not the only actor in the "Demand" phase of the residential building process as shown in Figure 4's framework. Traditionally, the housing consumer is essentially seen as both the *user* and *the client*. However, this research agrees with Tombesi's (2006) classification that the housing consumer is the customer of the Volume Builder and is the end-user, choosing a "known" product from a selection of products and only indirectly affecting supply products through preference selection.

In traditional, commercial construction procurement models the consumer/user is the client. However, this paper proposes that in current residential building processes the client is actually the Volume Builder. Clients are the initiators of the project Atkin and Flanagan (1995) and Tombesi (2006) concurs clients "prescribe the program, set the characteristics and define the ideal traits of what is yet to be produced" (p. 277) and consequently, the Volume Builder, as client, is responsible for demand creation in relation to providing the product to the *user* and has the contractual, financial and physical relationships with the supply chain to be the driving demand force of production requirements. This is largely due to the nature of supply chain relationships between the Volume Builder and supply chain stakeholders, as there are no singular contracts for one house, but an agreement for the mass production of multiple homes. Due to this "size", the Volume Builder really is the essential "consumer" and the one who has the control in the building process, as they can dictate to the supply-side what they want and how they want it. Consequently, under consumer theory (European Commission, 2012), they are empowered, and they have the ability to be knowledgeable or bring in the knowledge. Consequently, they can drive the market for change given the right motivators – in particular, the financial and marketing edge, and utilising this to their advantage (identity signalling).

Consequently in seeking solutions to empower the demand-side stakeholders, the engagement of both the users and the Volume Builders is required to drive change. The Volume Builder, in other studies, has often blamed the homebuyer (housing consumer) for not being engaged in the options related to sustainability. Furthermore, other studies of homeowners or purchasers have found that they are disengaged with the sustainability agenda (Crabtree & Hes, 2009). However, if considered in relation to an actual product that

has a practical impact on the user, they were more likely to consider implementation. This is shown as a key element found in several studies from Warren-Myers et al. (2012); Crabtree and Hes (2009); Gabriel and Watson (2013) and Maller, Horne, and Dalton (2011). However, for housing consumers who do lack knowledge in the building process in general and will often follow a default option when presented with choices in the new home building process, if sustainability initiatives and information is not provided by the Volume Builder in the process, how can they be informed to utilise their choice in this matter. Consequently, if the sustainability agenda in the new home building process is to be driven by a collective approach of the demand-side, the role of the Volume Builder can consequently provide the mechanism to drive the change. The common perception of Volume Builders in the sector is mass production, minimal cost, high profits, consequently why would they consider driving this agenda? As aforementioned, the concept of identity and the sustainability agenda in commercial practice is not new. The relationship between marketing and presenting oneself as being a socially conscious organisation can be a point of difference in achieving a competitive edge in the context of presenting home owners with the opportunity to economically build a more sustainable home. Consequently, this research approaches the demand-side of the residential building process by considering the Volume Builder and homebuyer (user) as parties in the demand-side which can then challenge traditional thinking and drive change through the sector to provide a more sustainable built environment.

Roles and relationships: supply-side

The Volume Builders are a key demand-side stakeholder, clearly demonstrated in the Australian residential property market as an oligopoly; and their market power has a strangle hold on the type, style and provision of housing. This is seen through the standardisation of the "McMansion" style housing that bourgeons in new residential developments across Australia. The oligopolic players behave and move together, limiting and minimising consumer choice. In their relationship with the supply chain, they wield enormous power in terms of their relationship, requirements and innovation.

The current building process (Figure 3) presumes a singular contractual relationship between the housing consumer and the builder with numerous contracts with the various supply chain stakeholders. Current practice in the residential property sector differs from the theory, in that Volume Builder supply chain contracts are generally not for a singular dwelling but for potentially hundreds of dwellings. So, the contractual agreement financially is significantly larger overall than the contract between the housing consumer and Volume Builder. Consequently, this transfers the power balance to the *demand-side*, as the Volume Builders can dictate to an extent their requirements to the supply chain stakeholders. Innovation and implementation coming from the supply-side is limited and the upwards push is often met with substantial limitations particularly in the aspect of knowledge transfer (Thorpe, Ryan, & Charles, 2009). In this case, the Volume Builder can dictate their requirements, be it an innovative solution in the design and construction process, or a sustainability initiative, but it is up to the supply chain to supply the product at a price and quality acceptable to the Volume Builder, otherwise the Volume Builder will choose a different supplier or provider.

Consequently, if change in the sector is to occur the power of the oligopoly needs to be utilised to drive widespread market change through the supply chain. The Volume Builders

contractual and financial power over the supply-side stakeholders, generally being small- to medium-sized operators, means that should Volume Builders engage with and take the opportunity to mainstream sustainability initiatives into their housing provisions, the supply chain will then need to respond. The size and power of the Volume Builders means they can enable cost efficient solutions due to contract sizes and volume of houses. This should mean that issues identified by homebuyers, like cost effectiveness and quality of workmanship and product, can be conquered through the actions of the Volume Builders in mainstreaming sustainability.

The power drivers in the framework's relationship

The Volume Builders are the central point of the contractual relationships with the homebuyers and the supply chain. They are also the driving force in all relationships within the framework. In Figure 5, the power and contractual relationships are shown, with power relationship (shown dashed arrows) and the contractual relationships (in solid arrows). In the relationship between the Volume Builders and the housing consumer, the Volume Builder dictates to the consumers what they want and how they want it, whilst providing limited choice. For example, there is generally a book or list of plans produced by the Volume Builder with various forms of plans, façades, interior features and the like. Essentially what would appear to be a wealth of choice, from the purchaser's perspective. However, if a unique home is requested or there are changes to the standard set of plans, this incurs substantial cost to the homeowner, and they are discouraged from using this approach – verbally, financially and in the additional time required to achieve their requests. Consequently, the user has limited demand power, and influence is only achieved indirectly through preferential choice of products supplied.

As intimated above, the Volume Builders' relationship with the supply chain is also one of power and control. In traditional procurement theory, this is not recognised as a major power position, because the theoretical assumption of a single construction project. Because Volume Builders are not just building one or two projects, but building hundreds and thousands of homes this changes. Consequently, they set the requirements and prescribe this to the supply chain through the negotiations and contracts with contractors, trades, sub-contractors, suppliers and professional services providers. The magnitude of the contracts and financial implications are substantial and as a result, the Volume Builder has immense power over the supply chain. Even a slight variation in the price of a single component in a dwelling will have major implications in terms of the overall cost and contract size for the Volume Builders (The red and black architect, 2012). The Volume Builder has the power in the process to select the supply-side providers where there is generally a considerable level of choice, given the number of small- to medium-sized firms that are prevalent in the industry. If the Volume Builder does not agree with the supply cost, quality or timing of delivery, they are able to choose another. From the supply-side providers who are generally small- to medium-sized firms, a major contract with a Volume Builder will likely be its only major source of work. Consequently, care needs to be taken in order to remain price competitive whilst providing a quality product within the timeframe and still turn a profit.

It is evident when viewing the residential property sector home building process from a consumption-based demand and supply perspective, it becomes clear as to where drive for sustainability and innovation needs to emerge – with the Volume Builder. As the Volume

Figure 5. The power relationships in current practice. Source: Authors.

Builder has the power to drive sustainability through the supply chain, overcoming the commonly known barriers for sustainability like: cost, quality of product and quality of installation. Some Japanese housing providers have already embraced mainstreaming sustainability into the volume building process, by typically providing renewable energy technologies as a standard feature, in addition to a range of other features that improve the indoor environment quality, re-use of resources, materials selections to ensure a more resource efficient, long-term sustainable and liveable dwelling. This demonstrates a substantial move in the industry beyond additional cost-based marketing led strategies for sustainability incorporation (Nouguchi, 2015). From the evidence in Japan and in some cases in Europe, there is opportunity and evidence to demonstrate this approach will work. However, the right levers are required to drive the key demand-side stakeholders to engage in the sustainability agenda. Furthermore, by integrating sustainability into standard housing provision, broad-scale adoption by the end-users is enabled, providing a cohesive more sustainable product without the perceived "costly" price-tag.

How and why will this help the issue

The requirement to increase sustainability in the new home building process is paramount, as each year many homes are built that will house our population for at least another 50 years. During that time, these suboptimal homes will consume more finite resources than necessary, produce more waste and emissions and provide deficient accommodation that may have detrimental effects on health and well-being. Current regulatory approaches are plagued with problems and are focused only on energy efficiency. A broader sustainability agenda and a more cohesive approach to the building process may be the solution if mechanisms are identified in order to drive this change now, before the plethora of suboptimal housing plagues not only this generation but future ones as well. Consequently, by viewing the residential property sector with a new lens from the perspective of a "consumption-based demand and supply framework", this isolates the key stakeholders who can drive change within the sector. Consequently, future research needs to examine the relationships to identify opportunities to enable change.

This research advocates that if viewed from a "consumption-based demand and supply framework" perspective, the solution to this problem can be found through a coordinated approach between the demand-side stakeholders to develop and integrate the sustainability conversation, that the Volume Builders can then drive through the supply chain.

The intricacies of the relationship between the demand-side stakeholders is rather "chicken and egg" because, as previously described, housing consumers want, but do not know what to ask for, whilst clients assume no demand as there are no questions or requests.

However, how do housing consumers know what to ask for? This requires an education process in conjunction with engaging and marketing opportunities of the benefits of sustainability to housing consumers. This process needs to be enabled by the Volume Builders, who can then capitalise on a marketing edge available in a highly competitive market to realise the demand from housing consumers for sustainability in their homes. Once the Volume Builders are aware as a sector, mainstreaming sustainability will be possible as they have the market power to drive this change through the supply chain.

Further investigation is required. First, an examination of the demand-side stakeholder relationships is required, isolating mechanisms and frameworks to enable communication, education and discussion of sustainability in the new home process. Second, investigation into Volume Builders' organisational strategies and operations is required to identify how and what would be the best opportunity to incorporate and mainstream sustainability initiatives into the new home building process. And finally, investigate the ability and opportunity of the supply-side stakeholders to respond to the requirements of the Volume Builders.

This will then provide the opportunities and information to inform the development of a coordinated framework to engage demand and supply stakeholders in the sustainability discussion and implementation to ensure sustainability becomes mainstreamed in the residential property sector. In practice, this will result in the informed and empowered consumer able to communicate, identify and take up sustainability opportunities offered by the Volume Builders who are driving the sustainability agenda through the supply chain, facilitating a transformation for mainstreaming sustainability in new homes in Australia.

Notes

1. Consumer: an individual who purchases goods or services from a seller/merchant/professional (*Shorter Oxford Dictionary*).
2. Customer: a person who makes a purchase or gives business, especially habitually to any particular seller or establishment, and has the ability to choose between different products and suppliers. (*Shorter Oxford Dictionary*).
3. Client: a person using the services of a professional entity; in construction literature clients "are the initiators of projects and those that contract with other parties for the supply of construction goods or services" (Boyd & Chinyio, 2006, p. 5); and.
4. End-user: a person who uses something. Not necessarily meaning, the end-user is the purchaser of the goods or services, but is the ultimate user in the distribution chain of a good or service.

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References

Atkin, B., & Flanagan, R. (1995). *Improving value for money in construction*. London: Royal Institution of Chartered Surveyors.

Australian Bureau of Statistics. (2010). *Types of dwellings*, 1301.0 Year Book Australia, 2012, released 24/05/2012. Retrieved February 20, 2015, from www.abs.gov.au

Australian Bureau of Statistics. (2014). *Building approvals: Australia* (Cat. No. 8731.0; Table 21 Value of Dwelling Units Approved: Australia: New Houses). Retrieved November 18, 2015, from www.abs.gov.au

Barlow, J. & King, A. (1992). The state, the market, and competitive strategy: The housebuilding industry in the United Kingdom, France, and Sweden. *Environment and Planning A, 24*, 381–400.
Barlow, J., Childerhouse, P., Gann, D., Hong-Minh, S., Naim, M., & Ozaki, R. (2003). Choice and delivery in housebuilding: Lessons from Japan for UK housebuilders. *Building Research and Information, 31*, 134–145.
Boyd, D., & Chinyio, E. (2006). *Understanding the construction client*. Oxford: Blackwell.
Coiacetto, E. (2006). Real estate development industry structure: Is it competitive and why? *Urban Research Program, Research Paper, 10*, 32 pp. Retrieved from www.griffith.edu.au/_data/assets/pdf_file/0006/48579/urp.
Crabtree, L. (2006). Sustainability begins at home? An ecological exploration of sub/urban Australian community-focused housing initiatives. *Geoforum, 37*, 519–535.
Crabtree, L., & Hes, D. (2009). Sustainability uptake in housing in metropolitan Australia: An institutional problem, not a technological one. *Housing Studies, 24*, 203–224.
Dalton, T., Horne, R. E., & Maller, C. J. (2008, July). *The practice of going green: Policy drivers and homeowners' experiences of improving housing environmental performance in Victoria, Australia*. European Housing Researchers' Network Conference, "Shrinking Cities, Sprawling Suburbs, Changing Countrysides", Dublin, Ireland.
Delmas, M. A., & Burbano, V. C. (2011). The drivers of greenwashing. *California Management Review, 54*, 64–87.
Dowling, R. (2005). Residential building in Australia, 1993–2003. *Urban Policy and Research, 23*, 447–464.
European Commission. (2012, May). *A European consumer agenda – Boosting confidence and growth, communication from the commission to the European parliament*. The Council, The Economic and Social Committee and the Committee of the Regions. Retrieved November 16, 2015, from http://ec.europa.eu/consumers/eu_consumer.../consumer_agenda_2012_en.pdf
Gabriel, M., & Watson, P. (2013). From modern housing to sustainable Suburbia: How occupants and their dwellings are adapting to reduce home energy consumption. *Housing, Theory and Society, 30*, 219–236.
Garrett, S. (2014). *Home starts top 180k but supply restrictions start to bite*. Campbell: Housing Industry Association Limited, Media Release.
Häkkinen, T., & Belloni, K. (2011). Barriers and drivers for sustainable building. *Building Research and Information, 39*, 239–255.
Haugbølle, K., & Boyd, D. (2013). *Clients and users in construction W118 research roadmap report* (Report No. 371). International Council For Research and Innovation in Building and Construction (CIB). http://site.cibworld.nl/dl/publications/pub_371.pdf
Heywood, C., & Kenley, R. (2010, December). An integrated consumption-based demand and supply framework for corporate real estate. In Y. Wang, J. Yang, G. Q. P Shen, & J. Wong (Eds.), *International conference on construction and Real Estate Management* (pp. 380–385). Brisbane: China Architecture and Building Press.
HIA. (2015). *Housing 100 2014/2015*. Campbell: Housing Industry Association Economics.
Love, P. E. (2002). Influence of project type and procurement method on rework costs in building construction projects. *Journal of Construction Engineering and Management, 128*, 18–29.
Love, P. E., Skitmore, M., & Earl, G. (1998). Selecting a suitable procurement method for a building project. *Construction Management & Economics, 16*, 221–233.
Maller, C., Horne, R., & Dalton, T. (2011). Green renovations: Intersections of daily routines, housing aspirations and narratives of environmental sustainability. *Housing, Theory and Society, 29*, 255–275.
McGregor, S. (2005). Sustainable consumer empowerment through critical consumer education: A typology of consumer education approaches. *International Journal of Consumer Studies, 29*, 437–447.
Ng, S. T., & Skitmore, R. M. (2002). Contractor's risks in design, novate and construct contracts. *International Journal of Project Management, 20*, 119–126.
Nouguchi, M. (2015). Towards zero energy mass customized housing delivery. *Innovative Energy Policies, 4*(1), 1–2. Editorial.

O'Brien, W. J., London, K., & Vrijhoef, R. (2004). Construction supply chain modeling: A research review and interdisciplinary research agenda. *ICFAI Journal of Operations Management, 3*, 64–84.

Pinkse, J., & Dommisse, M. (2009). Overcoming barriers to sustainability: An explanation of residential builders' reluctance to adopt clean technologies. *Business Strategy and the Environment, 18*, 515–527.

Pitt & Sherry. (2014). *National energy efficiency building project*. Adelaide: produced by Pitt & Sherry for Department of State Development – Government of South Australia.

Reardon, C. (2013). *Buying a home off the plan, in your home*. Retrieved February 20, 2015, from http://www.yourhome.gov.au/

The red and black architect. (2012). Interview with Alex Nock, 'Volume house builders and the great Australian nightmare'. Retrieved February 10, 2015, from https://theredandbalckarchitect.wordpress.com/2012/10/06/volume-house-builders-and-the-great-Australian-nightmare

Thøgersen, J. (2005). Consumer behaviour and the environment: Which role for information. In C. Krarup, S. Russell (Eds.), *Environment, information and consumer behaviour* (Chapter 3) (pp. 51–63). Northampton, MA: Edward Elgar.

Thorpe, D., Ryan, N., & Charles, M. B. (2009). Innovation and small residential builders: An Australian study. *Construction Innovation: Information, Process, Management, 9*, 184–200.

Tombesi, P. (2006). Good thinking and poor value: On the socialization of knowledge in construction. *Building Research & Information, 34*, 272–286.

Unilever. (2011). *Inspiring sustainable living: Expert insights into consumer behaviour and Unilever's five levels for change*. London: Unilever PLC.

Warren-Myers, G., Carre, A., Vines, M., & Wakefield, R. (2012). *Existing buildings research project: Isolating opportunities for the improvement of the environmental performance of existing housing stock*. Melbourne: Sustainability Victoria, Victorian Government.

Wathieu, L., Brenner, L., Carmon, Z., Chattopadhyay, A., Wertenbroch, K., Drolet, A., & Gourville, J. (2002). Consumer control and empowerment: A primer. *Marketing Letters, 13*, 297–305.

Wilkinson, S., & Schofield, R. (2003). Procurement systems for construction projects. In *Management in the New Zealand construction industry*, Chapter 21 (pp. 239–249). Auckland: Pearson Education.

Williams, K., & Dair, C. (2007). What is stopping sustainable building in England? Barriers experienced by stakeholders in delivering sustainable developments. *Sustainable Development, 15*, 135–147.