

Mind your business: entrepreneurs, their dynamic capabilities, context and new business models for energy efficiency services

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Keywords

adoption, business models, user perspective, energy services, innovation policy

Abstract

It is expected that as many as two thirds of the total potential for energy savings in 2035 will not be exploited. Energy services are considered to be a good delivery mechanism for Energy Efficiency. To bring these energy services to the market, the first step is a good business model. User-centred approaches to business model design are key as they are characterized by user involvement and interaction in different stages of the supply chain. A second element of importance to delivering effective energy efficiency services are the dynamic capabilities of business model developers and providers of services to focus on this customer perspective and tailor their services. A third element of relevance to understanding how to deliver more effective energy efficiency is the context influencing the model. Based on a comprehensive analysis of 42 businesses and their business model in 5 countries and an accompanying context analysis, our conclusion is that the tech-push perspective is centre stage in many framework conditions such as policies, regulations, incentives, financing institutions. As a result, the energy efficiency market is dominated by limited types of business models mainly focused on delivering goods and given the established framework conditions only incremental innovation of business models occurs in the energy field. We indeed need these products and the business models delivering them are successful enough to some extent, but the uptake of energy efficiency products demonstrates that to be effective at mass-marketing energy efficiency we also need services that facilitate

this uptake. Such as services alleviating decision stress, or providing non-energy benefits as well. Because of their constitution however, these more user centered and service oriented business models challenge or stretch the existing framework, i.e. servitisation business models have a difficult time emerging. In this paper, we discuss findings from our empirical analysis, which led to the identification of four business models for delivering energy efficiency services, the dynamic capabilities the entrepreneurs demonstrate in delivering more value to end-users, and we explore the policy needs for delivering user centred business models for energy services.

Introduction: the three keys to understanding the uptake of energy efficiency services

In 2014, the Demand Side Management programme (DSM) run by International Energy Agency (IEA) started this research project on new business models for energy efficiency services (IEA, 2014). This research is part of a growing body of research aimed at understanding what is causing the apparent lack of market uptake of Energy Efficiency. (IEA 2015) new business models for energy services are considered to be a key delivery mechanism for Energy Efficiency and savings. (Boons and Lüdeke – Freund, 2013). A growing understanding is that in many business models underlying Energy Efficiency services, the supplier perspective is dominant. Too little attention is given finding appealing values that go beyond financial savings and profitability, values only appealing to a certain number of people (Hienerth et al., 2011) (Arevalo et al, 2011) (Gentile et al., 2007; Vargo & Lusch, 2008). The premises behind this observation is that the current system (the established system) is technocratic and push oriented and

that a more user centred approach will be more effective in creating market uptake (Tolkamp et al 2017). This is directly related to the fact that service value is being co-created with the end user. No user means no service. Business models and energy services focusing on the customer perspective and their unique buying reasons for energy efficiency are considered to be the next step in creating a larger market uptake for energy efficiency (Nilsson et al 2012) (Hiernerth et al, 2011). The capability to identify user needs has been found to indeed correlate positively with profit generation and the increase in market share among other indicators, in other sectors (Janssen, 2015).

The key question guiding our work was if indeed these new types of business models and energy services are more effective than the so far rather technocratic and technology push approach type of business models. And if the dynamic capabilities of entrepreneurs and providers of services that facilitate a focus on this customer perspective and tailor their services (Teece, 2011) indeed contribute to a more effective uptake of the product and service. These dynamic capabilities relevant to user centered service development include sensing, conceptualising, orchestrating, stretching and scaling (Den Hertog et al. 2010). We also investigated if a better alignment of the business model with context was helpful in delivering energy efficiency more effectively because a business model design is strongly influenced by context, e.g. existing legislation and available subsidies, other bottlenecks and constraints, and various players within the current energy production and consumption system. (Bidmon and Knab, 2014; Provance, Donnelly, and Cara Yanniss, 2011; Geels and Schot 2010; Huijben and Verbong 2013 Mormann 2014). The focus of this paper is not to provide a rich context analysis based on institutional theory, but aims to use the empirical data collected to identify context influences on the development of the business model and the uptake of the product or service. For a more substantial context analysis for each of the participating countries we refer to the country reports.¹

The creation of a user centred business model and value proposition, the dynamic capabilities of the entrepreneur/enterprise in navigating the context and user related issues and finally, the context in which the business model and service is deployed are therefore at the core of our empirical analysis. In this paper, we first briefly discuss our methodology, and then provide a brief theoretical discussion on user centred business modelling and entrepreneurial dynamic capabilities. The main body of this paper is based on a comprehensive set of empirical data and includes a practitioner perspective focussed on the key question if service orientation and thus user centeredness in the business model, well developed dynamic capabilities and alignment with context indeed were conducive to the market uptake of a business' service. In the remaining text, we first briefly discuss the methodology underpinning our work, theoretical notions relevant to our analysis and discuss results. We conclude with some explorative thoughts on the facilitating conditions policy makers could design to support the more demand pull and user centred type of business models.

Methodology

This paper is based on an analysis of 42 business models in the Netherlands, Sweden, Norway, Austria and Switzerland as part of the IEA Demand Side Management Task 25, Together with national experts, we first drew up a longlist of more than 350 Energy Efficiency propositions we could in the participating countries using a quick scan on internet and using the networks of the energy agencies involved. We focused on a mix of retrofitting, lighting, smart solutions and total solution (one-stop-shop) products and services. We explicitly excluded Energy Service Companies (ESCO) and Energy Performance Contracting (EPC) services for non-residential segments because these were already investigated in task 16 of the IEA DSM. Based on initial information collected in this longlist we made a selection of propositions that would be further analysed to understand their business model, the accompanying entrepreneurial dynamic capabilities and their interaction with context. The selected propositions were chosen to represent variety in success (market share and market uptake) and in alignment or challenging relationship with the broader context (policy, consumer attitudes, regulations), thus representing either a clear fit or stretch relationship with context (Huijben 2015). The selection allowed for comparison of similar smart service, retrofitting, total solution and lighting propositions, operating in different political, institutional, technological, socio-cultural contexts. We started fleshing out 42 business models using the business model canvas and customer value canvas designed by Osterwalder and Pigneur (2010). During this analysis of the business models, in each of the participating countries we organised a workshop with the entrepreneurs being analysed and other stakeholders from industry, academia and the policy arena to discuss our initial findings. What became quickly apparent is that the canvasses are a snapshot, while the underlying business is a very dynamic and complex entity which operates in a system, which is also very complex, with its own dynamics, something the research field has been researching extensively (Boons, F., & Lüdeke-Freund, F., 2012.),² but for the purpose of drawing out basic information about the business model and the value proposition the canvasses by Osterwalder and Pigneur (2010) were sufficiently adequate. To incorporate the more dynamic view on the business model we investigated the entrepreneur's journey for each of the 42 propositions as well, which is a description of the business and how it has evolved over time by means of interviews with either the CEO of the companies or the most relevant employee. Also, we identify how the system influenced this development by performing a context analysis by means of literature analysis of relevant material on the context, including grey literature such as websites (i.e., Eurobarometer, Eurostat), and or interviews with key representatives for industry, government, NGO, academia, business and other sectors. In order to collect our data, the authors and national experts interviewed all entrepreneurs both on their business, their dynamic capabilities and their perspective on the system they operate in, and we focused on the user centeredness of the business model and the entrepreneur (Tolkamp 2017). As such the data is a mix of self-reported mate-

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2. Suggested reading includes Gassmann O. et al. (2016), Saebi et al, (2017), Boons, F., & Lüdeke-Freund, F. (2013).

rial and material collected on the businesses from for example internet, or provided to us by the entrepreneurs, e.g. on market share and number of clients, turnover etc.³

Theoretical framework: the paradigm shift from delivering goods to services

Entrepreneurs in many sectors, including the energy sector, are exploring a shift from delivering goods to delivering services, which can also be seen as a way of innovating business models (Bocken et al 2014) (Mont & Lindquist 2003) (Kindstrom et al. 2017). A recent study on North-American and European utilities (Bigliani, R. et al., 2015) for example demonstrates that utilities increasingly face new competition for (the wallets of) their customers from nonutility players (including ICT companies, consumer electronics and energy equipment manufacturers, telecom) that offer richer customer experience with new services and new business models and in response are discussing new business models as well (IRENA 2014). In Europe for example, new business models tops the strategy agenda of European utility executives (Bigliani, R. et al. 2015). And of these business models, the service model, including PV charging, HVAC services, rooftop solar, bundled home services, community energy, data management, is most appealing to utilities that are forward-looking. Some of these utilities even decouple the service from the sale of a commodity supply contract (Bigliani, R. et al. 2015). Examples of emerging energy efficiency services include integrated or one-stop shop or bundled offerings around retrofitting, smart (grid) services, lighting-as-a-service, heating-as-a-service, smart energy management as a service and the more common ESCo's and EPC contracts.

The transition to delivering services (servitisation) instead of delivering goods is not new and has taken place throughout the economy for several decades now (Vandermerwe and Rada, 1989). Several processes explain the rise of this 'service economy' in other sectors (OECD, 2000). Demand-side explanations include the idea that higher levels of economic development entail an increasing demand for services. An assumption is that richer individuals opt more easily for buying services, especially when skills they need become very specialized and can be delivered by the service, but this has not been substantially researched in the energy field yet for the residential sector. This process of outsourcing is strongly linked to the globalization and fragmentation of value chains which make it very difficult to have all the skills, information, access etc. necessary for customers. In these processes, and this can clearly be witnessed in the energy efficiency field as well, the availability of information and communication technologies (ICT) has played a key role in fuelling the growth of services (Miozzo and Soete, 2001). In particular, customized output and economies of scale can be achieved at the same time thanks to more recent advances in ICT and the use of Big Data (see the examples of AirBnB and Uber) (Mourik et al. 2017).

3. For a comprehensive overview of the methodology applied see the Task 25 Annex 1 report on <http://www.ieadsm.org/task/task-25-business-models-for-a-more-effective-uptake/>.

Dynamic capabilities

Research on service delivery identified several key dynamic capabilities necessary for designing and implementing services (Den Hertog et al 2010; Raddats et al., 2014) (Janssen et al, 2015). Often, to incorporate these dynamic capabilities, most companies need to completely switch their mind-set from a goods-based to a service-based logic. In particular, service developers face challenges in understanding what Unique Buying Reasons users have, since they are focused on the Unique Selling propositions and technical possibilities instead of really understanding the potential other and non-energy related needs of users (Nilsson et al 2012) (IEA 2014). This sensing of user needs skill and the skill to create solutions based on that sensing, and the skill to respond to changes in the system around the business model and the proposition is found to be essential in designing, developing and delivering services that really provide the unique buying and using reasons that the users want (Den Hertog et al 2010; Raddats et al., 2014) (Janssen et al, 2015). However, many stakeholders in the field, from entrepreneurs to institutional actors lack the knowledge and capabilities to design and facilitate truly service oriented and user centred business models. Research and our analysis found the following capabilities to be particularly significant:

- Sensing user needs of whatever segment, industry, SMEs, industry, households and (technological) options through meaningful engagement and co-learning with users and other stakeholders with the goal to create (conceptualising) the best match between their needs and the service.
- Conceptualizing is about using the information coming from the sensing activities to identify patterns that can be used for continuous innovation.
- The co-producing and orchestrating skill is about aligning all the relevant actors and providers working towards a seamless, coherent and smooth end-user experience.
- Scaling and internal stretching capabilities relate to the marketing dynamic capabilities of service providers and the ability of the service provider to create a smooth and aligned service oriented company structure.

What we found in our 42 cases is that in particular the sensing and orchestrating skill are essential to the success of delivering energy services. Visnjic and Neely (2016) also state that service providers, especially the B2B2C ones, are shifting from being 'doers' to becoming 'problem solvers', capable of orchestrating the delivery of complex services that enable their stakeholders to deliver value to their customers. Raddats et al. (2014) indicate the importance of a particular element of this orchestrating skill: building new networks of actors with a high level of trust between them in order to deliver advanced services. Janssen et al, (2015) also found evidence that sensing user needs and conceptualizing capabilities are positively correlated both with higher than average profits and with the innovativeness of companies, as measured by the share of turnover they get from improved rather than existing products (goods and/or services). These capabilities are not independent from each other but they form instead a coherent set of elements reinforcing each other. And it is the sum of all capabilities that is strongly correlated to companies' performance and market share. Indeed, we found

that those entrepreneurs that demonstrated strong dynamic capabilities in sensing, conceptualising and orchestrating were most successful in delivering energy efficiency services.

Results

With our analysis, we aimed to understand if indeed those business models that are more service oriented, more user centered, and where entrepreneurs demonstrate well developed dynamic capabilities were more effective at delivering energy efficiency. More effective in the sense of better market uptake and or growth of market share. We were also interested in finding out how alignment with context influenced this success. Unfortunately, due to page limits we are not able to discuss the individual cases we analysed. In this paper, we focus on the typologies we found. For more information on the individual cases we refer to the country reports (IEA DSM Task 25 2016, 2017). What we found in the 42 cases we analysed is that often, parts of the business model and the dynamic capabilities used were changed towards a more service oriented approach only once confronted with absence of market growth or uptake. Increasingly, in response to these barriers, the delivery of these goods and products was 'enriched' with add-on services. And there are even business models and value propositions emerging where energy efficiency is no longer the primary value delivered, but a secondary outcome of other value delivery, for example where design was the primary value offered with near energy zero homes, or where safety, control, ease or value such as client retention and access were the primary values being offered with smart services. We also found that in our case studies the firms made different, often intuitive, changes to the business model and to the dynamic capabilities they use to guide their business in a direction that better aligns it with the user's needs.

In the remaining of this paper we first discuss the four types of business models and the four strategies and then conclude with a discussion on what policy makers could start doing to make the uptake of promising energy efficiency business models more effective.

Four types of business models to deal with context barriers and drivers

Based on the analysis (consisting of literature, other written material and interviews and workshops) of the different elements of the business model canvas and the dynamic capabilities in each of the 42 cases, 4 types of business models could be identified that are less and more successful at delivering energy efficiency and four strategies were identified to deal with context barriers. We first discuss the four models we found amongst our cases.

PUSHING HARDER/THE RESELLER OR REFERRAL MODEL

This first business model type has a strong technology driven start and often is also strongly linked to the (coming into effect of) a law, regulation or directive. Usually a very passionate and skilled engineering entrepreneur developed a concept and is now trying to market it, often to the more commercial and or industrial type of client. These type of businesses are the ones developing their business around one technology or product,

for example a smart plug, smart algorithm, insulation, HVAC system, earth leak detectors).

The selling occurs by stressing the technological and energy related functions and characteristics of the product (figures and percentages of energy saved, insulation quotients etc. safety, reliability, control, optimisation, verification) to their clients, not the benefits the product can help deliver to the end-users (clients) of the clients such as for example safe and fresh food (for refrigeration clients). To some extent the clients want exactly the ventilation or refrigeration, but the businesses we investigated reported that this customer base was too small and competition too high and that they experienced difficulty increasing sales. Partners usually are the more technological types of partners, co-developers of the product. This type of business is not really focused on sensing user needs, certainly not in a systematic manner, and not during the use of the product. The aim is to sell a one-off product. The cost structure is very traditional and includes costs for personnel and costs for material needed to build the product. The revenue structure is also mostly product oriented, with one-off payments, hardly any recurring (monthly) fees. And if the companies have recurring (monthly) fees or subscriptions, this is at most 20 % of their revenues, with 80 % one-off payments for the sale of a product.

Once the business starts experiencing that the early adopters have saturated, that the market is static and a ceiling seems to be reached, the response is to focus on the scaling skill of marketing and sales. So, the companies aim to buy and or hire the marketing and sales skill. To this end a relationship with a certain type of intermediary is developed: consultants, installers or even Original Equipment Manufacturers (OEMs) are approached and either paid to resell/refer the product, or trained into better understanding the product and as such being able to better refer it to potential clients. The training is focused on the technical characteristics of the product whereas the skill of sensing user needs remains undeveloped. There are still no activities aimed at sensing user needs systematically and adapting the value proposition to these needs. Another skill that is potentially built up is the orchestrating skill, where the business aims to develop relationships with retailers to get them to consider offering their product as part of a package to their clients. So, it is not the orchestrating skill in a traditional manner, where the company aligns her partners to act as one in delivering the user experience, but it is orchestration aimed at having the product being one of the elements being aligned and offered as part of a partner's package. This type of company does not demonstrate strong conceptualising capabilities, or innovation capacity in the sense of developing totally new products or services. Any innovation being performed is incremental. They do not aim to radically innovate their product, or develop a set of services. Of course, this is a valid approach if the company is successful in just selling their product. However, the entrepreneurs we analysed and interviewed all reported that they were facing a stagnation in their client base and were increasing facing difficulty selling just the product. Thus, conceptualising to develop services around the product to facilitate the further uptake of their product would be a valuable strategy. The skill of sensing technological options comes naturally to this type of business. The relationship with the clients is not developed strongly and is not aimed to understand the characteristics of

specific client contexts. Similar types of clients, e.g. all active in the refrigeration sector, are approached in similar ways. This pushing harder or reselling model is about keeping as much as possible the same, but pushing harder and using other channels to enlarge the market potential. The companies we followed in our research that went bankrupt or decided to stop (a smart algorithm developer that could tell households what appliances they needed to replace for more energy efficient ones, or a provider of insulation measures) can all be categorised as belonging to this first category, although some of them, in the last phases of their existence tried to turn their business model into the next model.

REFRAMING WHAT YOU PROPOSE/ THE PARTNER MODEL

This reframing what you propose or partner model is represented by the type of companies that for example, after experiencing difficulty selling their product, start reframing the value of that product. For example, insulation companies that face difficulty selling their products and start to sell comfort, or an easy implementation and quote process and comfort, or builders of nearly energy zero buildings (NZEB) that start selling their homes as designer homes instead of energy efficient or NZEB homes.

This model still focuses on achieving the transaction moment, a one-off relation with their clients. These companies don't consider an active relation that remains during the use phase of a proposition to be relevant. However, there is a huge difference in the role of the client compared with the pushing harder model. In this model, the client is understood, and the needs and wishes are taken seriously and are being used for building a relation and the process of selling the proposition. The relationship and role of the user changes fundamentally when this model faces its market and uptake barriers. In first instance the role of the user is passive, but after the model hits stagnation, the role of the user becomes active. Also, this relation can be used to add extra value to existing and create new services focused more on the use phase. However, in the timeframe of this research these companies still held on to a one off relationship with their clients, a focus on a one time transaction. This second model still resembles the first model in many ways. At the start the model is practically identical to the first model. The only difference is that this model starts off with a different, more equal position vis-à-vis partners. But once this type of business is faced with a standstill in the market development they demonstrate clearly different strategies in reaction. Instead of pushing harder, efforts are undertaken to understand user needs better. The skill of sensing user needs is developed. This occurs through personal contacts, including training of potential users, tailored quotes, personal telephone calls, follow-up talks. No systematic and pro-active sensing of user needs in the use phase occurs though, all efforts are aimed at influencing the purchasing decision, not the use of the product. Often, in response to this deeper understanding the companies start appreciating that energy efficiency or specific technical characteristics of the product is not a top priority to clients. And in response to this insight, the value proposition is altered to reflect this. For example, instead of trying to sell passive homes, the homes are sold as design homes.

The skill of conceptualising is also further developed, however not towards technological innovation but towards process

innovation aimed at building a trust relationship with clients and easing the transaction process. The technologies are still at the core of the value proposition and remain more or less untouched. These types of businesses for example performed some process innovation, delivering the process as a service to households, for example insulation companies delivering timely quotes, a no-hassle type of process around retrofitting, with a focus on delivering ease and comfort instead of energy efficiency alone. The technologies or products being sold do not change, only the process to deliver them. Partners for these types of businesses usually are the more technological types of partners, co-developers of the proposition. However, these partners are explicitly used to underpin the branding of the product, they are selected on the basis of excellence and quality. Follow-up is performed to make sure the process was experienced as pleasant, and potential technical matters are solved in this follow-up. But that is where the model stops. The cases representing this model show a clear stop at the use phase. The actual use phase of the home or insulation measures is not used as a gateway to delivering more services, for example smart home services. However, the cases might in the future develop to also focus on the use phase, and as such move towards the third model: pushing something else or the user phase model.

Similar to the first model (pushing harder), the revenue structure is also mostly product oriented, with one-off payments, hardly any recurring (monthly) fees. And if the companies have recurring (monthly) fees or subscriptions, this is at most 20 % of their revenues, with 80 % one-off payments for the sale of a product. A few companies also mention more intangible revenue in the form of Goodwill. These are companies that implement their energy efficiency product and or service as a way to meet other goals such as a competitive edge in their respective market (rental market, retail market). To sum up, this model is very much about reframing what you propose. As a model it is already much more on a path towards servitisation, focusing on user needs, partnering with excellence partners increasing value instead of economics. However, what is missing still, is a focus on the use phase, and on delivery of services around the product, allowing for an extended relationship with the clients beyond the purchasing phase.

PUSHING SOMETHING ELSE: THE USER PHASE MODEL

This model is about pushing something else and about focusing on the use phase. This third model demonstrates a shift from pushing a solution to becoming problem solvers in reaction to reaching a ceiling, or sometimes also in reaction to unsolicited feedback from clients. This unsolicited feedback then triggers a company to reflect on its value proposition and start focusing more actively on user needs. The main difference with the second model (reframing what you propose) is that not the language is changing (framing), but essentials in the proposition. The main change is the awareness that the client is in fact a 'user' and usage isn't one moment in time. This means that the use phase, after transaction, provides key insights for innovation. These businesses still have a strong technology push start but are not afraid of developing a totally new package around that technology or even adapting their technology to meet new user needs. Especially when they become part of a larger package. These businesses, very often businesses developing single

type technologies in the smart metering, solar business, smart ICT and feedback sector, are trying to pivot the company away from direct consumer sales towards a business-to-business partner relationship. They aim to partner with a larger company offering a larger and more complex value proposition to end consumers, sometimes not directly related to energy efficiency at all, but more focused on delivering health benefits, safety benefits, comfort etc. Here all elements of the business model change to some extent, where the clients and the value proposition and partners change significantly. Resources change as well, from technical know-how and marketing expertise to also or sometimes foremost include data as a resource. Activities also change to data handling instead of developing soft and hardware.

What happens in reaction to this sensing of user needs is a realisation that their specific technology, which is very specifically focused on energy and energy efficiency or conservation is actually not really valuable to their end-users. What makes this model significantly different from the first two is the focus on extending and deepening the relationship with the end-users of the package, focusing on the use phase, with the aim to collecting data valuable to the businesses they now aim to develop as clients, thus moving from being B2C to B2B2C businesses. Another clear difference with the first two models is that this model is about delivering multiple values to the client and to partners. It is about going beyond energy efficiency and focusing on real user needs. The analysis, systematic analysis, of the user needs is centre stage. These companies very strongly develop the skill of sensing user needs, where the users are both the business mediating between them and final (residential) users. Another skill these businesses develop strongly is orchestration. They explicitly set out to become aligned with deliverers of a larger more complex value proposition, and in reaction to that they also develop their conceptualising skill, making sure they innovate their product strongly to match the technological system it becomes part of. For some of the businesses in Sweden, for example, this implied that their value proposition was adapted from delivering a metering device to delivering a platform, a hub where different complex datasets could be merged and turned into actionable information for different users. Becoming part of a network delivering multiple values thus becomes the main strategy for this type of business.

RESPONDING TO NEEDS: THE SERVICING MODEL

This fourth and final model is a completely different one, in the sense that where the others are reactive in co-creating and working with clients, in this model this is the start. Some entrepreneurs don't even start with energy efficiency. The coming into existence of this type of enterprise mostly originates from a deep concern with the needs of a certain group of people. An example is the ECT business in Sweden, where a total solution around the testing, choosing, financing, implementing and maintenance of solar systems for households is being developed by a magazine focused on sustainable technologies. Their clients asked for help in testing and identifying the best solar system, financing etc. and this magazine developed a business to meet these needs. Their unmet needs are thoroughly known and researched and the initial value proposition is being tailored to a small group of those customers. An iterative process of build-test-learn in co creation with customers and partners

leads to a network type of enterprise, where a proposition is the result of an intensive cooperation between – more or less equal – partners, and with (at least a representative group) customers. After the initial start, they expand their business gradually with new or extra benefits that, in a way, naturally fit the needs and lives of the customers. They focus on the experience of using energy efficiency, or delivering an experience that highlights the value of energy efficiency using other values as starting point. The biggest difference between this model and the others is that the clients and their needs and lives in all phases (from orientation to transaction to use and even end of use) are at the core of the business, instead of the value proposition. As a consequence, the key dynamic capabilities of sensing, conceptualising and orchestrating are essential resources in the business model and need to be highly developed in order to be successful. Although in this model context also plays a role, the context is more malleable and the model finds its way within the given boundaries, and stretches them if needed. The trusted relation with clients and partners is an essential resource, as is as the skill to translate the variety of wishes and needs in such a way that it fits in the proposition and doesn't damage the trust. There seems to be one essential difficulty in this model. For B2C businesses, maintaining a trusted relation with clients is becoming difficult when the client base is increasing. Although client databases and datamining are essential dynamic capabilities, an intimate relation and customizing a value proposition are becoming less obvious.

KEYS TO SUCCESS

What we found when analysing the cases representative for these four models is that the more service oriented they were, the more successful they were at delivering energy efficiency in terms of market uptake, growth of customer base and market share. The data on this is partly self-reported by the entrepreneurs, and based on public data.⁴ However, this was particularly the case for business models that had a 'mother company' providing either start capital that allowed for effective sensing of user needs and becoming service and user centred, for example through co-creation. Furthermore, these mother companies often also provided two more valuable elements: an already existing customer base and branding, something also argued to be important by Kindstrom et al. (2017). But perhaps most importantly, these mother companies provided time. Time for the business models to grow, to experiment, to learn, to lobby, to adapt. Especially the spin-offs of universities, utilities, DSOs or a totally different company were doing best compared to smaller and standalone businesses because they had this mother company providing protected space for experimentation and further developing of the business model without too much financial constraint. Another finding is that the business models that delivered multiple value for multiple stakeholders and provided opportunity for end users to experience the value of energy efficiency while using/after transaction were more successful as well. This again proves that energy efficiency may not be a buying reason, but often only proves to be of value in the use phase. Delivering multiple value for multiple stakeholders and for the end-users requires

4. <http://www.ieadsm.org/task/task-25-business-models-for-a-more-effective-uptake/>

very good orchestration dynamic capabilities from businesses. Experiencing energy efficiency in use was most successful when energy efficiency rode piggy back to other value being delivered such as comfort, safety, ease, control. As such, the experience of comfort, control, ease, safety or a combination of these was enabling the uptake of energy efficiency. The business models that were successful in delivering the experience of energy efficiency had one thing in common: the focus on the total end-user journey from the orientation phase, through transaction, to the use phase and beyond. The focus on the use phase also requires businesses and entrepreneurs to be able to really sense the user needs on a continuous base and adjust (conceptualise) the value proposition in reaction to changing needs. Thus, the conceptualising skill needs to be developed quite well too. What we can conclude is that those business models in our analysis that are more service oriented, the better they master the sensing, conceptualising and orchestrating dynamic capabilities, the more they reported a better uptake of energy efficiency in terms of market share and customer base growth. And those businesses that in addition have a mother company are being most successful. However, even with these keys to success businesses still can face context barriers that hinder their scaling significantly. In the next section, we will discuss the different strategies we found in dealing with context in more detail.

Four fitting or stretching strategies to deal with context: another key dynamic capability?

The four models are positioning themselves differently in the paradigm shift from delivering goods to services, as discussed in the previous section. One element of that positioning has to do with the tension or stress the business model experiences with respect to its users and its context partners; from hindering regulation or procurement rules to clients not seeing the value of the product or service, or banks not wanting to provide the financing because the value is too vaguely described. The four different models approach these stresses differently: some were very aware of the transition and the potential problems, while others operated as they always had or engaged in trial and error changes to the business model to overcome problems without having thought of the larger picture on the fore hand (Tolkamp 2016). In relation to context, entrepreneurs and the business model vary on a spectrum from fitting to stretching context drivers and or barriers (Huijben 2015; Huijben et al. 2016). Some align themselves with what is possible while others actively try to stretch the possibilities and shape the context. The same holds for the expected value for the end user: a firm can decide to try and fit with the expected value, or take a stretch perspective and provide a proposition that is more novel but might not be understood. Based on our analysis we found four strategies, ranging from being unaware, to aiming for a fit with the context or stretching it which will be discussed below. The different strategies that we found can be linked to the four different types of business models. We found that the unaware market changer strategy was mostly found amongst the pushing harder business model, focused on the transaction phase and delivering a very narrow energy efficiency related type of value such as savings or bill management. The smart matcher was clearly found amongst

the reframing what you propose type of model, where a clear focus existed on delivering a process to enable energy efficiency (e.g. Netherlands Insulates). These two models clearly are aimed at fitting, not at stretching context. The aware market changer and the stealth market changer both were found more amongst the type of business models that focused more on delivering value in use: the pushing something else and the responding to user needs models. These models were clearly aimed at stretching context.

THE AWARE MARKET CHANGER

An example of an aware market changer is Philips and its light as a service business model. The firm is aware of the ongoing paradigm shift and argues that the majority of businesses is not ready for light as a service or the circular economy thinking it is based on (Interview Philips, 2015). Still, the firm tries to launch a business model that deviates far from the expected value and tries to create movement in the market. To do so, Philips targeted a dedicated customer and tried to build success stories with the clients that are aligned and demand a service approach. The firm thus targets a segment that is aligned and, for the time being, waits with broader introduction in the market. Doing so Philips pulls or stretches the market and relevant stakeholders such as policy makers towards its end of the service spectrum and actively tries to make the paradigm shift happen. (Tolkamp, 2016). This strategy is a clear stretch strategy, but wisely done within a protected space of a willing client segment.

THE STEALTH CHANGER

Stealth changers have the same goal as the aware market changer: they aim to shift towards service delivery. The approach that is taken is different however. The stealth changer, as the name suggests, does not abruptly bring a radically new proposition to the market, and follows a fit strategy but looks for the boundaries of the fit. The firm rather sticks close to what is expected by users and other stakeholders, until a market share is appropriated and a loyal customer segment is established. Then, gradually, the firm makes changes to the business model and products or services offered within this loyal customer base (Tolkamp, 2016). An example in the Dutch energy sector is Eneco. Like other energy suppliers, Eneco feels the need to provide more services, as the margin on the sales of energy is too low in the long run (Interview Eneco, 2015). Eneco thus tries to move beyond supplying energy to its dedicated customer segment and starts offering all kinds added services, including safety, health, light, control etc. Several start-ups were bought to diversify the delivery of services. The vehicle to do so is Toon, the smart thermostat which was first offered as part of the energy contract until the Authority for Financial Markets ruled this to be illegal. This was the fit-stretch boundary they explicitly looked for. By then the customer base was big enough and they could start feeling market pull (Tolkamp, 2016).

THE UNAWARE MARKET CHANGER

As the name suggests, some firms are not aware of the origin of several stresses in their ecosystem and as such do not explicitly use a fit or stretch strategy. These firms tend to change their business model when they hit a ceiling or market uptake is

struggling. Often these type of business models are very context dependent, for example their reason for existing is based on (the expectation of) a law to take effect such as the energy efficiency directive, or the roll-out of the smart meter. This strategy takes shape in trial and error changes to the business model to see whether this solves certain problems, without having a broader picture in mind (Tolkamp, 2016).

THE MATCHER

The matcher attempts to offer value that is expected by the user and other stakeholders in the context, a very clear fit strategy. In this sense, the firm benefits from the momentum in the market. A matcher has no intent to become service orient, but simply tries to follow the wishes of the user and stick close to the expected value (Tolkamp, 2016). On the long run these firms might get out of touch with their users if the transition continuous while the firm operates on business as usual or gets locked in to a product oriented approach. Netherlands Insulates, a very successful firm in the Netherlands can be taken as an example of a matcher. The firm takes a product dominant approach, as this is still the common way to deliver insulation measures. This way they avoid mismatches. What this strategy does however, is deliver service in the form of a process facilitation. The fragmented retrofitting market in the Netherlands and very burdensome process of quotes, decision making, choosing measures, finding finances etc. is delivered as an easy, quick bundled package.

Except for the unaware market changer, all strategies are rather successful at what they do. What this highlights is that being aware of one's position in the paradigm shift, and also, more importantly, the position of strategic stakeholders is essential to success, and that the combination of a pushing harder model with the unaware market changer strategy is a strong hindering factor with respect to growing in market share and customer base. There are different pathways to work towards more service orientation however. In the next section, we focus on how policy could support the successful uptake of the four models and strategies.

Policy support for experimentation

Service orientation in a business model, and a focus on the use phase to allow energy efficiency to be experienced by a user, for example in terms of the comfort it provides, or control, or ease, are clear drivers for successful uptake of an energy efficiency service. Based on the analysis of the 42 cases in Sweden, the Netherlands, Austria, Switzerland, and Norway we can conclude that those service oriented business models that indeed become big are able to become big thanks to a mother company. This mother company, for example a well-established utility, a university, or holding company, provides them with the following elements: access to a well-established client base and relationship, and therefore also valuable customer data, branding, money, to set up adequate user sensing dynamic capabilities and perhaps most importantly patience and thus time. The services are explicitly not yet commercially viable and therefore need time to experiment, stretch, learn, adapt. It can indeed be witnessed that big players in the energy sector such as General Electric, Schneider Electric, but also many utilities are turning (part) of their business towards this service model

approach. GE for example launched Current, a company that blends advanced energy technologies like LED and solar with networked sensors and software to make commercial buildings and industrial facilities more energy efficient and productive is already worth a 1 billion dollar in revenue⁵ These type of business models and players benefit from taxes but don't really need targeted policy support.

In most countries that we analysed however, most firms providing energy efficiency services are very small (often under 10 people). These businesses have a very hard time (because of lack of a mother company and thus money and time to experiment and truly sense needs and options) to become really service oriented, and to stretch the context and are not likely to follow the aware market changer or stealth changer strategy. These companies are forced to follow the smart matcher strategy. As mentioned earlier, many of these smaller businesses are very dependent on context elements such as laws, regulations, and they need to develop dynamic capabilities on how to deal with the constantly changing and inherently complex and uncertain framework conditions, and to overcome internal organisation barriers (Smith and Raven, 2012; Chesbrough, 2010; McGrath, 2010). Most SMEs have hardly any capacity and resources to experiment and develop capabilities necessary to move away from a product and technology push approach. What these smaller businesses need to be able to also move away from the product dominant logic, stretch and challenge the existing system and start becoming more service oriented is room to experiment. The importance of experimenting is also evidenced by the finding that business models that constantly reinvent themselves in response to changing frameworks are more successful (McGrath, 2010; Mullins and Komisar, 2009; Chesbrough 2010; De Reuver, Bouwman, and Haaker, 2013). This experimentation and or responsiveness is however not facilitated sufficiently by existing framework institutions such as public authorities. Public authorities should nurture energy efficiency entrepreneurs more. We have not yet performed a comprehensive analysis of which kinds of policy support would best support the four models and strategies, this is the aim of the next phase of this Task 25. In the next paragraph, we explore briefly what the different kinds of policy support are that are available and what might be potential valuable support for the four models.

The traditional ways public authorities can nurture SMEs is through education, information and awareness creation; regulatory and fiscal frameworks⁶. The push harder/unaware market changer model and strategy's biggest barrier is their own lack of awareness on where they are positioned on the product-service shift, and these types of businesses' capability to sense user needs is underdeveloped and they experience a mismatch with what many potential clients need. For this type of entrepreneurs, information and awareness raising campaigns about the paradigm shift, targeting the entrepreneurs would be valuable (Mont & Lindquist, 2003). These entrepreneurs would also benefit from self-assessment information tools. But

5. <http://www.greentechmedia.com/articles/read/ge-launches-1b-energy-services-company-current>. It is unclear how this 1 billion translates into kWh savings being realised.

6. Also see the toolkit for policymakers developed by the Ellen MacArthur Foundation (2015).

public authorities can of course also use other policy interventions such as business support schemes that focus on building up the necessary entrepreneurial dynamic capabilities such as sensing user needs, conceptualising and orchestrating. The Energy Agencies involved in this project did indeed organise such workshops with entrepreneurs and these workshops received positive feedback from the entrepreneurs stating that they were now much more aware of the business they are in, and their position on the paradigm shift and what that entails for their business model and necessary dynamic capabilities.

The reframing what you push/smart matcher model and strategy is well able to get to the transaction moment, selling their product and service combination. Their awareness about how to create a longer term relationship with their clients, into the use phase, and thus maximise the potential for energy efficiency and savings is less developed. These types of entrepreneurs need resources to be able to experiment with conceptualising, co-creating with clients to find out what value exists in the use phase. Policy support for this type of entrepreneur can take the form of subsidies for SMEs supporting co-creation or other sensing activities, or grants or subsidies to allow for experimentation with the delivery of multiple value and more collaborative and sustainable type of business models. But support can and should also take the form of training in dynamic capabilities such as conceptualising in incubators or in chamber of commerce type of networks. Public private partnerships such as KiCInnoEnergy have an important role to play here as well, not only delivering business modelling training and support, but with a clear focus on delivering service and value in the use phase.⁷

The third model and strategy aimed at pushing something else and being aware market changers might yet be more supported with other policy instruments. What these types of entrepreneurs face is need for well-developed orchestration skills, and experimental space to learn about user needs. These entrepreneurs could be helped with policy support that opens up customer relations and quantitative and qualitative data on customers that can help businesses identify valuable customer segments. Many public authorities have very relevant open data about labels, infrastructure etc. that SMEs can use to perform a first sensing of user needs, for example finding out which homes might be in dire need of insulation. Policy instruments that might be used to support the development of the orchestration skills these entrepreneurs need are for example collaboration platforms focused on linking businesses with consumer organisations, governmental agencies, NGOs and with other businesses. These can be used to help the smaller businesses find suitable partners to create bundled services which then naturally are able to more easily provide multiple (also non-energy) value. Facilitating partnerships across sectors and including public private partnerships with for example NGOs creating trust by endorsing a type of service (brand independent), certification (when it is standardised and provided by trusted institutions) could potentially also be powerful market changers supporting this third type of businesses. Yet another type of support from public authorities that could potentially be helpful to this third type of businesses is the purchasing

power of public authorities. They could be launching customers for SMEs focused on delivering services where energy efficiency is experienced in use. These contracts should then be opened up to serve as demonstration sites for others to learn from and experiment in. Metcalfe and others have stated that in fact, (innovation) policy is about creating conducive context for organizations to engage in experimentation (Metcalfe, 1995; Metcalfe and Miles, 2000). Janssen (2015:120) makes an even stronger statement and states that: "In this respect, one cannot assume this is simply a matter of having the right funding instruments and framework conditions in place; weak innovation capabilities constitute a systemic failure that is detrimental for the processes of novelty creation within markets ... The observation that many firms lack dynamic capabilities and competences to realize new services (Sundbo, 1997), can be regarded as a strong justification for policy intervention." Authors such as Janssen (2015) and Rubalcaba et al. (2010) therefore argue that policy interventions such as the provision of business services aimed at enhancing these entrepreneurial capabilities of sensing user needs, orchestration, conceptualising, scaling and stretching would therefore be appropriate policy responses.

The fourth model and strategy hardly needs support, except potentially support in creating market pull, for example through more focus on multiple benefits of energy efficiency. The role that public authorities could play in creating more focus on the use phase needs much more research. There are several avenues for research. For example, regulation of feedback on energy consumption, improved and more frequent billing and Energy Performance Contracting for the residential sector. Other interesting foci are the internalising of externalities in the electricity or gas price for example, revisiting the system where the price of electricity decreases with increased use, the sharing economy, regulations with respect to healthy indoor climate, both residential and for buildings in general, regulation about reducing sick leave for companies through better work environments (lighting, heating, acoustics, ventilation).

Conclusions

For the specific case of the energy sector, there is little data on the market share of energy services in the total energy market, or energy efficiency market. Some data exists on the growing market share of services such as ESCOs and Energy Performance Contracting, and some data exists on the expected growth in workforce in the energy efficiency services sector (IEA 2016). Data on the market share for services such as lighting-as-a-service, smart energy services such as home automation, heating as a service or bundled or integrating offerings around for example retrofitting is rather difficult to find and to establish given that most databases do not collect specific data on these types of services. In addition, collecting data becomes even more difficult when energy efficiency is not the first selling point but a secondary outcome of other value being proposed. Based on our analysis however we can conclude that business model where the service offered uses goods to deliver a specific function, like warmth, lighting or mobility, are particularly relevant for greening the energy sector. But the many entrepreneurs out there both trying to develop energy efficient products and services in a more service oriented manner however face many difficulties, especially when they are SMEs, which most of them are.

7. <http://ise.innoenergy.com/>

They need time, space and support to learn about and experimenting with the development of the business model types, context stretching and entrepreneurial dynamic capabilities such as sensing and orchestrating. And we state that facilitating this learning is also the responsibility of national frameworks (regulations and (innovation) policies). To conclude, the energy efficiency market still is mostly being defined in terms of technologies and/or products. The supportive system (i.e. policies) also focuses almost solely on products and on making the purchasing decision of these products easier. For many energy efficient products such as appliances, LED, such an approach is probably sufficient to support their uptake. However, the use phase is not in focus and this creates missed opportunities for further increasing savings and spill-over effects where households start thinking about other products and services, up to retrofitting. We argue that both the product dominant and the service dominant logic are complementary and necessary to harness the full potential of energy efficiency and savings. The lack of support from public authorities in creating a more service and user focused system not only influence the way business models are being created, but also the way they are being studied (as for example, technical or contractual constructions) and being reviewed by, for example, policy makers. We think this is an exponent of what is called 'the tech-push' perspective.

Our research is not comprehensive but did allow for the identification of interesting business models and strategies for energy efficiency focused services. We are just starting to understand what the business models delivering energy efficiency need to do to be successful, and need from policy makers in terms of support, and much more research is needed. More research is needed on how the more service and user centred type of business models and entrepreneurial dynamic capabilities can be supported to increase the uptake of energy efficiency. Also, more research is needed on how these different models and strategies relate to specific sectors. ICT and automation are very different sectors compared to retrofitting or insulation, and different segments such as households, SMEs and commercial buildings might also benefit from different business models and strategies. The IEA DSM Task 25 on which this paper is based is just a first explorative step.

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Acknowledgements

We would like to thank our Task 25 national experts for their support in the analysis and data gathering. Finally we would like to express our gratitude to the two peer reviewers for their valuable comments.