DESIGN DRIVEN INNOVATION – MINIMUM VIABLE PRODUCTS FOR LOCAL ENTREPRENEURSHIP IN NEPAL

Keitsch, Martina Maria
Norwegian University of Science and Technology, Norway

Abstract

Well-designed products and services link to the ability of designers of interpreting needs, but they often struggle getting valuable contributions from users when developing innovative products and services. Minimum Viable Products (MVPs) address this problem through a practice of connected leaning and development. MVPs are useful to test the utility of a product before making efforts to improve its usability and desirability.

In this article, the value of the MVPs for a product development process is appraised within a case study on a local entrepreneurship project in Jharkot, Lower Mustang, Nepal.

The case study shows that MVPs are not only interesting for mass-production or high-end design, but comprise a valuable tool for Micro- Small and Medium Enterprises (MSME) and frugal Innovation too. Among others, MVPs emphasize the importance of testing different prototypes, which is an interesting onset for future research on collaborative knowledge generation and co-operative decision-making between stakeholders.

Keywords: Design methods, Minimum Viable Products, Prototypes, Local entrepreneurship, Stakeholder collaboration

Contact:
Prof. Martina Maria Keitsch
Norwegian University of Science and Technology
Product Design
Norway
martina.keitsch@ntnu.no

1 INTRODUCTION

Well-designed products and services, and satisfaction of users both link to the ability of designers of interpreting (and sometimes anticipating) needs and desires. How far users themselves can contribute to the initial phase of a new technology is however, heftily debated in design research, and some authors criticize the importance of user experience for developing a new solution altogether (Verganti, 2011, Norman 1998). The onset for this debate is the fact that even if the product may be well developed though iterations of user/customer research, prototyping, and usability testing etc. at launch, the risk remains that customers will not find it valuable enough buying and using it.

Realizing that the biggest risk for a start-up lies in uncertainties about the product/market fit, Ries introduces Lean Start-up as an approach that seeks to reduce this risk (Ries 2008). Ries defines a start-up as "a human institution designed to create new products and services under conditions of extreme uncertainty" (Ries 2011, 17). Conditions are uncertain because who the customer is and what the customer might find valuable is yet (heuristically) unknown. Thus, Lean Start-up proposes learning as the essential unit of progress for start-ups. Any effort that does not contribute to learning about what provides value for customers is here considered as wasteful.

The Lean Start-up approach builds upon Blank's concept of Customer Development, where a start-up continuously is searching for a venture/business model that works instead of executing on a business plan (Blank, 2013). Customer Development originates from the realization that the greatest risk for a start-up lies "not in the development of the new product but in the development of customers and markets" (Blank, 2007, 5). Ries developed the methodology further and the Lean Start-up approach has grown popular lately. A part of the Lean Start-up comprise the technique of Minimum Viable Products (MVPs), which employs iterations to accelerate learning about the product/market-fit. MVPs match well with the design methodology, since both develop solutions iteratively in close contact with users and customers. However, for MVPs customer response is the *driving force* of iteration cycles instead of being just a part of them. This implies that launch to customers has to be included in iteration cycles. Concerning Micro- Small and Medium Enterprises (MSME) and business models in emerging markets, MVPs seem to be comparatively easy to comprehend and apply for local entrepreneurs.

Further, the MVP tool can be effectively connected with frugal innovation ideas (Bound and Thornton, 2012). Frugal innovation aims at reducing the design complexity and the cost of products and services but also at finding new ways for distribution and marketing in developing and least developed countries.

Some relevant frugal innovation principles for Nepal are:

- Scarcity as a driver for innovation
- Do more with less.
- Think and act flexibly.
- Seek opportunity in adversity (Dugan 2012).

Frugal innovations targets at good-enough, affordable products and services that meet the needs of resource-constrained consumers. This article discusses the appliance of the minimum viable product technique for a local entrepreneurship project in Jharkot, Lower Mustang, Nepal. At present, there are 48 countries designated as "world`s least developed countries" of which Nepal is one. However, accompanied by the last years' stabilization of the political circumstances in the country, SME business is now thriving in the country. Following this introduction, the second section of this article introduces key concepts and examines how MVPs influence the product development and design process. Section three presents the MVP approach in the case study and summarizes benefits and risks of applying the MPV. The case study indicates that MVPs comprise a valuable tool for Micro- Small and Medium Enterprises (MSME) in a developing country context but the technique implies some challenges, mainly relating to failure of the prototypes as scarce resources and necessary workforce is spent. The fourth section of the article discusses general advantages and pitfalls of the MVPs for local entrepreneurship in developing and least developed countries related to frugal innovation.

2   MVPS IN THE DESIGN PROCESS

2.1 The Design Process

The standard design process can be drawn as a double-diamond model of divergence and convergence stages (Design council 2013) as illustrated in Figure 1 (Hunter 2014). These stages can be related to the iterative design steps of observation, ideation, prototyping, and testing as well (Norman, 2013).
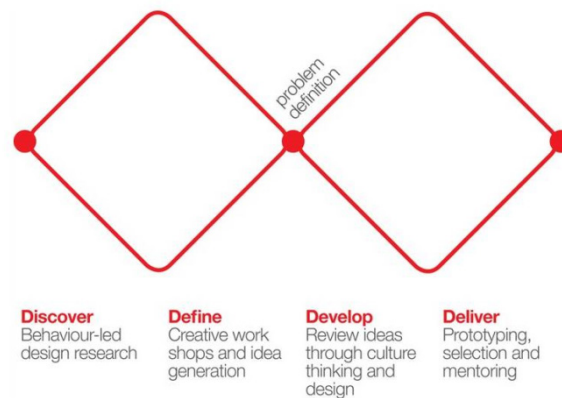

Figure 1. Double-Diamond, Diverge-Converge Model (Hunter 2014)

In the Discover stage (divergent) perspectives are kept wide in order to gain understanding and insights on user needs, opportunities and the context of the project. It states that a problem or opportunity exists and that a product or service development or iteration is necessary. In the Define stage (convergent) ideas are translated into problems to be solved and solutions are initiated and prototyped. Further, the design team has to comprehend the context of the problem in terms of cultural, economic and social issues, as well as to gain understanding of what is feasible within the capabilities of the organization providing a solution.

The goal of this stage is to "refine the scope of the project, and to home in on which solutions can have impact, which product or service pushes the business and design in the right direction" (Design Council 2013). The stage concludes with a design brief – a clear definition of the problem and a plan for how to address it. In the Develop stage (divergent) different prototypes are iteratively refined and improved, which mitigates the risk of implementing a product with severe technical, utility or user experience errors. The conclusion of this stage is the specification for the product. The Deliver stage is characterized by a final implementation of the solution and testing before launch. Many companies have routines for evaluating the success of the launched product or service, with the common aim to gain internal learning for future projects as well as to help gain buy in for other design projects (Design Council, 2013).

One disadvantage of the double-diamond model is that the design process is seen as seemingly linear which results in that no active strategy to iterate the solution once it is launched is proposed. If findings of the Discover and Define stage result in a product brief and iterations circulate around how well the solutions respond to this brief, the value of these iterations depends on how well the brief actually addresses market needs in the first place. Combined with the fact that designers struggle getting valuable contributions from consumers, when developing new solutions, one can argue that, related to the degree of innovation, a single run of the double diamond process may risk considerable failure at launch of new products and services, as illustrated in Figure 2.
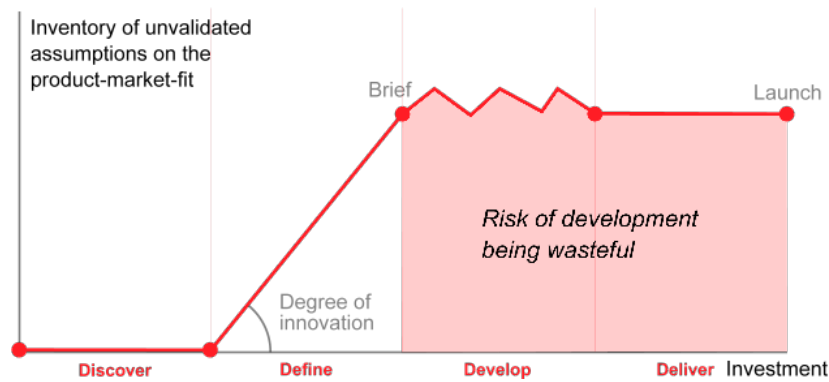
Figure 2. Analysis of accumulated Risk (Roed 2013)

In the Define stage assumptions increase related to the degree of innovation or alteration of the product, the value of the investments spent in the Develop and Deliver stage is based upon how well the assumptions in the brief *de facto* address customer/market needs.

If the degree of innovation and the uncertainty in the Define stage is high, iterations in the Develop stage become relatively irrelevant since the product might fail anyway. MVPs applied in product design development might mitigate the risk of not answering to market needs at product launch.

2.2 Minimum Viable Products

Ries (2008) introduces the process of iterating with help of the Minimum Viable Products (MVPs) technique as part of the Lean Startup concept. An MVP is defined as "…version of a new product which allows a team to collect the maximum amount of validated learning about customers with the least effort" (Ries, 2009). Validated learning is explained as "…the process of demonstrating empirically that a team has discovered valuable truths about a startup's present and future business prospects" (Ries, 2011, 46). The MVP process is concerned with learning about what provides value for which customers, and how product features correspond with these values (Laugero, 2012).

An MVP is a product made with the minimum set of features with the goal to start learning about the product – market fit. It is meant as a tool to test and reduce uncertainty about whether the envisioned product will have customers or not. An MVP in itself does not necessarily imply a market launch, but the process aims at early market launch since many uncertainties lie in the hypotheses about how the product will be accepted after launch. MVPs are designed to accomplish the feedback loop of the Learn–Build–Measure–(Learn) cycle as quickly as possible (Figure 3). This iterativity resonates well with the design process however MVPs expand it by including a launch to customers in the iterations.
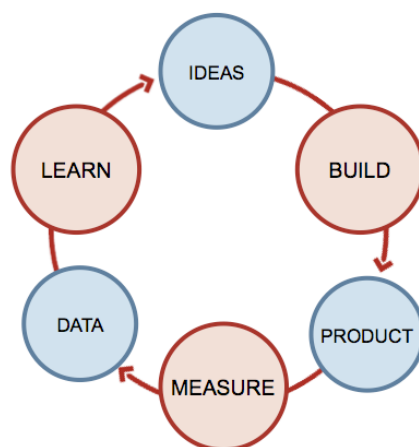

Figure 3. MVP Cycle, Ries 2008

Learn: This process starts with assumptions on how to create a sustainable venture model for a product. Explorative research and consumer contact is crucial here. Early contact with customers does not seek definitive answers, but indicates what assumptions require the most urgent testing: "The first step in this process is to confirm that your leap of faith assumptions are based on reality, that the customer has a significant problem worth solving" (Ries, 2011, chapter 5, section 7). Hypotheses are established comprising for example who the customers/users will be, what they will find valuable, and how they will define quality. Further, hypotheses can address organizational, social and legal aspects. Iterating on this process can help building a feedback loop for the development team. The hypotheses are then prioritized by their amount of validated learning possibilities about the product/market fit. For a start-up, the riskiest elements are the parts on which everything depends: leap of faith assumptions (i.e. weakly justified hypotheses) which are in the core of the venture model are to be tested first (Ries, 2011).The learning process provides ideas on how to design MVP prototypes.

Build: The MVPs are meant to prove or disprove hypotheses with the least amount of development effort. An MVP prototype is not necessarily a materialization of what a designer or a team believes to be the optimal product features and functions feasible at the time, or a product stripped of as many features as possible. It is rather a sample on a utility basis, which functions as medium for communication on how to reduce uncertainties. In this phase, the product is still incomplete, hypotheses are not validated, and the venture plan is not tested.

Level one prototyping aims at the short-term design of the utility of the functional object that is launched in a pilot study. Utility is the core of any user experience, and replies to questions such as: What should the product do? What is the product's reason of existence? Does the product do what users need? Level one prototyping addresses early adopters and/or competent end-users and does not need to meet every possible user demand.

The other level of prototyping is for imagining and testing a long term vision and improving venture, launch and promotion. The visionary prototypes – which may correspond to what Verganti (2009) calls 'cultural prototypes', do not necessarily address early adopters. Rather the contribute to create radically new meanings, and the end-product often implies a deep change in socio-cultural practices such as the Wii game console, the Swatch watch, the 3Doodler, etc.

The cultural prototypes can also be used for visualization in workshops and stakeholder meetings and they have the character of boundary objects (Keitsch et al. 2013) rather than being utility-testable products. Objects in the widest sense are a common topic of interest for different stakeholders. The boundary object (BO) concept emphasizes that exploring objects in a group may facilitate communication. These level two prototypes are highly relevant for launching innovation for local products in rural areas in Nepal. As a comparatively easy tool, they work well as mediators between different interest and expectations. Local stakeholders in the villages experience knowledge differences between 'them' and the 'experts from Katmandu' as significant (and vice versa) and prototypes ease the situation and facilitate the communication and development process on a hands-on level, where all stakeholders can contribute with their expertise. These prototypes represent reflective practice on different levels (Bound and Thornton, 2012).

Measure: Hypotheses are tested by applying quantitative and qualitative methods such as empirical data collection or interviews (Ries, 2011, Løvlie et al., 2013). The hypotheses have to be formulated that results can give clear guidance for the next steps. The results should also reply to whether the hypotheses are relevant for the venture plan or not.

Continuous learning: The process of iterating on MVPs provides the basis for continuous learning about a product. The first hurdle is to get MVPs to the users. MVPs can target e.g. early adopters, i.e."… customers who feel the need for the product most acutely" (Ries, 2011, chapter 4, section 5) or competent users, who have a specific know-how related to the product. These user groups are typically more willing to spend time exploring a prototype, provide feedback and supplement with visions and requirements, and they are equally valuable for behavior studies and testing (Ries, 2011). Hence one strategy is to launch MVPs as pilot studies. It may take a considerable amount of effort to stage pilot

studies; however, this activity in itself can contribute to valuable learning. Further, once a contact with these groups is established, the threshold for further participation is lower, which may lead to more time for gathering insights and less time to spend on project management and organization. Pilot studies may also lead to lasting connections with users over time. Overall, the MVPs imply a proactive relation to users by iterating on prototypes. Even if the first goal of MVPs is to validate hypotheses for a venture plan, its proactive user involvement approach might have effects for other domains of user research. Kolko and Tran (2013) mention e.g. increased empathy and the ability to continue insights beyond an initial research phase as advantages of ongoing partnering with stakeholders in the design process. These assumptions have to be tested in a pilot project. The following section exemplifies how the MVP approach is applied in a rural area in Nepal.

3 MVPS FOR LOCAL ENTRERPENEURSHIP

3.1 The case study and the MVP process

Nepal is a Himalayan country bordering India and China, with enormous cultural and natural diversity. The country has an area of 147,181 square kilometers, and 83% of total area is covered by Mountains providing increased opportunities for tourism. Almost all tourism activities take place in rural areas except cultural tourism in Kathmandu valley. However, tourism income is not shared by all communities and local entrepreneurship is increasingly seen as an alternative way to generate income (e.g.: One village one product project, Ghimire, 2013).

Nepal has more than 101 ethnic groups, and 92 spoken languages and a rich variety of cultures, lifestyles, values and traditions. The Mustang District is a part of Dhaulagiri Zone, and has a population of ca 15 000. Jharkot is a village In Lower Mustang area at 3550 m close to the Himalayan peaks of Nilgiri, Tukuche and Dhaulagiri and Annapurna. It is part of the Annapurna Conservation Area. Jharkot has 65 households. The community has an active the women's group (Ama Samuha), which has recently developed a multi-purpose cooperative limited. The members are women from each household. In case there are no women in the family, a male member can join on consensus. One of the Ama Samuha activities is producing Thora (Sea buckthorn) Juice, which has become an important local business. They produce a 10 000-20 000 0,5l bottles a year. Production costs for each bottle are app. NRS 80 and it is sold for NRS 300 (3 USD) per bottle. The juice is locally distributed to close by villages Marpha Muktintah, Jhong and Kagbeni and the district town Jomson. A new production building and facility was established in 2011 through local community investment plus government support.

Figure 4. Sea buckthorn plant and Jharkot Prodcution facility (Photo: Keitsch 2014)

The author and her research team met the Ama Samuha group twice in October 2014. This was in relation to a project at the Norwegian University of Science and Technology, Department of Product Design on co-designing stakeholder-driven, sustainable solutions in rural areas in Nepal. The first phase of the project explores stakeholders' needs, competences and energy consumption practices in different villages in the Lower Mustang region.
After interviewing the Ama Samuha members, a brainstorming and idea generation phase was initiated in the first meeting, which resulted in the members' proposition to produce Thora cosmetics, as side-

line to the juice, starting with a cream. A cosmetic line is seen as advantageous by the members since it is less labour intensive (plucking berries) and gives more profit. As distribution plan was mentioned to produce the cream with the next Thora *overproduction* from the harvest in summer 2015. The decision to use the overproduction only was made with regards to possible loss of resources reducing the expected quantity of Thora juice.

After testing cream samples from other Thora cosmetics, the research team and the Ama Samuha jointly developed two prototypes 1 in the second meeting with Thora extract, glycerine, oil and bee wax. One hand cream, which is against cracks, and rough hands and feet and one lighter facial cream have been developed.

Until March 2015 the Ama Samuha and their families had tested and assessed the creams. When discussing with the Ama Samuha members in March 2015, it turned out that both samples from Prototype 1 provide good protection, but the consistence is too soft. Another downside is that expensive jars have to be bought and transported to the 3500 metre high village. The group suggested that the new prototype will be a bar that can be wrapped in paper. In May, the group and the research team will refine both samples for the preparation of prototype 2 samples. To user groups are identified - local people and tourists (see below). Both prototypes 2 will be distributed to tourists asking for their feedback.

The Ama Samuha members will also come up with suggestions for the following MVP phases until then. How much bars do we want to produce, do we keep the sale locally, who should sell it? Further - How to use the good reputation of the juice to promote the cream? Further, the Ama Samuha will think about how to integrate the sale into the existing practice of the village that the Thora cream income should comprise benefits for the whole community besides private profits. Perhaps a social entrepreneurship model (Keitsch et. al 2013), can be developed.

In the second building phase, in May 2015, a pilot project for prototype 2 is launched. We produce sample bars for two main customer groups: Locals, who want a cheap and effective product, protecting against cracks on hands and feet rather than an expensive elaborated one (Eyring et.al 2011), and tourists who would buy a 'healthy', 'natural' (and more expensive) product. A promotion campaign has to be developed that highlight the comparatively small price for protecting and additional health benefits of the cream for locals, however and might work for both groups, this will bested with prototypes 2, in autumn 2015. Additionally, it is important to mention that local knowledge on how to pick the berries has be enhanced and that the Ama Samuha has bought better equipment (gloves) which enables them to pick berries more economically.

In the ongoing measuring and continuous learning phase, the Ama Samuha members and her families give feedback to the research team on the product and it is commonly discussed on how to improve the prototypes. Methods to assess the hypotheses are usability testing, interviews, observations and co-design.

The continued learning phase comprises iterations of prototype 1, based on new findings/hypotheses and further developed with help of users' feedback. It will culminate in a new prototype 2 launch that could be handed over to other users as well (other villagers and tourists) for a period of some weeks. A level two 'cultural' prototype (Verganti 2009) will highlight additional product attributes that refer to aesthetic features and/or cultural and social practices and may stimulate a broader spectrum of users to provide feedback. The prototype 2 will also contribute to revise venture- and launch hypotheses.

3.2 Possible risks and benefits

The MVP in this case is first and foremost seen as a technique to motivate innovation but avoid costly failures. The inhabitants of the village are poor and it is essential that a possible failure of the cream/bar affects the rural economy as little as possible. Further the women of the Ama Samuha have many daily chores and thus are often deprived of time for business activities. If the MVP approach fails it might hinder further activities and contribute to lessen the authority of the group in the village. Therefore it is important to be sensitive towards rules and cultural conditions and consider them in the planning, design and launch of the new product.

Finally, even if the MVPs the Develop and Deliver stage in the design process should be as short as possible since this may lead to less iteration in the Develop stage, this is not possible in a rather conservative and traditional environment. The development takes months and negotiations with many stakeholders are necessary to get approval to start an innovation at all.

On the benefit side MPV motivates the development of new innovation through a comparatively easy adoptable process. In Nepal innovative ideas and products are increasingly flourishing through disruptive innovation (Christensen 1997). The Jharkot cream is a typical example of "good-enough" products that meet basic needs at a low cost and thus provide high value. Products like these are at the center of low-end disruptive innovation. What is even more relevant is that successful frugal innovation is connected to a mindset of participation and co-design. Since the living conditions, culture, value system of these markets are very different from those in developed countries, success also depends largely on the ability of the R&D team to understand and translate local needs (Bansal 2014).

4   DISCUSSION

This article has studied implications of applying the Lean Startup technique of Minimum Viable Products in the conjectural design process for a local product and entrepreneurship in rural Nepal. MVPs are useful to simplify ideas by displaying their core components, build and test those, and then iterate on the learning process. Minimum Viable Products divide development into smaller parts to validate the core implications before making development efforts on uncertain elements. This demands several loops early in the design process, but it may lead to less iteration in the late stages. In shortening the fail and retry phases of product and service launch, MVPs are an interesting technique for future research and development. However, in our case MPVs were not mainly used to shorten the development process for product launch, but as a method to communicate and co-design prototypes. Developing local entrepreneurship in rural Nepal, a short-time frame is not necessarily criterion for success. If the product line succeeds over a period of two years and production is maintained the endeavor, it would be perceived as viable by producers and consumers. So far, the search for financing additional production facilities has been neglected, and this is definitely an issue the research team and the Ama Samuha have to consider. For example, when introduced to the concept, local authorities suggested to contact the Regional Centre For Entrepreneurship in Mustang which is providing information, and the Alternative Energy Promotion Center Alternative Energy for possibilities for technical and financial support from the 'Productive Energy Use Component'.

MPV literature has a significant shortcoming by thematizing traditional product innovation and MVPs use for business purposes only. Consideration of the system dynamics (e.g. changes of social and cultural practices) are lacking too. However, product development is not necessarily connected merely with a product's commercial success or failure but as well with its social acceptance, its availability, accessibility, affordability and accountability, for both the producer and the user. Another shortcoming in the MVP discussions is that they are very lead-user oriented, and will thus not necessarily meet the demands of less-resourceful community members (the 'anti-users', Cooper, 1998). Applying MVPs in design practice, both shortcomings can be met by combining MPVs with stakeholder inclusion, reflective practice (Schön 1983) and co-design methodologies (Sanders 2006).

In its current state and for promoting local entrepreneurship in in rural Nepal, MVPs seem a reasonable tool to initiate pilot projects and commence valuable producer-user contacts. One could also consider MVPs as appropriate technique for settings where alternatives are unavailable and new markets appear (Eyring et al 2011). MVPs are then relevant, not only for designing products and services but likewise for developing new venture and promotion models. However, more studies are needed to evaluate if MVPs should be methodologically integrated in e.g. Design for Development, which has the aim to provide long-term, socially and environmentally appropriate and practical solutions to the expressed needs of local communities.

REFERENCES

Bansal, S. Innovation within reach (2014). The New York Times. Aug. 21, 2014; Accessed 30 March 2015.http://opinionator.blogs.nytimes.com/2014/08/21/innovation-within-reach/

Blank, S. G. (2013). Why the Lean Start-Up Changes Everything. Harvard Business Review, May 2013. Accessed 20 August 2014. http://hbr.org/2013/05/why-the-lean-start-up-changes-everything/ar/1 ,

Blank, S. G., (2007). The Four Steps to the Epiphany: Successful Strategies for Products that Win. 3rd ed. Café Press.

Bound and Thornton, (2012), Our Frugal Future: Lessons from India's Innovation system. Accessed 7 December 2014, http://www.nesta.org.uk/sites/default/files/our_frugal_future.pdf

Christensen , C. M. (1997), The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail. Boston, MA : Harvard

Business School Press .Cooper, Alan (1998). The Inmates Are Running the Asylum: Why High-Tech Products Drive Us Crazy and How to Restore the Sanity. , Accessed 20 August 2014 http://itu.dk/people/russel/B%F8ger/Pearson.-.The.Inmates.Are.Running.the.Asylum.pdf.

Design Council, (2013). The design process, , Accessed 20 August 2014 http://www.designcouncil.org.uk/news-opinion/introducing-design-methods.

Dugan, M., Frugal Innovation (2012), Accessed 20 November 2014 http://knowinnovation.com/frugal-innovation/

Eyring, M., J., Johnson, M.W., Nair. H. (2011), New Business Models in Emerging Markets, Harvard Business Review, January-February 2011, pages 89-9

Ghimire, B (2013), One Village, One Product, UNDP-NP Development Advocate Nepal, Accessed 20 November 2014. http://www.np.undp.org/content/nepal/en/home/library/development-advocate-nepal/

Hunter, M. (2014), What is Design and why it matters, Creative industries, Accessed 20 November 2014 http://www.thecreativeindustries.co.uk/uk-creative-overview/news-and-views/view-what-is-design-and-why-it-matters.

Keitsch M., Warell, A. (2013), Boundary Objects as Mediators between Design Areas, The 2nd International Conference for Design Education Researchers, 14-17 May 2013, Oslo, Norway.

Keitsch, M., Spencer, E., Sigurjonsson, J., Nielson B.F. (2013), Sustainable Design and Social Entrepreneurship-A Common Path Toward Social Innovation? Journal of US-China Public Administration, ISSN 1548-6591, June 2013, Vol. 10, No. 6, 618-629

Kolko, J. & Tran, C.,(2013). Hour School: Engaging Stakeholders in Service Design. Commentary on chapter 3: Løvlie, L., Polaine, A. & Reason, B., 2013. Service Design: From Insight to Implementation. Rosenfeld Media, New York

Laugero, G., (2012). Making Sense of Minimum Viable Products , Accessed 20 August 2014 http://johnnyholland.org/2012/02/making-sense-of-minimum-viable-products/

Løvlie, L., Polaine, A. & Reason, B. (2013). Service Design: From Insight to Implementation. Rosenfeld Media, New York

Norman, D. A., (1998). The life cycle of a technology: Why it is so difficult for large companies to innovate. Accessed 18 August 2014, http://www.nngroup.com/articles-life-cycle-of-a-technology/ .

Norman, D. A., (2013). Rethinking Design Thinking. Accessed 20 August 2014, http://www.core77.com/blog/columns/rethinking_design_thinking_24579.asp .

Ries, E., (2008). The lean startup. Startup Lessons Learned. Accessed 18 August 2014 http://www.startuplessonslearned.com/2008/09/lean-startup.html

Ries, E., (2009). Minimum Viable Product: a guide. Startup Lessons Learned. Accessed 20 August 2014http://www.startuplessonslearned.com/2009/08/minimum-viable-product-guide.html

Ries, E., (2011). The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses. E-book, Crown Business, New York, Accessed 20 August http://www.stpia.ir/files/The%20Lean%20Startup%20.pdf

Roed, B. J., (2013). Design-driven innovation through Minimum Viable Products – Validation of utility before designing for usability and desirability. Design Theory – Article Collection, IPD, NTNU, Accessed 20 August 2014 http://www.ntnu.no/design/forskning/artikkel

Sanders, L., (2005). Co-creation and the new landscapes of design – MakeTools, Accessed 6 December 2014. http://www.maketools.com/articles-papers/CoCreation_Sanders_Stappers_08_preprint.pdf

Schön, D. (1983) The Reflective Practitioner, How professionals think in action, Basic Books

Verganti, R., (2009). Design Driven Innovation: Changing the Rules of Competition by Radically Innovating What Things Mean. Harvard Business School Publishing, Boston, Massachusetts

Verganti, R. (2011). Radical Design and Technology Epiphanies: A New Focus for Research on Design Management, Journal of Product Innovation Management, Volume 28, Issue 3, p. 384–388.

ACKNOWLEDGEMENT