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## Influence of context variation on quality of solutions: experiences with gasifier stoves

W.C. Kersten<sup>a\*</sup>, J.C. Diehl<sup>a</sup>, M.R.M. Crul<sup>a</sup>

*a Delft University of Technology, Faculty of Industrial Design Engineering, department Design Engineering, Landbergstraat 15, 2628 CE, Delft, The Netherlands*

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### Abstract

Many global sustainable development issues affect large numbers of people, e.g. clean cooking. Most current projects focus on a specific use context, therefore do not scale well to new contexts and consequently do not reach enough beneficiaries. We present an approach, Context Variation by Design (CVD), in which insights from different contexts are intentionally combined early on in the process to develop solution directions. This creates a richer solution space than when contextual variations are developed sequentially. The rich solution space is then the basis for these contextual variations which might include connections and synergy between them. We discuss several real-life project examples that demonstrate that this approach indeed creates a basis for better solutions. In particular, confronting insights from different contexts at an early stage reveals new solution directions. To fully capture the potential the approach needs to be applied throughout the design process.

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### 1. Introduction

As introduction to this paper we briefly discuss how global innovation flows have developed over the past century, and how these represent an increasing level of complexity. Not all strategies for global innovation have acknowledged that aspect. We will then continue by discussing complexity and how to use it for our benefit.

#### 1.1 Global innovation flows

The history of innovation that crosses geographical boundaries goes back for millennia. For now we will limit

ourselves to the past century. In a somewhat simplified fashion we can roughly distinguish the following stages, derived from Govindarajan [1]:

1. Western countries dominate inventions and application in new products. According to Vernon [2], once labour costs become a differentiating factor companies decide to move production to low-cost countries, but still have Western markets as their main beneficiary. MNCs (Multi National Companies) are the dominant players in this phase.
2. With end-users in other markets becoming more affluent and accessible, they get served by means of roughly the same products, lightly adapted to (assumed) local preferences on mostly superficial level (colours, visuals, names), although even there many failures have occurred [3].
3. Upon such failures and with the rising self-awareness of less affluent countries, they began developing products for their own markets based on local knowledge, much of it very context-specific.
4. With the further evolution of so-called emerging markets, the EMFs (Emerging Market Firms) move into the front seat, scaling up production and sales of the local inventions. While at the same time the “Base of the Pyramid” paradigm [4] emerges, Western MNCs however more often than not have difficulty in developing appropriate products for these markets because of lack of contextual understanding [5].
5. Reverse innovation: inventions and applied products and modes of thinking that initially were intended to serve marginalized beneficiaries in emerging economies (Base of the Pyramid segments), turn out to be relevant for Western economies as well. [6, 7]

For all stages one could claim that innovators had a global outlook and were dealing with complex situations. In fact this was not the case and this has serious consequences. To understand this better we have to briefly elaborate on the concept of complexity and its relevance for global innovation, in particular with respect to large scale issues related to basic human needs.

### 1.2 The increasing role of complexity

To be able to assess how well certain strategies address the complexity of society, it is necessary to first have an understanding of what complexity entails. A complex system consists of a diverse multitude of parts, many of which are interrelated and we cannot oversee let alone control and manage neither their interrelations nor the consequences thereof. This makes the system’s behaviour as a whole unpredictable [8]. What we *can* say is two things: the answer to dealing with complexity does not lie in applying a narrow focus, zooming in, clinging onto one strategy, i.e., trying to manage away the complexity [9]. Rather, the uncertainty that is engrained in complex systems [10] should be accepted, and should be turned into a benefit by using a mind-set of “fighting complexity with complexity” [11]. Of course this to many people sounds daunting and therefore requires further guidance.

Before we address that concern, it is also relevant to highlight an immediate consequence of complexity in the realm of large scale social issues. The currently preferred strategy to develop, implement and then scale a solution (usually involving a physical product), is to focus on one context, design and test it there, optimise the value chain including production, and only once it becomes a success start with scaling. The most encountered problem then is the mismatch with requirements in a next context, necessitating (partial) redesign of the solution and often the production system. At the same time, especially for the beneficiaries in the Base of the Pyramid segments, one of their main concerns is affordability, and scaling up production is one of the main strategies that a company has to increase affordability. However, if a new solution needs to be developed for each context, it will be hugely challenging to reach the volumes that enable economies of scale.

By applying the principle of “fighting complexity with complexity”, another type of strategy emerges. It basically refers to the same process but in a more discursive way; in this case, start at the end: 1. You know that to substantially contribute to reducing a large scale issue, you will need to achieve scale, 2. That scale, i.e., the range of target groups, is dispersed over many contexts, 3. Their needs have to be addressed in a way that also enables an efficient design of the production system, thereby facilitating economies of scale effects, 4. It then helps to have insights in what the requirements in these contexts will be. In other words: by recognising, accepting and then working *with* complexity you can develop new strategies that enable you to work with it instead of pushing it away for now. This realisation is the starting point for the remainder of this paper.

### 1.3 Structure of the paper

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