

# Product Service Systems and the Base of the Pyramid: A Telecommunications Perspective

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## Abstract

The paper draws on an emerging discussion about how mobile telecommunication may positively impact development in emerging economies from a Base-of-the-Pyramid (BoP) perspective. Secondly, Product Service Systems (PSS) literature suggests this industry can contribute to reduced environmental impacts focusing on user value and stakeholder involvement. PSS and BoP literature is reviewed in the context of the “missed calls” phenomenon in developing countries. These are often intentional and used for free communication using pre-negotiated codes, providing a burden for telecom providers in terms of lost income and diminished infrastructure capacity. Based upon research at a main telecom provider, the review is input for a discussion on the most important requirements for developing alternative triple bottom line service solutions which will benefit all stakeholders involved.

## Keywords

Product Service Systems, Base-of-the-Pyramid, telecom industry, missed calls, service design

## 1 INTRODUCTION

Product service systems (PSSs) have received increasing attention as a study object from scholars as a result of a call for more systemic views on sustainable product design, for higher factor improvements, and for more attention to the use stage in product life cycles. It calls for an understanding on the co-evolution of industrial production and social patterns, arriving at partnerships between companies and other stakeholders, including final users. Development of Product Service Systems is commonly considered to belong to the design domain [1]. Key aspects of Product Service System development include full life cycle considerations, mapping relevant actors, and understanding social structures and behaviours.

The focus of PSS development as described in literature has been on original equipment manufacturers moving away from the development of physical products only, to the development of a system of products and services which are jointly capable of fulfilling specific client demands, while re-orienting current unsustainable trends in production and consumption practices [2] with both environmental benefits (for example dematerialization) and economical benefits (the recognition that services in combination with products could provide higher profits than products alone). Some scholars associate PSS with social benefits and impacts as well. For example the replacement of a product by a service can have implications in terms of employment for company personnel at many lifecycle stages [3].

The concept of PSS has gained in usage, especially in Europe, and exemplifies the ‘service economy’. However, its application to non-western regions, such as the Asia Pacific region, and especially developing countries, is a relatively unexplored area [4]. According to Ness [4], PSS has the potential not just for greening of business but also for achieving economic development, improving the lives of the poor. Social benefits in such context could for example include the manufacturing, maintenance and repair of products within local communities, generating employment for poor women.

In search of design paradigms that advocate triple bottom line product development within the context of emerging economies, the Base-of-the-Pyramid concept has received substantially more attention than PSS. So-called BOP propositions suggest the development of products and services attractive to customers in emerging economies, engaging in sustainable business ventures, generating income for both western multinational corporations and customers and partners in emerging markets. Like in the PSS paradigm, also here an important role is attributed to the role of design. Also here, understanding consumer behaviour (in particular in the context of local cultures) is an important aspect, and social benefits are focused on much more than in PSS development.

The telecom sector is one of the traditionally western market industries that has recently discovered the potential of BOP markets, and are quite successful serving them. This sector provides, in addition to PSS and BOP, a third, less scholarly, starting point for this paper: the so-called “missed calls” phenomenon that telecom providers experience in developing countries. These are calls that are terminated by the caller before the receiving party answers), and constitute a familiar phenomenon in emerging mobile markets across Africa and Asia [5], providing a burden for telecom providers in terms of lost income and diminished infrastructure capacity.

### *Goal of the paper*

This paper aims to review the utility of BOP protocols in the context of the telecommunications industry wishing to contribute to sustainable service development for emerging economies in a commercially attractive way, and to bring together PSS and BOP methodology in a joint application arena. Section 2 will provide background knowledge on BOP, and section 3 will discuss the telecom industry’s increasing interest in emerging markets, as well as the challenges that exist in doing so. Section 4 will zoom in on the ‘missed calls’ phenomenon, and discuss challenges and opportunities from a design perspective. Section 5 concludes with a discussion and directions for further research.

## 2 THE BASE OF THE PYRAMID

In 2005, well-known scholar CK Prahalad, alongside Stuart Hart, launched his ideas on what has become known as the “Base of the Pyramid” principles. In his book “The fortune at the bottom of the pyramid: Eradicating poverty through profit”, he explains how treating the poor as consumers instead of victims, can eliminate poverty [6].

Prahalad, a well-known academic, management consultant and author of several best selling books, has been working on how to eradicate poverty for several years. He disagrees with earlier stands on how to eradicate poverty, such as a large increase, “a Big Push”, in Western foreign aid that would help ensure the successful economic development of the poorest countries, as advocated by Sachs [7]. Sachs’ reasoning is that people at the base of the pyramid need their entire income or more just to survive, and as such have no money that can be invested in the future. This makes the poorest to become trapped in poverty, with low or negative economic growth rates. Without the possibility to accumulate capital, they have no means to pull themselves out of this down wording spiral. Only if the gap between what they can afford and what they need is closed, the poor countries can “break out of their poverty trap and begin growing on their own”. Prahalad instead feels that development aid has totally failed to solve the problem of poverty. Corruption has made very few people in those developing countries very rich while most have not gained any help at all. He argues that it has become strikingly evident that development aid, charity or ‘global business-as-usual’ would not deliver solutions to poverty as had been expected.

Prahalad, together with Stuart Hart, further developed his ideas based on market-based solutions rather than foreign aid and illustrated them with a number of cases in his book “The Fortune at the Bottom of the Pyramid”, with as subtitle “Eradicating Poverty through Profits”. He explains how treating the poor as consumers instead of victims, can eliminate poverty. Because of their large numbers, Prahalad claims that the poor represent a big potential buying power. By treating the poor as consumers instead of aid recipients, the poor will get access to better and cheaper products and services, a higher sense of dignity and value and thus the ability to climb out of the poverty trap.

Prahalad and Hart state that multinational corporations (MNCs) have ignored the fact that there is an unknown and unexploited fortune at the base of this economic pyramid. By turning their attention towards the poor in the world, there are possibilities of large economic profit. Large firms tend to assume that people at the bottom of the economic pyramid have no assets to spend beyond basic necessities such as water, food and shelter. They also assume that illiteracy, poor infrastructure and unstable governments make the BoP a difficult market to build a profitable business in. Prahalad contradicts these assumptions by showing that many MNCs already have started successful and profitable projects in these markets.

### 2.1 Criticising the Bottom of the Pyramid proposition

Prahalad’s claims about poverty being a means to alleviate poverty by simply targeting the poor as consumers, has met a lot of criticism for being unclear about the mechanisms that link this to actual poverty reduction [8]. Oosterlaken [9] warns that it should not too easily be assumed that a win-win situation of profit plus poverty reduction arises whenever a company successfully introduces an innovative product or technology in a developing country. When people are living in acute poverty and struggle even to meet their most basic needs,

they cannot possibly be viewed as a profitable market for large corporations [10].

Walsh et al. point out that Prahalad is so consistent to showing the positive effects of his BoP propositions that he only presents success stories in his book [11]. Prahalad himself states that his “... *book is concerned about what works. This is not a debate about who is right. I am less concerned about what may go wrong. Plenty can and has. I am focused on the potential for learning from the few experiments that are going right. These can show us the way forward.*” Walsh counter replies saying that if so many projects have gone wrong and so few have succeeded, it is even more important to figure out the difference between a success and a failure.

### 2.2 The poor as consumers: market challenges

A dilemma occurs when looking at the poor as consumers. The BoP proposition does not differentiate between priority and non-priority areas [10]. Prahalad even argues that BoP is a lucrative market for “luxury” goods, saying, “We should not assume that the poor are too concerned with fulfilling their basic needs to ‘waste’ money on non-essential goods.” Still, the BOP proposition could lead to poor people spending the little money they have on television, cell phones and shampoo, instead of higher priority needs such as education, health and nutrition [8].

This leads to a problem introduced by Jaiswal [10] as undesirable inclusion and exclusion. When giving poor the opportunity to buy e.g. single cigarettes instead of a whole packet, it includes them in a market that perhaps never should have been opened for them as it is beyond their real needs. Karnani examines this moral dilemma with the sales of a popular skin-whitening cream sold in India. Hammond and Prahalad [12] introduce us to this product by telling how a poor woman, having had the opportunity to buy this cream, feels that she has “a choice and feels empowered because of an affordable consumer product targeted at her needs.” Karnani feels that this is not empowerment. Yes, Unilever, the producers of this skin-lightening cream have the right to make a profit of the sales and women have the right to buy this cream, but Karnani feels that the BoP proposition goes too far by commending the company for empowering women and helping eradicate poverty. Prahalad disagrees by arguing that the poor have the right to decide themselves how to spend their money, and that it is patronizing and arrogant for anyone else to decide what is best for them. But Karnani states that the poor are vulnerable and easily exploited, lacking education (often being illiterate) and proper information, and are thus not always able to make choices that are in their best interest [8].

#### *Informal economies*

The vast majority of people at the base of the pyramid operate within the large but hidden informal economy. These economic activities do not appear in official GDP or PPP statistics [12]. While the informal economy in developed countries is mainly due to tax evasion, in the developing world it is simply too complicated and costly to enter the formal economy. De Soto [13] found that it took 289 days and \$1231 to register a business in Peru. These disadvantages encourage the poor to operate in the extralegal economic sector.

Within this informal economy, rules are not based on laws but on social contracts. Social boundaries are stronger and more respected than formal legal documentation [13]. To successfully operate in these informal markets, organizations need to respect and appreciate the benefits they entail. For example, the most successful micro loan programs have relied on group lending and peer pressure to ensure payback [14].

In his book "The Mystery of Capital", De Soto challenges the assumption that poor people are in fact poor. He claims that the poor in the developing world are often asset-rich but capital-poor. They often possess land but lack the formal titles, preventing them from obtaining the full value of the possession, as they cannot use their land as collateral to obtain loans. The microfinance movement attempts to close this glitch, but according to Khawari [15] it might do more harm than good. Unwilling to invest in new technology, the poor fail to earn a greater return on the investment than the interest they must pay. Prahalad embraces the idea of the poor as entrepreneurs, but the fact is that most microcredit clients would prefer a factory job if it were available [16].

In many developing countries, laws are constantly being subjected to new regulations. These are enacted at such high speed that the system may be difficult for people to understand. As a result of chaotic legislations, corruption infiltrates all levels of bureaucracy. The consequences of the fast growing legislation of micro regulations can be just as bad as not having laws at all making an informal business sector emerge beyond reach of the chaotic world of laws, regulations and corruption. Another variant of the phenomenon is that the laws are underdeveloped giving bureaucrats the opportunity to interpret laws in their own favour [17]. This situation does cause large firms to have an aversion to operate in markets at the base of the pyramid [6], but makes it complicated for local firms as well to engage in formal economical activity.

Sachs [7] argues that it is the poverty trap that explains the low economic growth in poor countries instead of corrupt governments. He argues that the poor are able to govern themselves responsibly and that any help they may receive is used for the benefit of the group, rather than pocketed by powerful individuals. Easterly [17] disagrees with Sachs and claims that there is a strong correlation between per capita income and corruption. While Sachs classifies countries as well-governed if their corruption is low for their level of income, Easterly argues that their level of income is low because of they are corrupt.

### 2.3 The poor as consumers: market opportunities

The other side of the coin learns that in spite of being challenged by income, resource, and informal economy constraints, BoP consumers are sophisticated and creative. Donaldson [18] discusses how BoP consumers are motivated not just by survival and physiological needs but seek to fulfil higher order needs either to build social capital, for cultural reasons or as a means to compensate for deficiencies in other areas of their lives. This is important to understand for those who want to operate on BoP markets. Building bonds with community and higher order needs such as self-esteem and self-fulfilment may be a key to success in BoP market initiatives. In BoP communities, social harmony, group loyalty and group recognition are so important that they even supersede physiological needs, providing a hierarchy of needs context different from Maslow's.

### 2.4 Telecommunication for development; the digital divide

The role of ICT in general and telecommunication in particular when considering effective development incentives is increasingly being discussed among scholars [19-21]. Considering the aforementioned challenges of poverty reduction, the lack of affordable access to relevant information and knowledge services is a major barrier for development, especially with the development of the global knowledge-based economy. The term digital divide refers to the gap between people with effective access to digital and information technology and those with very

limited or no access at all. It includes the imbalance in physical access to technology as well as the imbalances in resources and skills needed to effectively participate as a digital citizen. With the developed world making huge knowledge and information leaps, continuously strengthening their competitive advantage, how will the underdeveloped world ever be able to keep up?

There are several reasons why telecommunication is considered the most appropriate technology when attempting to close the digital divide [22]. First, due to its unique characteristics, mobile technology is an especially good leapfrogger, eliminating the need to rely on physical infrastructure such as roads and phone wires, with base-stations powered using their own generators in places where there is no electrical grid. Second, mobile phones only require basic literacy, especially important in developing countries with high illiteracy levels. Finally, due to factors like increased private sector competition and innovative payment methods, mobile phones are increasingly affordable to the lower strata of the population and thereby can be used as a mechanism to ensure greater participation of these groups in the development process.

As mobile penetration rates increase rapidly in developing countries, there has also been an increase in the extent of research on telecommunication for development. A study by Deloitte [23] concludes that an overall increase in mobile subscribers by 10% increases BNP in developing countries by 1.2%. While scholars generally agree upon the value of telecommunications at the BoP, there is still a lack of evidence on how this mobile product service system works as a tool to solve development problems, due mainly to the difficulty in measuring their social and economic impacts [24]. A thematic research approach focused on the different developmental domains could assist in determining the sectors or areas where mobile phones can have the highest developmental impacts.

### 2.5 BOP and designers

Over the years, designers have played active roles in so-called poverty-alleviation and Base-of-the-Pyramid projects, supporting these and other strategies. Designers are experts in understanding needs, communicate between professions and combine these findings in product and service solutions. As cultural differences, affordability issues, scarce access to resources and in some cases unstable political systems are challenging factors when addressing product, system, or service-oriented solutions, the creative thinking and innovative experimentation embedded in designers' work methods have been found to support project goals considerably.

#### *Design manuals for projects in developing countries*

Whereas an abundance of sustainable design manuals exist, attention for design guidance in the specific context of developing countries has only emerged recently. Cooperation between Delft University of Technology and the United Nations Environmental Programme has been instrumental here. Crul and Diehl [25] point out that, whilst there is considerable experience accumulated in the field of product innovation in developed countries, much of this is not directly applicable to developing countries. Innovation climates in developing countries are, by nature, problematic, characterized by poor business and governance conditions, low educational levels, and mediocre infrastructure, challenging the promotion of innovation in these contexts. Most of the current available sustainable design manuals and tools are based upon European experiences. However, in developing economies needs are different and more immediate. Also the characteristics of the local companies and product innovation approaches differ because of specific local

social, economical and industrial development aspects. Often micro, small and medium enterprises companies dominate the economy as well as the labour market. A structured product development process often is lacking.

These insights have led to the development of Design for Sustainability manual specifically targeted at developing economies [26], which was an adaption of the United Nations Environment Program (UNEP) Ecodesign manual [27], which was mainly based upon experiences in Europe and the United States. In a nutshell, the new manual is adapted to the context of developing economies in terms of an increased focus on internal drivers, higher priority to cost savings, educating in elementary product development principles and the inclusion of simple to understand tools that do not require extensive knowledge on underlying sustainability principles.

### **3 WIRELESS CARRIERS AT THE BOP**

#### **3.1 Telecom sector approaching the BoP**

The BoP proposition considers the saturation of western markets one of the most important motivational factors among multinational corporations searching for future growth. In the case of the mobile telecommunication, with almost every western citizen already a mobile subscriber, the growth of new subscribers has seized. Developing countries on the other hand consists of billions of underserved customers, making them a major potential source for continuing growth. The requirements of a growth economy have led every major telecom player searching for the fortune at the base of the pyramid, and it appears they have been rather successful at it as well. There has been a rapid growth of mobile phone networks in developing countries, with the average number of mobile phones per inhabitant raised by 100-400 % in a span of just five years [28]. With other businesses struggling to generate profit at the BoP, how come the telecom industry appears to thrive in this market?

To better understand why the telecom sector is ideal for BoP ventures, the BoP market requirements proposed by Prahalad are drawn upon here. He states that the basic economics of the BoP market are based on small unit packages, low margin per unit, high volume and high return on capital employed. Mobile technology requires very little physical infrastructure, and once in place it has the potential to serve large volumes without generating significantly increased costs, this allowing them to further reduce service cost. Innovative payment methods such as prepaid solutions also make mobile services accessible to the poor. These elements have made many developing countries skip fixed wire communication, leapfrogging into the mobile world [24]. Currently mobile telephony is the predominant mode of communication in the developing world. While developing countries are still lagging behind high-income countries in overall ICT usage and applications, the mobile phone has been regarded as a more accessible and less expensive means to close the digital divide [29].

#### **3.2 Missed calls; a challenge for product service system development**

Traditional BoP literature emphasizes the need for radical innovation in order to create sustainable business ventures in developing countries. It has been discussed why mobile technology is especially suited for doing business at the BoP, and seen payment methods that assure affordability in low-income markets. But what about product service system innovation? It could be argued that the vast majority of all telecom products and services offered to the BoP are mere adjustments to the ones

offered in western countries. Do the advantages of mobile technology make it ideal all over the world?

During the last few years, the widespread usage of SIM switching and intentional missed calls has received increasing attention among scholars and wireless carriers [22,30]. SIM switching implies that mobile users possess several SIM cards, and alternate between them to obtain the best possible service offering depending on the task to be performed.

Missed calls are placed to a number where the caller intentionally hangs up before the receiver answers the call. These calls often communicate simple, prearranged messages, but the phenomenon is increasingly evolving towards social networking and gaming. This development has placed enormous stress on the network capacity, with peak usage upwards of 70 % of total network traffic [5], causing network congestion while generating zero revenue for wireless carriers. This recent development could indicate that if product service systems are not specifically developed with the end user in mind, the BoP will make creative use of the available technology and develop free, easy to use ways of communicating.

The telecom industry is currently considering regulatory ways of reducing these intentional missed calls through charging for missed calls, or removing the caller ID from the missed calls log. While an obvious solution to the problem, there are a number of potential pitfalls that could severely damage brand identity and market acceptance. The challenge is therefore to develop solutions that not only benefit the telecom sector but also equally benefits other stakeholders, such as users, government and non-governmental organizations? In the next section it is considered how drawing on methodologies for product service system development may offer input to the described design challenge.

### **4 OPPORTUNITIES AND CHALLENGES FOR DESIGNING SERVICE BASED SOLUTIONS IN RESPONSE TO THE MISSED CALLS PHENOMENON**

One of the early challenges in a design process targeting telecom services for the BoP is the selection of appropriate tools and methodology. Both BoP and PSS literature contribute with valuable insights that can be applied to service oriented design processes within the telecom sector aiming at emerging markets. The BoP protocols focus on the development of viable business concepts in cooperation with the poor, consider business models and local market knowledge. PSS literature focuses on identification of customer value, early involvement of the customer in the system, effective communication, information sharing, and continuous improvement. A key aspect in the fulfilment of customer needs is the addressing of perspectives, needs and activity cycles among all relevant stakeholders, which may result in non-conventional combinations of physical artefacts and services to fulfil those needs. PSS methodology also stresses the importance of a company having to move from 'product thinking' to 'system thinking', and having to break down the 'business as usual' attitude [31].

Both concepts share a sustainable ambition, although this ambition is more socially driven in the case of BOP, and more environmentally driven in the case of PSS. Combining these two perspectives could contribute significantly to an overall methodology for product service systems development targeting the BoP.

The next section summarizes a number of main elements from PSS and BOP methodologies that are considered meaningful input into the design brief for developing a

solution to the missed calls phenomenon. They include stakeholder mapping, stakeholder involvement, focusing on user activity cycles, and avoiding business as usual.

#### 4.1 Stakeholder mapping

Stakeholder mapping is a crucial part of PSS methodology in order to develop mutually beneficial services. Donaldson et al. [32] propose a tool named customer value chain analysis (CVCA), which enables design teams to comprehensively identify stakeholders, their relationships with each other, and their role in the product's life cycle. Similarly, BoP protocols emphasize the need for cooperation with partners familiar with, or preferably embedded in, local communities, to understand local priorities and to avoid mistrust. Operating in close proximity to, or within, the local communities at the same time enables mapping stakeholders relevant to the actual service development. Stakeholder needs are a fundamental element in general design methodology, implying that researchers and designers should engage with the cultures directly to avoid false or second-hand assumptions [33,34].

#### 4.2 Understanding users and their activities

In addition to stakeholder mapping or network analysis, Sakao et al. identify value creation and focusing on the customer as a central aspect in all of the concepts within PSS [35]. One fundamental challenge when designing for the BoP is probably the term BoP in itself. Such a strong demographic label could lead designers to believe that the BoP is a homogenous group of customers, when it in fact is nothing but a label on the four billion people at the bottom of the economic pyramid. The dumbest mistake to make would be to generalize customer values, needs, abilities, customs and cultures across the BOP. With that being said, there are some general characteristics of the BoP that could prove valuable, especially in the initial stages of the design process.

Naturally, living at the bottom of the economic pyramid implies that the cost of telecommunication is of great importance. The missed calls phenomenon clearly shows the creativity of the BoP in order to reduce cost and take advantage of technology in more cost efficient ways. The task of competing with a free service is naturally a challenge, but the resulting increase in network capacity could be a sufficiently strong motivational factor for operators to support solutions that simply channel this behaviour in less network intensive ways.

With parallels to the early days of telecommunication in developed countries, missed calls were initially used for conveying short messages for free, and is still practiced to some extent today, like "I'm outside, open up", not necessarily due to cost efficiency, but for more practical reasons (quick and efficient). It is also common to exchange phone numbers through leaving a missed call on the phone of the person in question. In developing countries this behaviour has evolved towards a mobile language where missed calls are understood only in the context of the persons communicating, like a missed call in the morning could mean "I love you" if it is from a boyfriend, "you're late for class" if it is from a classmate and "call me back" if it is from a younger sister.

Another important element of missed calls is the uniform appearance a missed call has. It has no meaning outside the context of the two persons communicating, and can therefore easily be explained as something less meaningful than it really is, like girls communicating with their boyfriends, or a random call intended for communicating with strangers, but with the ability to explain it as a wrong dial. The freedom of not having to compose a personal message is also mentioned as a major strength of missed calls.

In a Bangladesh case study [5], it was found that additional motivational factors (beyond missed calls being free) may range from practical motives (easy, fast), entertainment (missed call competitions, the other person tried to receive the call before the first hangs up), social and relational motives (missed calls providing a unique private space where socially forbidden behaviour can be practiced), or even the opposite: social control (indicating that all is well, or keeping a phone line busy to prevent others from calling).

Such analyses of customer needs and wants are crucial for designing an attractive substitute for missed calls; without a thorough understanding of the strengths and weaknesses of the communicative properties of this concept, possible alternatives may not be successful.

Customer value in the case of mobile phone services for the BOP may have to take into account the illiteracy aspects of prospective customers. Nokia suggests design solutions including iconic user interfaces, a speaking clock, an iconic phonebook and audio messaging [36].

Another aspect to consider, as it constitutes a general difference when comparing western telecom markets to that of the BoP is the percentage of phone owners. While a large majority of the BoP uses mobile communication on a regular basis, only a small percentage actually owns a phone. The concept of SIM-switching, allowing users to insert SIM-cards in community or friends' phones, is another consequence of non-ownership. Beyond accessing personal contact information, messages and the ability to leave missed calls from a number familiar to the receiver, it also implies an increasing market for services embedded in the SIM-card as this is the only true possession of the poor. Operators offering more SIM-based services are more likely to become what is known as the primary SIM, the SIM-card preferred by the user the majority of the time.

#### 4.3 Stakeholder involvement

In order to develop successful projects at the BoP, apart from understanding the needs and capabilities of the poor, one of the key metrics is, according to the BoP literature, to co-create new business ventures with them that mutually benefit everyone involved. This correlates well with the evolution of PSS methodology towards a more user-involved design process. Reviewing the perceived benefits of such involvement in light of the BoP, it was found that user education, improved public relations and the creation of long-term relationships especially valuable [37]. With the poor involved in the actual shaping of a new service, less emphasis is needed on educating innovators and early adopters, creating market acceptance and maintaining a long-term commitment to the new service.

However, BOP literature suggests that the consideration of a range of other stakeholders is crucial as well.

##### *For-profit stakeholders*

Wireless carriers, terminal manufacturers and smart-card manufacturers work closely to develop product service systems. One of the current challenges between these players is the blurring of business boundaries. Increasingly, wireless carriers offer their customers SIM-based services developed in collaboration with smartcard manufacturers, thus interfering with the interface of the terminals. In response, terminal manufacturers hesitate to include the necessary tools enabling the SIM-card to communicate fully with the terminal. This development could in turn lead several wireless carriers to develop proper terminals in order to offer their customers a more seamless product service system [38]. This mix of agendas leads to considerable challenges when choosing appropriate platforms and developing appropriate technology for future telecom services.

### Not-for-profit stakeholders

A community based organization, i.e. a non-governmental organization, could play a critical bridging role at the start of a project and help facilitate new relationships between designers and the community. They are often embedded in the local communities, with strong social ties to make both the introduction to the local communities and the selection of local resources run smoother [39].

### Government and development initiatives

Several stakeholders could provide important contributions to the design of new services through their own agendas and potential use of telecommunication for governmental and developmental efforts. A growing discussion on the role of telecommunication for development could be a natural starting point in order to increase the perceived value of telecommunication among the poor.

- Rural livelihoods are almost by definition challenged by the lack of communication, both physical and digital. Without proper access to information, rural communities experience increased travel costs, less favourable market prices and lack of access to the latest agricultural information and technology.
- Women empowerment raises additional challenges in terms of development efforts. Women are believed to contribute considerably to the economic growth of a community, but without sufficient access to information they are unable to make deliberate decisions on their own.
- Other areas of interest are those of health and education. No country has been able to eradicate poverty without properly educating its people. At the BoP a wide range of not-for-profit and governmental organizations work closely on issues regarding education and health, especially in rural areas, providing interesting areas for further investigation.
- Finally, disaster prevention and intervention programs, both from governmental and not-for-profit organizations could provide valuable inputs on how telecommunication can assist in warning the population, distributing disaster relief and provide distant emergency assistance.

Working in close collaboration with government and not-for-profit organizations on these issues is an important step towards ensuring that the service concept becomes beneficial for all stakeholders involved, without compromising the triple bottom line.

### 4.4 No business as usual

It has also been observed that western designers take process shortcuts caused by the perceived lack of complexity in finding a solution at the BoP, which again stresses the importance of leaving behind the 'business as usual attitude' when designing solutions to the missed calls phenomenon. Without distancing themselves from existing services, while at the same time incorporating the strength of intentional missed calls in a way that significantly increase the perceived value of such a new service, designers are likely to fail.

## 5 TOWARDS A SUSTAINABLE SERVICE DESIGN IN RESPONSE TO THE MISSED CALLS PHENOMENON

This paper has intended to consider aspects of existing BOP and PSS methodologies as input to a process of formalizing specific requirements for a new service design in response to the missed calls phenomenon, SIM-switching and other forms of unintended use of mobile networks. The ultimate goal is to develop a service that

would take into account the needs of prospective users as well as satisfy industrial requirements. PSS and BOP literature suggest a number of aspects to consider in this blueprinting process. This section aims to summarize the main elements for developing triple bottom line service solutions in response to the missed calls phenomenon, which will benefit all stakeholders involved. Table 1 provides an overview of these elements; they have been used as a starting point for a project at a major Norwegian telecom provider, and served as main input to the project and design brief.

Table 1: Project and design brief input based on BOP and PSS methodology review.

Stakeholder perspective	Required Elements
Provide customer value to the <b>end user</b>	<ul style="list-style-type: none"><li>▪ Free or minimal cost</li><li>▪ Easy to access and use</li><li>▪ Allow for use by illiterate customers</li><li>▪ Encompass existing communicative advantages of missed calls and SIM switching, including social networking</li><li>▪ Potential use for accessing beneficial information and services to improve social status and economic gain</li><li>▪ Reduce the gap between perceived benefit and cost of using the service</li><li>▪ Allow for gradual education of potential users through user-involvement and step-by-step implementation</li></ul>
Address <b>operator incentives</b> for an additional service	<ul style="list-style-type: none"><li>▪ Reduce necessary network capacity</li><li>▪ Reduce options and/or incentives for SIM-switching through strengthening of advantages resulting in a primary SIM position</li><li>▪ Include possibilities of alternative revenue streams, possibly from third party service providers</li><li>▪ Consider how a new service will complement existing services</li><li>▪ Improve brand acceptance in general through local involvement and commitment to sustainable thinking</li></ul>
Consider the position of <b>competing operators, terminal and smartcard manufacturers</b>	<ul style="list-style-type: none"><li>▪ Allow service to function on competing networks without compromising the competitive advantage of the client</li><li>▪ Involve terminal manufacturers to avoid tension while integrating product and service in a seamless way</li><li>▪ Involve smartcard manufacturers in order to design services without compromising security aspects of the SIM</li></ul>
Connect to <b>local institutions</b> to create leverage	<ul style="list-style-type: none"><li>▪ Allow local institutions to participate in the development process to improve the final proposal and thus future market acceptance</li><li>▪ Address local institutions potential use of a new service to strengthen development efforts</li></ul>

## 6 FUTURE RESEARCH

To what extent the criteria listed in the previous section might provide synergies, or might, on the other hand be mutually exclusive remains object of further study. This analysis has been the basis of a design project with a main Norwegian telecom provider aiming at considering the missed calls phenomenon an opportunity for strengthening their competitiveness as opposed to being a problem to be solved through economic sanctions and removal of features perceived valuable to the user.

While PSS literature contributes extensively to economic and environmental aspects of business, it demonstrates a missing social dimension that is becoming increasingly important for western companies in search of future growth. The BoP protocols on the other hand are very much targeting the potential profit of social sustainability, but environmental concerns are lagging behind. Further research on how these areas could join forces and contribute to improving the toolbox for sustainable thinking would be of great importance.

It would also appear that neither BoP nor PSS literature is optimal for developing innovative telecom services, implying that both fields could benefit from a more general focus on sustainable innovation.

Finally, when discussing motivational factors for western companies, the learning process when undertaking BoP projects is emphasized. Through developing concepts for poor and resource scarce environments, within the framework of PSS, companies could significantly expand their understanding on how to develop concepts suited for western markets as well. In this context it would be of great value for further reference to maintain a focus on western markets when innovating BoP specific services.

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