European Management Journal 34 (2016) 414–423

Contents lists available at ScienceDirect

European Management Journal

journal homepage: www.elsevier.com/locate/emj

Reverse logistics and informal valorisation at the Base of the Pyramid: A case study on sustainability synergies and trade-offs

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ARTICLE INFO

Article history:
Received 22 December 2014
Received in revised form
15 January 2016
Accepted 16 January 2016
Available online 4 February 2016

Keywords:
Informal valorisation
Base of the pyramid
Reverse logistics
Trade-offs
Critical case

ABSTRACT

Despite a growing body of research on business with and for the Base of the Pyramid (BoP), ecological aspects of such businesses have not been considered adequately in the literature. We take a holistic view on the social and environmental consequences of a specific case of a BoP business. Water sold in plastic sachets in Africa is a typical BoP product with potentially negative ecological impact caused by littering. Reverse logistics activities could mitigate these consequences. At the same time, such activities provide opportunities for poor people to make a living from collecting waste. This in-depth single case study sheds light on the opportunities and disadvantages of informal valorisation in reverse logistics activities from both social and environmental perspectives. The case offers insights into the potential and actual trade-offs in BoP activities in different pillars of sustainability, which are otherwise rarely discussed in academic literature.

1. Introduction

Recent research on the so-called 'Base of the Pyramid' (BoP)—the bottom tier of the world income pyramid and thus those people living in extreme and moderate poverty—claims to see the poor not only as consumers but also as active parts of the value chain, thus potentially advancing social sustainability through development. A holistic understanding of 'BoP 2.0' (Simanis, Hart, & Duke, 2008), or 'integrated BoP' (Hahn, 2009), attempts to integrate the population at the BoP in earlier phases of the supply chain to address issues of economic well-being and social improvements for the poor population. However, apart from a few exceptions (e.g. Gold, Hahn, & Seuring, 2013; Hart, 2011; Kandachar & Halme, 2008), the perspective of the ecological environment has been neglected in most BoP articles until now (Kolk, Rivera-Santos, & Rufin, 2014). Similarly, supply chain issues at the BoP are also rather absent from academic discussions (for recent exceptions, see, e.g. Gold et al., 2013; Hall & Matos, 2010; Sodhi & Tang, 2011).

The present paper aims at filling these voids by, first, exploring the reverse logistics (RL) value chain of portable drinking water distributed in so-called 'water sachets' (i.e. bagged water sold in small quantities of usually up to 500 ml to provide safe and affordable instant drinking water to the public) before, second, critically scrutinising the various sustainability-related outcomes of such a BoP project. To achieve this, we take a holistic and multi-disciplinary view on the sustainability issues of a typical BoP supply chain; illuminate the ways of actively including the BoP population in the value chain and combine this with ecological aspects by considering RL as informal valorisation activities in detail. Most cases that aim to include the BoP usually focus on production or distribution aspects. The inclusion in this case, however, is in the reduction process of the product following the use phase. The concept of informal valorisation (IV), stemming from waste management research (Gunsilius, Chaturvedi, & Scheinberg, 2011; Scheinberg, 2011) emphasises the role of informal waste pickers who extract value from the end-of-life product. Against this background, we aim to explore the inherent complexity of sustainability by providing an in-depth examination of RL as part of the supply chain of a typical BoP product.

In early BoP research, the focus was often multinational enterprises (Kolk et al., 2014). In the present case, however, local industry associations, non-governmental organisations (NGOs) and politicians foster the BoP activities (see also Hahn & Gold, 2014), which helps to reduce the ecological impacts of the respective product by enabling reverse material flows through valorisation incentives for the BoP segment. However, while at first glance the

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http://dx.doi.org/10.1016/j.emj.2016.01.004
0263-2373/

valorisation opportunity involves considering the social dimension due to the inclusion of the BoP population, a thorough scrutinisation shows that successful poverty alleviation via this opportunity is not possible for systemic reasons that will be discussed throughout the paper. The case study offers a holistic and critical perspective of sustainability issues in BoP supply chains. We start by exploring the question of how the RL chain of water sachets is organised and then proceed by more specifically illuminating the question of potential sustainability trade-offs of IV at the BoP.

As such, we contribute to the growing BoP research stream by discussing the long-needed ecological perspective while integrating thoughts on social and economic aspects. In doing so, we follow Kolk et al.'s (2014) call for a better understanding of the trade-offs and tensions between the different sustainability dimensions, which again underlines the multidisciplinary approach of this study. Based on an abductive in-depth empirical case study, we provide a rare example of a critical case study in a field that has seen an abundance of best-practice examples which often lacked a critical perspective. From a conceptual perspective, we follow an interdisciplinary approach, introduce the idea of IV (and the broader issue of RL) to the BoP domain and thus advance our understanding of supply chains in developing countries. In this regard, we also provide a fresh lens on BoP ventures by extending the supply chain perspective to the end-of-life phases of specific BoP products.

To achieve these objectives, our paper is structured as follows: In Section 2, we introduce the RL and IV concepts, which serve as our conceptual lenses for analysing the present case study. Then, in Section 3, we describe the method used in our in-depth case study on the supply chains of water sachets in Ghana, especially in terms of data collection and analysis. In Section 4, we provide a detailed picture of the respective supply chain and illustrate our findings with a look at the actors involved before discussing our findings through the conceptual lenses of RL and IV. In Section 5, we illustrate potential influence from IV for BoP businesses. In this section, we also elaborate on the constraints and trade-offs of IV for sustainability at the BoP. Finally, we briefly conclude the paper.

2. Literature review and conceptual background

In the following section, the conceptual elements used for our analysis are derived first from the literature on RL and then from the concept of IV, which therefore widens the theoretical foundation of BoP studies.

2.1. Elements and activities of reverse logistics

RL focuses on the recovery of value from a product after its disposal and is therefore the starting point of a new supply chain (Guide, Harrison, & Van Wassenhove, 2003; Guide & Van Wassenhove, 2009). It is part of the wider efforts of reducing the (environmental) impact of reused products or waste. The general or ideal sequence of options (e.g. King, Burgess, Ijomah, & McMahon, 2006, p. 258) would be as follows:

'1. waste reduction (such as extending product durability);
2. waste re-use (such as remanufacturing products for a second life);
3. waste recovery (such as raw material recycling) and lastly
4. waste landfill (as the last resort).'

With regard to the example discussed in this paper, offering water in plastic bags is a hygienic and comparatively cheap option of supplying water. Waste reduction through not providing such packaged drinking water is not a viable option, as drinking water is a primary need of all human beings and alternative sources are insufficient. Re-use options of plastic products exist, but require a better upfront quality of the packaging (see, e.g. the analysis of Ross & Evans, 2003). Hence, waste recovery seems to be the preferred option over contributing to waste landfills. The waste recovery therefore demands that a close-loop supply chain is established, where RL activities form part of the core processes for setting up such a supply chain (Pagell, Wu, & Murthy, 2007; Pohlen & Theodore Farris, 1992).

RL is characterised by its central activities depicted in Table 1. It is a process of planning, implementing and controlling the efficient and cost-effective flows of product returns management (A), including product acquisition (1) and RL from manufacturing, distribution or the use point to a point of recovery or proper disposal (2). The operational remanufacturing/recovery (B) consists of inspection, sorting and disposition (3) in order to, for example, refurbish, re-use, repair, remanufacture, recycle or dispose (4). A final step of recapturing value is remanufactured product market development (C) and therefore the re-marketing of the remanufactured goods (5).

To summarise, RL includes the idea of a reverse process flow via logistics with the purpose of recapturing value from the point of consumption to the point of origin (Rogers & Tibben-Lembke, 1999). In a broader understanding, the reverse flows do not necessarily have to end at the (former) point of origin but instead can end at any point of recovery or disposal (Brito & Dekker, 2004). For the subsequent case study, the RL processes form the backbone of the economic activities and help in structuring and comprehending the reverse flows.

2.2. Characterisation of informal valorisation

In developed countries, waste management is usually a formalised process controlled or even carried out by municipalities. In low-income countries, however, private activity-driven (via informal sector) processes frequently occur (Ahmed & Ali, 2004; Wilson, Rodic, Scheinberg, Velis, & Alabaster, 2012). In this regard, the term 'informal valorisation' (Gunsilius et al., 2011; Scheinberg, 2012; Wilson et al., 2012) is derived from the waste management research stream. Valorisation is characterised as '(...) the entire process of extracting, storing, collecting, or processing materials from the waste stream in order to extract and divert value and direct the material to a value-added stream' (Scheinberg, Wilson, & Rodic-Wiersma, 2010, p. 216). According to Scheinberg (2012, p. 2), valorisation encompasses 'all activities commercializing materials found in the waste stream'. Thus, Scheinberg and colleagues conclude that referring to 'recycling and composting' is no longer appropriate due to the extensive commercialisation of valuable waste.

Initially, the mechanism of the concept was addressed and observed in countries like Brazil, where informal and formal waste treatments coexist (Ahmed & Ali, 2006). Work in the informal sector is small-scale, largely unregulated and unregistered low-technology business without tax payment (see, e.g. Harriss-White, 2010; Wilson, Velis, & Cheeseman, 2006). The waste pickers who personify IV are part of this informal system because they have no regular income. Their individual income depends on the amount of waste collected. They undergo no regulatory pressures and work with their bare hands. Equipment is a clear difference towards the large-scale state- or company-owned industrialised formal waste management system. IV emphasises the role of waste pickers in a changing environment where there is a push towards a modernisation of the solid waste management system and an attendant formal interest in recycling activities (Ahmed & Ali, 2004; Scheinberg, Spies, Simpson, & Mol, 2011). Consequently, it is assumed that the pressure on waste pickers