



Street Waste Pickers: A Case for Appropriate Technology, Social Entrepreneurship and Innovation

Vusumuzi Malele^{1*}

¹Department of Science and Innovation, DST Building 53, CSIR Campus, Meiring Naude, Brummeria, South Africa
Email: vusimalele@gmail.com

Abstract - Street waste pickers, pushing their trolleys, are an everyday sight in many cities in South Africa. These paper reports on the pragmatic approach that was used to explore whether or not waste pickers/collectors need or already have the appropriate technology to conduct their daily activities. In this regard, street waste pickers in the northern part of Pretoria were interviewed to solicit information regarding the access to appropriate technologies and why they think there is a need for such technologies in their environment. The focus of the study was to assess the waste pickers environment as a potential innovation space for appropriate technology (AT). It was found that the environment provide a platform for the development of related AT research and development as well as social entrepreneurship and innovation.

Keywords - Waste pickers, Appropriate Technology platform, Social Entrepreneurship and Innovation platform

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1. Introduction

A waste or recyclables picker/collector is a person who salvages reusable or recyclable materials thrown away by others to sell or for personal consumption (CSIR, 2018). They are most marginalized people in any country who work in the streets of the cities, towns and suburbs opening the garbage bins looking for something to eat or sell, while others work in the waste landfills. The waste pickers/collectors as potential entrepreneurs and innovators contribute to the economy of the country.

According to Godfrey and Oelofse (2017), South Africa has successfully grown a recycling economy over the past three decades, partly built on the hard work of an active informal waste sector. The South African government has actively promoted co-operatives as a means of formalising the informal sector, and stimulating job creation and enterprise development. However, waste and recycling co-operatives have suffered from a very high failure rate in South Africa, at 91.8%.

Co-operatives in South Africa face numerous challenges including the lack of infrastructure such as a lack of access to transport, equipment, or premises at which to sort and store recyclables. Operational challenges such as difficulty in accessing markets or theft of recyclables, and weak capability to operate a business, were found to hamper successful implementation.

Numerous initiatives and research projects are underway in South Africa to find appropriate solutions to integrate the informal waste sector such as the one of the waste pickers/collectors into the local waste economy (Langenhoven and Dyssel, 2007; Schenck and Blaauw, 2010; Benson and Vanqa-Mgijima, 2010; Schenck and Blaauw, 2011; Viljoen, Blaauw and Schenck, 2016; Godfrey and Oelofse, 2017). One such solution is the integration of appropriate technologies in such a sector.

Adopting Lalonde (2016) description, appropriate technologies refers to the ensemble of hyper-local know-how and creativity, resident tacit knowledge, access to local materials, techniques and processes to improvise novel solutions for matching local needs and problems. Appropriate Technology (AT) becomes good for development when coupled with entrepreneurship and innovation paradigms such as open and free innovation and indigenous innovation practices such as *jugaad* and *frugal* (Lalonde, 2016).

Against this backdrop, this paper view appropriate technology as a vehicle for promoting entrepreneurship and innovation. It uses mix-methods to review literature to investigate waste pickers challenges, and interviews to collect data regarding the need or opportunities for the use of appropriate technology in enhancing waste pickers/collectors livelihood.

Despite this introduction, this paper will briefly highlight the literature review in respect to waste pickers, the AT concept and identify the gap. Furthermore, it will highlight the adopted methodology, and provide the study findings and discussion. Thereafter, it will provide the conclusion and future research work.

2. Literature Review

2.1 Waste Pickers

Fernández, Pena Pan, and Rey-Mazón (2014) argued that waste pickers could be categorized into three groups, namely: (i) The unorganized or autonomous waste picker, (ii) organized waste pickers, and (iii) the waste picker with a contract. Dias, Fernandez, and Parra (2018) expanded the categories of waste pickers to seven categories, namely: (i) dump/landfill waste pickers, (ii) street waste pickers, (iii) doorstep waste pickers, (iv) on route/truck waste pickers, (v) itinerant buyers, (vi) sorters, and (vii) handlers/processors of organic wastes. These categories are illustrated in Figure 1.

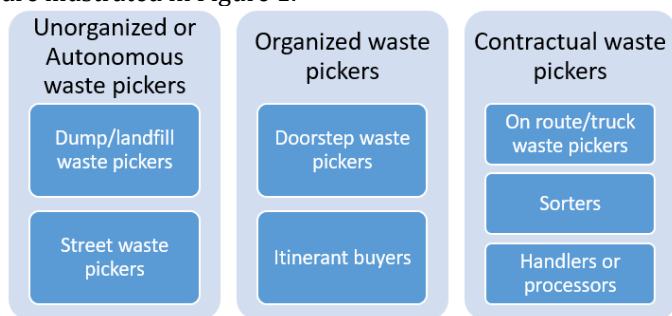


Figure 1. Categories of different pickers

Figure 1 shows how Fernández et al., (2014) and Dias et al., (2018) link. For example,

- (i). The unorganized or autonomous waste picker who makes a living picking or buying recyclable materials on the streets or in waste dumps and selling it to junk shops. These workers are not connected to waste pickers associations or cooperatives, although they may sometimes sell the collected materials to these associations.
 - (a). Dump/landfill waste pickers reclaim and sell recyclables and gather organic matter--usually for feeding livestock at disposal sites; may live on the disposal site in shacks or nearby; and
 - (b). Street waste pickers reclaim recyclables from mixed waste disposed in garbage bags and bins on streets or in dumpsters; some have arrangements with commercial and/or office buildings and may have access to previously segregated material.
- (ii). The organized waste pickers who work through cooperatives and associations.
 - (a). Doorstep waste pickers collect recyclables as part of door-to-door selective waste collection schemes run by municipalities in partnership

with membership-based organizations of waste pickers. Cooperatives with formal or informal agreements with commercial/office buildings may have members engaged in the collection of large quantities of materials by trucks or other vehicles;

- (b). Itinerant buyers collect recyclables from households/businesses in exchange for payment or barter. They generally work on fixed routes and use pushcarts or other collection vehicles.
- (iii). The waste picker with a contract who works mainly in junk yards or in the metallurgic industrial sector, but also in the public municipal sector or in associations and cooperatives. It is often not recognized that the occupational category of waste picking includes persons working with a contract.
 - (a). On route/truck waste pickers refers to formal collection crews who segregate recyclables from household waste as a supplement to their salaries. The term can also designate informal pickers who have permission to collect materials alongside collection crews; and
 - (b). Sorters select and sort recyclables by type from conveyor belts or other devices; and handlers/processors of organic wastes work in compost plants or biogas plants; they have become part of zero waste models.



Figure 2. Example of unorganized waste pickers and their drop off area. (Source: CSIR, 2018)

Waste picking takes place outside official, formal, unlicensed and untaxed channels (Schenck, and Blaauw, 2011); hence, most waste pickers are not accommodated by authorities and residents, actually most of them are treated as thieves. They often face low social status, deplorable living and working conditions, and get little support from local governments. The position of informal waste pickers in the broader waste management system is really at the bottom tier (Hayami, Dikshit, and Mishra, 2006).

There is a growing recognition that waste pickers/collectors contribute to the local economy, to public health and safety, and to environmental sustainability. Makwela (2018) reported that waste pickers offer a free service and such save South African municipalities about R700 million every year in terms of landfill space, as well as the indirect costs of recycling and

waste management. Schenck, and Blaauw (2011) depicted the position of waste pickers/collectors in the waste cycle (Figure 3) which clearly indicate their role in the waste cycle economy.



Figure 3. The waste cycle (Source: Schenck, and Blaauw, 2011)

The growing recognition of waste pickers/collectors is further intensified by the policy regulations of a country. In South Africa waste management is governed by the (i) National Environmental Management: Waste Act 2008 (Act 59 of 2008) as amended by the (ii) National Environmental Management: Waste Amendment Act (26 of 2014), and (iii) the National Environmental Management Laws Amendment Act (25 of 2014). The Waste Act promotes integrated waste management based on the waste management hierarchy as a means to reduce the amount of waste going to landfill, through waste avoidance, reduction, re-use, recycling, recovery, treatment, and safe disposal as a last resort. In order to reduce the impact on human health and the environment, the Act also includes minimum requirements and licensing for activities involving the storage, transportation, re-use, recycling, treatment and disposal of waste.

The South African Department of Science and Technology's (DST) recognizes waste sector as one that provides opportunities for value recovery, job creation and economic development. In this regard, the DST developed the Waste Research, Development and Innovation (RDI) Roadmap for South Africa to provide strategic direction and to coordinate and manage South Africa's portfolio investment for the next 10 years in six identified clusters of waste research, development and innovation activity, namely: (i) strategic planning, (ii) modelling and analytics, (iii) technology solutions, (iv) waste logistics performance, (v) waste and environment, and (vi) waste and society.

The effort made by government through different regulations and strategies is commendable; however, most of such strategies and regulatory frameworks focus on formal waste management groups and development of human capacity with high-end skills. For example, the DST's roadmap gave birth to the BSc. (Hons) in Environmental

Sciences with specialisation in Waste Management (https://www.wasteroadmap.co.za/download/bsc_hon_waste_manage.pdf); however, it is doubtful that such a degree could be relevant to waste pickers in particular the unorganized or autonomous waste pickers.

Viljoen et al., (2016) argue that the unique set of socio-economic circumstances in which street-waste pickers operate in the various cities and towns in South Africa make the design of any possible policy interventions a complex one. Policymakers will have to take note of the interdependence of the barriers of which failing to do so may cause policies that are aimed at supporting street-waste pickers to achieve the exact opposite, and, ironically, deprive these pickers of their livelihood (Hayami, et al., 2006; Viljoen, et al., 2016). Clearly, this signify a literature gap that should look at addressing the policy issues of the street waste pickers.

2.2 Appropriate Technology

From the 1970s to the 1980s, AT became a worldwide grassroots innovation movement that sought to redefine technology as a tool for development. The Welcome page of the International Network on Appropriate Technology (<http://www.appropriatetech.net/>) writes: "Appropriate technology (AT) is technology that is designed with special consideration to the environmental, ethical, cultural, social and economical aspects of the community it is intended for. With these goals in mind, AT typically requires fewer resources, is easier to maintain, has a lower overall cost and less of an impact on the environment compared to industrialized practices. Most importantly, Appropriate Technology is technology to empower people".

Drawing from the above description, AT could be defined as a set of techniques that makes optimum use of available resources in a given environment in order to maximize the socio-economic welfare of the one using the AT. It requires fewer resources and lower cost for implementation. The adoption of AT embodies a Do-it-Yourself/Ourselves (DIY) ethos which adopts an open innovation paradigm (Lalande, 2016), meaning ideas could emerge from inside or outside the innovator's environment (Chesbrough, 2003; Vanhaverbeke, 2013). As an open innovation, AT refers to providing technical solutions appropriate to the economic structure of the community, ability to finance the activity, operate and maintain it, the environmental conditions applicable, and to management capabilities of the community.

In their paper, Sibanda, Mpofu, and Trimble (2016) highlight an example of an AT innovation machine, the Universal Nut Sheller, which helped peanuts growers and harvesters to grind the peanuts. Furthermore, Sibanda, et al., (2016) further provides a framework for the development of reconfigurable machines through customized manufacturing process known as Reconfigurable Manufacturing Systems (RMS). They argue that the framework gives a direction for the development of RMS aligned to AT concepts.

Although AT provides a good base for communal appropriate technology, but it should be noted that what is appropriate in some area might not be appropriate in other areas. For example, M-Pesa, launched in 2007 by Vodafone for Safaricom and Vodacom, is an appropriate information and communication technology, which aided mainly eastern African communities to receive and transfer money from/to other family members living in other countries. Mohapi (2017) regards it as a Kenyan-technology success story; however, since its success was not an AT in South Africa, then it was not an AT success (Van Zyl, 2016).

2.3 Problem Statement

The literature review revealed that much has been written about waste pickers working and living on dumpsites or landfill sites in South Africa, but very little about street waste pickers (McLean 2000; Langenhoven and Dyssel, 2007; Benson and Vanqa-Mgijima, 2010; Schenck and Blaauw, 2010; Schenck, and Blaauw, 2011; Viljoen et al., 2016; Godfrey and Oelofse, 2017).

Despite the work by Schenck and Blaauw (2011), and Viljoen et al., (2016), there seems to be no other work that was conducted in the area of Pretoria. Furthermore, there was no indication of existing literature review that analysed the AT used or needed by the waste pickers in particular street waste pickers.

It follows that several questions aligned to AT and the context of waste pickers should be asked and addressed in order to maximise the socio-economic welfare of waste pickers. For example, could a wireless technology be an AT for waste pickers? If so, how so? Could there be any other ATs relevant to waste pickers. Using a pragmatic approach, in this paper the latter questions were explored.

3. Methodology

This paper adopted a pragmatic mixed method approach due to the nature of the environment in which waste pickers operate. Most studies that investigated the waste pickers environment used mixed method research approach (Langenhoven and Dyssel, 2007; Schenck and Blaauw, 2010; Benson and Vanqa-Mgijima, 2010; Schenck and Blaauw, 2011; Viljoen et al., 2016; Godfrey and Oelofse, 2017).

In this regard, a group of 25 waste pickers in the Pretoria North area was sampled and two prong pragmatic data collection techniques were employed. Firstly, (i) observing the waste pickers from 21 to 25 May 2018, early morning (as they conduct the work) and evenings (after work), and (ii) face-to-face interviews were carried on 25 May 2018. Secondly, observations were conducted on the same group from 25 to 29 June 2018, without interviews.

To conduct observations the researcher drove within the areas that street waste pickers were busy collecting waste. In this regard, five waste pickers were followed per day.

A face-to-face survey approach was used to collect data and information on the socio-economic conditions and

use of technology of the street-waste pickers. According to Babbie & Mouton, (2011:249) face-to-face surveys could be used effectively when members of the research population have limited literacy levels. Studies have shown that street-waste pickers have limited literacy levels (Schenck and Blaauw, 2011; Viljoen, Blaauw and Schenck, 2016). The questions for face-to-face interview were adapted from the survey instruments that were provided by the literature (Schenck and Blaauw, 2011), and Viljoen et al., (2016).

4. Results and Discussion

4.1 Empirical Findings

Interviews were conducted with a sample of 25 waste pickers laboring in the streets of Pretoria North, Gauteng Province in South Africa. The interviews were mainly conducted during the evening because most waste pickers were not doing anything at that time, so they had enough time to talk. Secondly, the time was used to observe what they do if not waste collecting. Their activities are captured as evidence in Figure 4.



Figure 4. The waste pickers after a daily activity

After a long day of hustling within the streets, waste pickers tend to choose a vacant or darker building, and then unwind through long conversations and sharing of beverages like beer. Some will have a focus time to read the bible and books (see Figure 4).

The following structured questions were used to conduct the face-to-face interviews:

(i) Do you have a family? Where are they?

Of the 25 street waste pickers who participated in this study, 40% identify that they had families. Of the 40%, majority were male waste pickers. The majority of waste pickers indicated that they were from Limpopo Province of South Africa (see Figure 5).

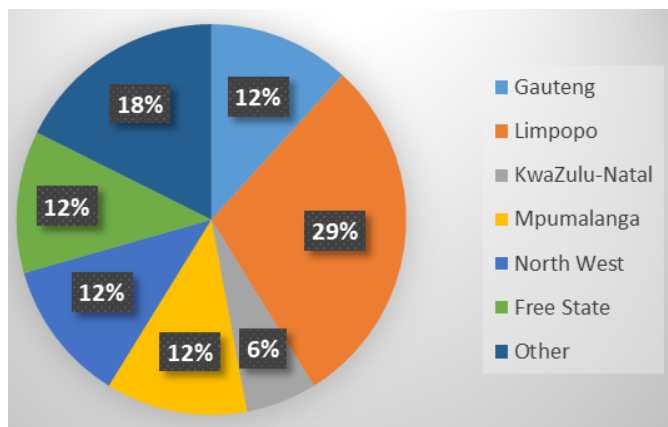


Figure 5. South African provinces were waste pickers originates

(ii) How often do you go to the streets to pick waste and when do you rest? Do you use any wheelbarrow or trolley to pick waste? Was it designed to suit your health and streets that you travel?

It has been observed that almost all the street waste pickers go and collect waste on daily basis except on weekends. When they asked why not collect over the weekend, most responded as follows:

"...people do not place their garbage bins on street during weekends because the municipality does not operate over the weekends..."

Furthermore, street waste pickers did not use wheelbarrows but different types of trolleys that they designed and build on their own (see Figure 6). When they asked if the trolley support their daily work, they answered as follows:

"...the trolley is ok but sometimes I feel that it hurts my shoulders...so government recognize us and should assist us with trolleys that could at least not yet us..."

"...the streets are not well designed to accommodate us with our trollies; hence, putting us into the risk of getting accidents..."

"...we which that the people could recognize us that we are also trying to make a living without stealing..."



Figure 6. The trolley used by street waste pickers

As illustrated in Figure 6(d) to (f), it was also observed that some street waste pickers provide job shadowing for other new waste pickers. Others collect waste walking with their kids and use the kid's cart to place the waste. This means that there are many street waste pickers who require ergonomic and health stable trolleys. For example, such trolleys should include ATs that might test and report on their health status while they do their job.

(iii) How much do you generate a month? Do you share your profits with the family?

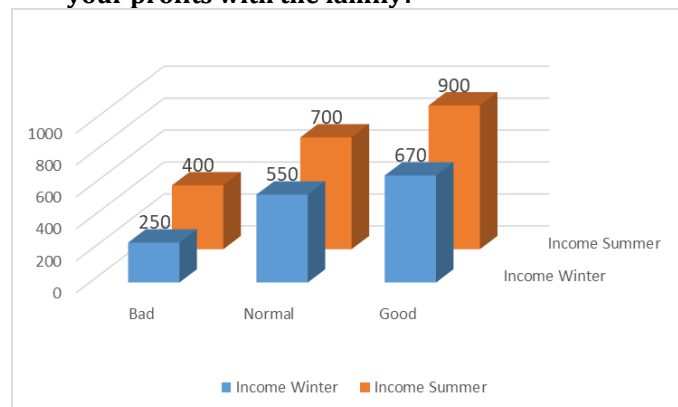


Figure 7. The trolley used by street waste pickers

As illustrated in Figure 7, in a good week street waste pickers makes good money on average more than R600 in winter and R900 in summer. Their normal week show that they could make on average more than R2000 a month.

The observations made on the amount that they make on average, led to a question of whether or not they do share their money with other. In this regard, although some waste pickers claim that they do send or share their money with families but that was not a significant number. For example, seven of the 25 waste pickers that were interviewed agree that they share the money with the families. Of the seven, two were actually a couple as they claimed that they were married to each other and have kids with their grannies at rural areas.

The majority claimed that they could not send or share the profits (on monthly basis) with the family but they actually use the money to visit their families during December festive holidays. It is then when they will buy foodstuff for the extend family. This finding was in agreement with Schenck and Blaauw, (2011) who found that most waste pickers earn so little that they are unlikely to be able to contribute to the support of their families.

(iv) In case of a potential danger along the street, how do you warn each other?

It has been observed that street waste pickers face injuries from dogs, and community members who are not please with them toiling through their garbage bins. It was not a surprise to some of them using a half-duplex technology in a form of walk-talk gadget. Then this led to a

question of testing how many of them use wireless technology for communication purposes and whether it was appropriate for the task. Of the 25 interviewed street waste pickers, 17 were in a position of a mobile phone and six had walk-talk gadgets. It should be noted the mobile phones were not smartphones and their market value was less than R350.

4.2 Findings

Adapting from broad literature that was sourced through secondary data, few observations were made:

- (i) Different studies with focus of empirical data sourced from different cities were conducted. For example, in Durban, McLean (2000) did the study, in Cape Town Langenhoven and Dyssel (2007), Schenck and Blaauw (2010), and Benson and Vanqa-Mgijima (2010) did a study. Of note, the focus area of Langenhoven and Dyssel (2007) was in Mitchells Plain, Cape Town. Schenck and Blaauw, (2011) focused on Pretoria, and Viljoen, et al., (2016), and Godfrey and Oelofse (2017) focused on all nine provinces.
- (ii) Schenck and Blaauw (2011) argue that street waste pickers are entrepreneurs who add value merely by collecting and then transforming waste into tradable commodities. Viljoen, et al., (2016) views waste pickers as small-scale, self-employed people who are mostly active in the urban informal economy. It therefore follows that in their space frequent innovation is in need.
- (iii) in South Africa, the municipal waste management systems do not appear to be ready to accommodate the waste pickers, meanwhile other countries are beginning to accommodate them (Schenck and Blaauw, 2011; Godfrey and Oelofse, 2017).
- (iv) Schenck and Blaauw, (2011) conducted a comprehensive study that established a socio-economic profile of the street waste pickers in Pretoria and to describe the social interaction and relationship dynamics between the waste pickers and their families, each other, the community and buy-back centres. They conducted an empirical data study of the street waste pickers in Pretoria. The results revealed that the role of street waste pickers in the broader waste management system is an important public issue that requires urgent attention and appropriate policy responses from policy makers.
- (v) Viljoen, et al., (2016) conducted a mixed method study using structured interviews in April 2011 and June 2012 with 914 street waste pickers and 69 buy-back centres in 13 major cities across all nine provinces in South Africa. In corroboration with Schenck and Blaauw (2011), they found that waste pickers have low levels of schooling, limited language proficiency, uncertain and low levels of income, as well as limited access to basic social

needs. These makes it difficult for waste pickers to move upwards in the hierarchy of the informal economy. The unique set of socio-economic circumstances in which street-waste pickers operate in the various cities and towns in South Africa make the design of any possible policy interventions a complex one.

- (vi) Different initiatives have already been put into place to assist the street waste pickers. For example, Abomakgereza (Recycling Hustlers) is a project of Red Bull Amaphiko Academy, which is a launch pad for grassroots social entrepreneurs who are making a positive difference in their community. The project aims to solve the endemic township unemployment by providing durable carts for waste collectors while educating (local informal waste collectors on waste management services by providing them with basic business and entrepreneurial skills needed. The long-term objective is to harness the entrepreneurial spirit of South Africa's informal waste entrepreneurs through functional and safer branded waste trolleys. Secondly, the South African National Department of Environmental Affairs (DEA), in partnership with the Council of Scientific and Industrial Research (CSIR), and Coca Cola Company - and its bottler, Amalgamated Beverage Industries (ABI), aim to bring solutions to the waste sector by integrating informal waste cooperatives into the municipal waste management system.

In general, both the empirical and hypothetical findings provide a good platform for establishing AT related research and development projects. Furthermore, such space provide social entrepreneurship and innovation opportunities.

5. Conclusion and Future Studies

Waste pickers face health and safety challenges, like lack of proper ergonomics, contact with toxic substances, etc. However, their environment provide unique opportunities for the development of innovation through ATs. It also provide a perfect research environment for studying socio-economic and sustainable topics. For example, their social entrepreneurship status could be tested because their everyday work could be profiled as informal entrepreneurs.

In the context of policy, it is acknowledged, that there is still much to be done given that significant quantities of waste, including recyclables, are still disposed of to landfill. This is an issue for future research, which could look at how street waste pickers could be integrated in the municipal or government official plans.

It should be noted that there was no way of knowing the exact population of the Pretoria North street waste pickers but the efforts were made to locate where they normally spend their night. In this regard, only 25 adults and 2 kids were around that place. For the purpose of this study, only the 25 adults were requested to participate.

Taking into consideration that Pretoria North is subdivided in different suburbs, there could have been more than 25 waste pickers in that area. These waste pickers could contribute significantly in the future study.

The age and education profile of the 25 waste pickers participated in this study was not collected the future study should focus at collecting such data and correlate it with the use of their profits.

References

- Babbie, E., and Mouton, J., 2011. The practice of social research. Cape Town: Oxford University Press.
- Chesbrough, H., 2003. The era of open innovation. MIT Sloan Management Review, 44, 3, pp. 34-41.
- Council for Scientific and Industrial Research (CSIR), 2018. Integrating the informal waste sector into municipal waste management. Council for Scientific and Industrial Research (CSIR). Retrieved from <https://www.csir.co.za/integrating-informal-waste-sector-municipal-waste-management> (Last accessed: 29 June 2018).
- Dias, S., Fernandez, L., and Parra, F., 2018. Waste Pickers: Environmental and Economic Contributors. Women in Informal Employment: Globalizing and Organizing (WIEGO). Retrieved from <http://www.wiego.org/informal-economy/occupational-groups/waste-pickers>.
- Fernández, L., Pena Pan, J., and Rey-Mazón, P., 2014. WAW: Waste Pickers Around the World Database. Women in Informal Employment: Globalizing and Organizing (WIEGO). Retrieved from <http://globalrec.org/waw/>
- Godfrey, L., and Oelofse, S., 2017. Historical Review of Waste Management and Recycling in South Africa. Resources, 6, 57, pp. 1-11.
- Hayami, Y., Dikshit, A.K., and Mishra, S.N., 2006. Waste pickers and collectors in Delhi: poverty and environment in an urban informal sector. Journal of Development Studies, 42, 1, pp. 41-69.
- Lalande, L., 2016. Entrepreneurship, Innovation and Appropriate Technologies for International Development- A new initiative at the University of Ottawa. Retrieved from <https://medium.com/@luclalande/entrepreneurship-innovation-and-appropriate-technologies-for-international-development-2afb9143c1d8>
- Makwela, M., 2018. Hidden economy thriving on South Africa's landfill sites. DST/NRF Centre of Excellence in Food Security. Available online: <http://www.foodsecurity.ac.za/NewsItem/1688>
- Mohapi, T., 2017. M-PESA's origins. IAfrican. Available online: <https://www.iafrican.com/2017/12/04/m-pesas-origins/>.
- Redbull Amaphiko <https://amaphiko.redbull.com/en/projects/abomakge-reza-recycling-hustlers>
- Schenck, R., and Blaauw, P.F., 2011. The Work and Lives of Street Waste Pickers in Pretoria - A Case Study of Recycling in South Africa's Urban Informal Economy. Urban Forum, 22, pp. 411-430.
- Sibanda, V., Mpofu, K., and Trimble, J., 2016. Appropriate Technology Innovation – Equipment Design for Sustainability. Proceeding of the 7th International Conference on Appropriate Technology, Victoria Falls (Mosi Oa Tunya), Zimbabwe.
- Vanhaverbeke, W., 2013. Rethinking Open Innovation Beyond the Innovation Funnel. Technology Innovation Management Review, 3, 4, pp. 6-10.
- Van Zyl, G., 2016. Why Vodacom M-Pesa has flopped in SA. Fin24Tech. Available online: <https://www.fin24.com/Tech/Companies/why-vodacom-m-pesa-has-flopped-in-sa-20160509>.
- Viljoen, K., Blaauw, P.F., and Schenck, R., 2016. I would rather have a decent job: Potential barriers preventing street-waste pickers from improving their socio-economic conditions. South African Journal of Economic and Management Sciences, 19, 2, pp. 175-191.