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ACHIEVING ZERO WASTE OPERATION IN A PRIVATE ORGANISATION THROUGH EXTENDED STAKEHOLDERS CONSULTATION: A CASE IN THE NIGER DELTA REGION, NIGERIA

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ABSTRACT

This paper focused on addressing the effects of operational issues on the stakeholders to a private organisation. The findings show that the implementation of stakeholders' involvement lent support to effective zero waste practice in this research. It is an action research, carried out in a case study of a commercial live-stock farm, using workshop and interviews as key data collection methods. The research considered the interest of the affected and involved stakeholders in identifying and deliberating on key operational issues such as live-stock waste management and mortality. Suggestions and decisions result in effective approach to addressing stakeholders' marginalisation through a participatory research process, which led to a zero-waste operational practice. The research concludes with the suggestion for a mixed method to explore the topic in future research in a private sector organisation.

Keywords: Action research; operational process; zero waste practice/ thinking.

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1. INTRODUCTION

The pursuit effectiveness in the use of resources to minimise waste is a key operational objective among business managers. Managers keep on the search for a working approach to waste management with the intention to maximise values and discard wastes from their operational processes. However, recent trends in practice project a new intention under the

caption of zero waste, intended to strive to reuse all wastes, the development of further values from these waste items (Ghadban, Shames, & Mayaleh, 2017; Oladipo, Olorunfemi, Adetoro, & Oladele, 2017)

The concept of zero waste has popularity among researchers and practitioners both in the public and private sectors in Nigeria (Greedy, 2016), Researchers have termed zero waste by different names such as ‘waste recycle’, ‘transforming waste to wealth’, and ‘minimising waste’ (Kang & Schoenung, 2005; Metin, Erozturk, & Neyim, 2003; Onwurah, Ogugua, & Otitoju, 2006; Kuehr, 2007; Marques, et al., 2014). While these names could be due to differences in context under which subject is viewed, the overriding similarity in their aim for zero waste practice among these researchers range from minimising operational wastes to addressing the challenge of reducing the amount of waste sent to the land fill (Henningsson, Hyde, Smith, & Campbell, 2004; Kang & Schoenung, 2005; Sasakia, Arakia, Tambunanb, & Prasadja, 2014).

Many researchers base their research work on the public sector, exploring the subject of zero waste on how the government manage societal wastes, and the input of the households in environmental cleaning for habitable society (Danso, Drechsel, Fialor, & Giordano, 2006; Troshinetz & Mihelcic, 2009; Zhang, Keat, & Gersberg, 2010; Jack, Coles, & Piterou, 2016; Escutia, 2017; Gutberlet, et al., 2017).

This research paper explores zero waste in the private sector operations and its effects on the affected stakeholders in an operational process. This is aimed to engage these stakeholders to jointly identify and address waste issues.

The next section presents a further literature review on zero waste and stakeholders involvement. This is followed by a presentation on the methodology used in the research. Next is the presentation of key waste issues identified in the research process. Finally, the discussion and conclusion.

2. ZERO WASTE AND STAKEHOLDERS’ INVOLVEMENT IN THE PRIVATE SECTOR

In most private sector organisational systems, wastes items are generated from operations, whether production or service organisations, pursue it set goals. Organisational wastes are classified into two, the tangible wastes and intangible wastes. Examples of tangible wastes are: expired materials, broken machine parts, etc. Examples of intangible waste are wasted time, purchasing power waste, waste due to incompetent personnel. All these wastes portray non-value adding features, such as monetary losses, hindrances to smooth operation to the operational process (Serpell, Venturi, & Contreras, 1995; Womack & Jones, 1996; Munguía, et al., 2018).

The possibility of keeping an absolute waste-free operational process, though has remained continuous pursuit among organisations, tends to be a herculean task for managers in the private sector (Suzaki, 1987). Sometimes, in order to secure an un-hindered operational process flow, some waste might be kept within the operational system, due to forces from the environment affecting, though such waste items do not command real values within the system (Gulyani, 2001; Arnheiter & Maleyeff, 2005). Similarly, (Rawabdeh, 2005) recognises the challenge involved in searching for waste in an operational system, observing that all wastes items in an operational system were originally introduced for some purpose/s, noting that the attempt to remove can pose the danger of destructive effects to other parts of the entire system.

There is a wide difficulty in arriving at a sustainable understanding of waste over a significant period of time. An identified item of waste in an operational system today can

change into an asset of value in the near future, due to the volatile nature of changes in environmental priorities, such as customer and other stakeholder requirements or perception, and the emergence of new business opportunities (Ufua, 2015; Ufua, Papadopoloulos, & Midgley, 2018). This dilemma about waste calls for the involvement of the relevant stakeholders to jointly determining the true meaning of waste and develop means to management it (Matete & Trois, 2008; Antunes, Stave, Videira, & Santos, 2015).

Engaging these stakeholders would enforce pragmatic innovation, especially in an action research process. This is based on the underpinning context, aimed to generate further values from an earlier declared waste, via a zero waste thinking across an operational structure and the stakeholders (Joseph, 2006). Engaging stakeholders in the implementation of zero waste is also aimed at developing a holistic approach to reducing the pollutants effects within and around the organisation, and emanating from the landfill sites, and helps to avoid the incineration of waste (Caniato, Tudor, & Vaccari, 2015; Lieder & Rashid, 2016). The affected stakeholders view the subject of waste from different perspectives and using different frames. However, zero waste practice in an operational provides the needed support, especially with the inclusion of all the affected stakeholders.

Stakeholders' involvement in the pursuit of zero waste could pose significant challenge, especially among the internal organisation members (Guerrero, Maas, & Hogland, 2013). Sometimes, these stakeholders share varied sentiments that may challenge the process of implementing zero waste. This calls for harmonisation of thoughts and preferences of the identified stakeholders to avoid conflicting effects of zero waste practice (Poppendieck, 2002; Roberts & Okereke, 2017).

3. METHODOLOGY

The paper applied an action research approach to explore the implementation of zero waste and stakeholders' consultation in a private organisation. The research applied a case study organisation approach. This was to adequately source in-depth qualitative data from those who are either involved or directly affected by the implementation of zero waste practice in the organisation. An approval to carry out the study was secured from the management of the case study organisation. The consent of all the identified stakeholder groups were also secured in writing before the research was carried out. (Mingers & Gill, 1997; Midgley, 2000; Midgley, Foote, Ahuriri-Driscoll, & Wood, 2007; Midgley, 2007) explain that, in most cases, organisational problems do not fit exactly with a particular approach in terms of data collection and analysis, suggesting a pluralist viewpoint that can be adequately applied in studying an identified problematic situation in depth, and also assist in the needed learning that can inform improvements. As a result of this, various data collection methods were applied on complementary basis in the research process. These are discussed in the next section.

4. METHODS

4.1. Interviews

Personal interviews with stakeholders were conducted at the beginning of the research as a key element required to identify key zero waste issues. Initial interview data provided a basis for grouping of issues and participants.(Olokundun et.al 2018) These case study organisation members were asked about other relevant stakeholders that could be interviewed, especially those who could have variant perspectives about their operations (Midgley & Milne, 1995; Ufua, Papadopoloulos, & Midgley, 2018). As a result, different participants' groups, such as, the government agency, host community, the input material suppliers and the downstream

customers to the organisation were identified. Over 200 interviews were conducted. These respondents were interviewed at different stages based on their relevance to the zero waste issues identified in the research process See (Ufua, 2015; Ufua, Papadoupouloulos, & Midgley, 2018) .

4.2. Workshops

Workshops were organised to explore current operational processes, identify waste issues, and deliberate on ways to address them. Workshop were organised with the affected stakeholders (i.e. internal and external stakeholders). Over 25 workshops, lasting 78 minutes on average, were conducted, covering a period of 8 months (see, Ufua, 2015; Ufua *et al*, 2018, for further details).

5. THE CASE STUDY ORGANISATION

The case study organisation is a commercial live-stock farm in a rural community in the Niger Delta region of southern Nigeria. It was registered in Nigeria, the year 2000. The establishment of the farm was a part of the positive reaction by corporate entities and individuals to invest in the agricultural sector, by the Federal Government of Nigeria. This call was aimed to address the challenge of food security, provide employment opportunities for many unemployed rural youth, boost this sector of the Nigerian economy.

Early on, the farm specialised in poultry, offering products such as broilers and table eggs to customers. Later it diversified into other live-stock lines.

Among the case study organisation's external stakeholders are the local community, which mostly consists of subsistence farmers and traders. Other external stakeholders include input material suppliers (e.g. those selling limestone, maize, sawdust and charcoal), all of which are needed for the maintenance of the live-stock. The organisation also has a range of wholesale and retail customers for the farm's different products.

Internal stakeholders include the senior managers, who have oversight of the farm as a whole; the middle managers and supervisors, who manage the different sections and the shop floor workers.

The main sections are the Hatchery and Poultry production section, comprising of a Feed Mill, a Fishery, a Piggery, a Snailery and a Cattle Ranch. The farm has a strong expansionary mission, focused on meeting downstream market demands, which has led to continuous diversification of product lines from the original broilers and eggs (see, Ufua,2015; Ufua et al, 2018, for earlier publications from the case study).

6. KEY ZERO WASTE ISSUES IDENTIFIED IN THE CASE STUDY ORGANISATION

6.1. The issue of live-stock mortality

High rate of livestock mortality was a key issue identified by respondents, especially the Junior staff who work in the various Pen houses where the livestock are kept in the organisation. Although this issue has been known to the top management, the respondents explained that live-stock mortality is a major obstacle to meeting downstream customers' expectations. The claims of these junior staff were presented to some Middle Managers for further comment (Layers, Broiler and Brooding departments). Whilst they recognised the issue, they highlighted the complication involved in identifying the specific causes of mortality. They noted that mortality is a company-wide challenge to their operations.

The explanation of these middle managers necessitated a schedule of a meeting by the researcher with the Assistant General Manager, who later approved a workshop on mortality issues in the farm. Among the invited participants were the top management. Middle managers and supervisors from each of the concerned departments (i.e. the Poultry section, the Veterinary Consultants and the Parents Stock), were invited to attend.

The Middle managers from the production section (Brooding departments and Layers, Broilers), honoured the invitation to participate in the workshop. Others included the supervisors at Parent Stock, Pullet departments, and Abattoir. From the top management cadre were; the Administrative Manager the Secretary to the General Manager, the Veterinary Consultant and the Assistant General Manager.

At the session, which lasted two and a half hours, participants were given the opportunity to express their opinions about the identified issues and make contributions on how to solve the problem of mortality in the farm.

They highlighted that the farm has a live-stock mortality allowance of 5% (i.e. the acceptable level of mortality in the farm, beyond which, it becomes a concern to the organisation). They cited the ugly mortality experience that has been on a very high rate in the farm, which affected several livestock departments, especially the poultry.

“This issue had adversely affected productivity in terms of meeting stakeholders’ requirements, especially the downstream customers who patronised the Broilers and Layers sections of the farm” (Middle Manager at the Layers’ section).

The top management explained that trying to address the mortality issues had consumed a large amount of resources, ranging from series of laboratory tests, investment in different structural adjustment of Poultry, and changing the live-stock pen preparatory materials, yet they persisted.

The Middle Managers (e.g. Layers and Broilers departments), explained that the alarming rate of mortality problems could be as a result of live-stock feed supplied by external partners, which they claimed were inadequate to effective live-stock nutritional needs in the farm. They further explained that mortality can occur as a result of the volatile weather conditions and neglect of daily operational standard procedures, such as the use of disinfectant foot dip at the pens by all staff and visitors. They emphasised that these practices are useful in preventing the spread of diseases that can easily result to live-stock mortality. See (Gunn, Heffernan, Hall, McLeod, & Hovi, 2008; Nöremark, Frössling, & Lewerin, 2010; Gwyther, Williams, Golyshin, Edwards-Jones, & Jones, 2011), for more details about the general use of bio security in live-stock farming).

The Assistant General Manager commented that, the farm has developed a new plan to produce key input materials (e.g. concentrate for live-stock feed), required for livestock management internally. This is a resilient response to the challenge of mortality in the farm, which he explained could assist the farm to gain further control over the processing and quality of feed administered to live-stock. Participants also debated and agreed to start using dead live-stock from the poultry to form part of raw materials used to prepare feed for the piggery and fishery sections instead of sending them to the landfill. They noted that, if well prepared under hygienic conditions, they are rich in the key nutrients needed to nurture live-stock in these section of the farm. The cited that the piggery needed bone meal for calcium development. They however cautioned that such effort, should be supervised by the Veterinary Doctors to avoid further spread of diseases.

6.2. The challenge of poor management of poultry waste disposal

From responses to interviews with members of the case study organisation, a key issue faced by the organisation is live-stock waste disposal process. Live-stock dung is the excreta (waste) passed by live-stock. It could be wet, in the case of Layers, Piggery or dry live-stock dung (e.g. from Broilers). This challenge has resulted to conflict between the case study organisation and the host community due to the pollutant odour from the live-stock waste dumpsite that is located within the host community habitation. From further interviews with the host community representative including the Secretary, the President and three other members of their group, they acknowledged the benefits which the community has received from the farm. “Generally, the company has impacted positively in our environment and has resulted in further economic development to the communities” (Secretary to the host community representative group).

However, these respondents stated that the establishment of the farm in their locality has also resulted to challenges to their lives. They explained that the dumping of livestock waste in their locality poses a huge threat of health challenges to the entire community where the case study organisation operates. They said that their wish to have economic development should not compromise their environmental health needs, placed on high esteem in the entire host community.

This identified issue was presented to the top management staff in a round of interviews with the Administrative Manager, the General Accountant, and the Assistant General Manager. In their response, they explained that the issues of livestock waste management disposal sanction notice from the regulatory government agency, asking the farm to it urgent attention of face government retributions.

The top had earlier moved the waste landfill to a new location, farther away, yet the expected effects could not yield the required solution. The representatives of the host community continued to express their dislike with the incidence of live-stock waste dumping in their locality.

In a furtherance effort, the researcher got the approval from the case study organisation to meet the relevant government agency who had issued a sanction to the organisation. The aim was to source further information about the issue identified, based on how they are affected and also seek to find what suggestion/s they could make to improve on the situation. However, the government agency officials agreed to attend only interviews instead of a workshop. Those who participated are the Assistant Director of Environmental Health, the Head of Department of Environmental Health and the Director of Environmental Health. They emphasised on their core responsibility as a government agency charged with the task of ensuring that operator in the industry where the case study organisation operates, comply with set standard requirement that are legally acceptable at all times. They also educate operators on health implication of operational activities, and encourage activities comply with environmental preservation.

The government agency emphasised on the need for the farm to engage in the development of further values from the currently generated live-stock waste. They cited the wet live-stock dung as an example, noting that it could be used to generate biogas electricity. They emphasised on the economic benefits and environmental safety, in the reduction of the pollutant effects that can be harnessed form the proposed biogas project. They explained that developing the biogas could partly address the waste management challenge faced by the farm.

“There are multiple approaches to waste management but the one we would recommend is the new approach which is the biogas which involves translating waste to wealth! It leaves

nothing unused; converting all waste to diverse values that are of further advantages to the organisation if they can implement it” (Director of Environmental Health).

In a workshop session in the case study organisation, the invited participants were the Middle Managers, Veterinary Consultants and Supervisors. The aim was to deliberate on the issue of live-stock dung and possibly develop a solution to tackle the challenge of live-stock waste.

The workshop was captioned ‘Poultry waste management and value enhancement for operational process sustenance’. It lasted for about two hours. Among the attendees were the managers from the different departments in the Poultry and Hatchery section and Supervisors. Some of these participants were indigenes of the host communities, though they did not formally assume the positions to represent the host communities. During the workshop, several suggestions were made by participants on the possible ways to address and improve the livestock waste management issues that has remained a challenge for the organisation. Among the key suggestions was the need for the farm to develop values from livestock dung, via the production of maggots from wet poultry dung currently generated from departments, such as Layers, Pullets, brooding departments. They explained that the production of Maggots could bring down the amount of generated waste sent to the landfill site. They noted that the produced maggots can be used as feed supplement for the Fishery, which could also reduce the cost of running the Fishery department considerably. They reckon that Maggots are nutritious and healthy for the fish.

“Maggot contains 55% of protein which can speed up the growth of fishes in the pond, and many other competitor farms that have access to these waste have started this practice” (Manager, Hatchery department).

Participants (e.g. Managers from Cockerel and Piggery departments), nevertheless pointed out that the amount of poultry dung required to produce maggots is small compared to the volume of livestock waste currently generated in the farm. This observation prompted an argument by the Supervisor at the Layers department. He said that the current pressure faced by the farm, from the host community and the regulatory government agency are the driving force to inform what effort must be put in by the organisation, in order avoid retributions and keep their operation, in what ways possible. He thought that whatever decisions taken should be meant to meet the standards set by the government agency and keep their relationship with the host community afloat.

Other participants (Managers at the Hatchery, Supervisors at Cattle Ranch, Piggery, Cockerel and Parents Stock departments), in their contribution to deliberation, drew the attention of participants to the need for absolute care in the management of maggot production process if it must be adopted in the farm. They advised that the ‘maggoty (1)’ should be located at considerable distance away from the other sections of the farm. They also suggest a practice of continuous clean-up of the site for biosecurity reasons. The cautioned that the application of requires care to be sure a healthy administration to livestock-Fishery so as to avoid the chances of an outbreak of disease that can result to losses to the farm business.

At the conclusion of the workshop session, participants unanimously advised the Veterinary Consultants and the Manager at the Fishery department to further debate on the suggestion of using producing maggot from current livestock waste, with the top management team to finalise on the possibility of adopting the suggestion to embark on maggot production as a means to partly address the challenge of live-stock waste management.

As a follow up to the propositions from earlier workshop, a round of personal interviews was conducted with the Veterinary Consultants and Supervisors at the Fishery department further discussion on the findings suggestions made by participants at the workshop.

In their response to interviews, the Veterinary Consultants certified the suggestion for approval by the top management. They explained that, apart from adding values to the Fishery in terms of a reduction in the amount of feed bought for the Fishery, the proposal would lead to a consideration in the overall waste generated in the farm. They however, reaffirmed the caution that the use of Maggots as supplement at the Fishery can achieve its purpose if the process is duly monitored and void of contaminants that can endanger the health of livestock in the Fishery, as well as the human consumers (Nuov, Little, & Yakupitiyage, 1995; Fasakin, Balogun, & Ajayi, 2003).

An approval was secured from the General Manager to hold a new workshop on the waste generated in the farm's Hatchery. The workshop theme was 'process improvement means to generate values from current hatchery waste'. The invited participants were the Hatchery Manager, the Piggery Manager and Supervisor the Feed Mill Manager and Supervisors, Manager and Supervisor from Parent Stock and some staff from the Veterinary Laboratory, who are involved with the formulation and processing of live-stock feed.

During discussion, the Supervisor from the Parent Stock department expressed the need for the top management to also consider the processing of waste generated from the Hatchery (hatched egg shells) into feed supplements for the production of feed for the Piggery. He noted that using live-stock feed supplement from egg shells, apart from reducing the overall waste generated in the farm, can yet reduce the cost of livestock feed sent to the Piggery, because the egg shells are sourced from within the farm. Managers at the Hatchery and Feed Mill departments, supported the proposal, noting that egg shells supplement would provide a useful source of calcium carbonate which the livestock in the piggery needs for strong bone development (Glatz, Miao, & Rodda, 2011; Wilkinson, 2011), have for more on calcium in pig growth).

Other participants explained that effective use of calcium facilitating nutrient such as the egg shell supplement can enhance maximum breast milk flow for Sow (2) that are nursing piglets (3).

The Brooding department Manager and Veterinary Consultant, however cautioned that such process would require proper cleaning effort to ensure that contaminated egg shells (e.g. dead in shell (4)), are not used for this process. They recommend a process of laboratory certification after a careful analysis before use to ensure adequate bio security and avoidance of an outbreak of disease in the farm. While the workshop session was well coordinated, due to the interest of participants in the discussion, it concluded with a unanimous agreement to contact the top management for a final approval and authorisation for a plan for implementation.

The top management members of the organisation were later engaged in a round of personal interviews regarding the suggestions advanced by participants at the recent workshop. The focus was on the proposals for using calcium supplement developed from egg shell for the Piggery and the production of maggots from current livestock waste generated in the farm, for the Fishery.

Whilst they acknowledge the proposals, they expressed the fear that the suggestions are critical to their operation, highlighting the need to make external consultation with experts who can offer further advise on the way forward, whether to grant approval of not. However, the top management respondents interviewed, still held on with the argument that a better approach to address the issue of effective waste management could still be achieved in their operation.

In another workshop, the attention was drawn to the possibility of generating power energy from current wet live-stock waste in the farm, which was earlier suggested by the government agency.

The Managers at Broilers and Piggery departments, supported the suggestion, reaffirming that if the proposal is well implemented, it could yield other benefits to the farm, especially in the area of operational process stability. They opined that it can also provide a means to effectively address the critical challenge of regular power supply in the farm. They note further that biogas, as suggested by the government agency can address needs such as regular power supply to the Cold Rooms, water supply, the Abattoir, and the Feed Mill. They however reckoned that for the proposal for biogas to be effective, it would require the active involvement of all members of the organisation and the sanction and support of the top management. The Supervisor at the Hatchery, in his comment, cited the implementation of biogas project by a known organisation operating in the same region as the farm. He laid emphasis on the reliability of the biogas energy, noting that it can effectively address the fundamental needs for effective power supply and waste management in the entire organisation.

“The expenditure on this proposed project would yield so much return especially in the aspect of operational process stability” (General Accountant).

Other participants highlighted the possibility for overall improvement in the farm’s operation via the proposed biogas electricity project. They however, noted that the farm need more inundating knowledge on further details about the functionalities of biogas project, which they claimed was new to their operations. Some participants were unwilling to contribute further to the discussion, but hope that the organisation can embark on a search for experts in biogas for further consultation about the suggestion for biogas. The session concluded after about 55 minutes of deliberation on the topic. See (Weiland, 2003), for details about the importance of biogas.

They equally agreed on the distribution of dry live-stock waste, to host community farmers for the development of compost manure for their farming. They thought that such effort would further enforce their relationship with the host community farmers and reduce the amount of waste sent to the landfill.

7. DISCUSSION

The adoption of an action research approach to addressing the waste and mortality issues in the case study organisation resulted to a zero waste implementation process that effectively address the issue highlighted in the case study organisation. This in line with the suggestion of authors e.g.

(Othman & Ameer, 2010; Midgley & Ochoa-Arias, 2012; Ufua, Papadoupouloulos, & Midgley, 2018), who emphasised on meaningful engagement resulted to productive suggestions, and innovations from all the participants.

Zero waste became the resultant effect of widened stakeholders’ involvement in the research process. Several researchers e.g. (Midgley, 2000; Gable & Shireman, 2005; Sharma & Henriques, 2005), observed that interactions between stakeholders result to emergent property that effect change. The implementation of zero waste thinking did not portray complete absence of waste but effective management of identified waste items, via an empathic thinking among participants in the action research process. It also provided due consideration for emerging such as the end to end effects of decisions taken in addressing identified issues.

The application of a participatory research process engaging the affected stakeholders also addressed the issue of marginalisation of interest and projected sustainable solutions that would be void of retributions from certain affected stakeholders' groups individuals, which led to a sustainable zero waste practice in the farm. In accordance to the submission of organisational waste management authors, this equally promoted a significant empathy and ownership mentality among the participants, both the internal organisation member and the external stakeholders who participated in the research process (Womack, Jones, & Roos, 1990; Wom961; Wilson, 2007; Sarkis, Helms, & Hervani, 2010).

Adopting an action research approach created a foundation for effective advancement of innovation from the participants. This is in line with the thought of systems thinkers e.g. (Jackson, 2000; 2003; Midgley, 2008; 2011), who assume that every event in a social relationships is connected to something else. The engagement of these participants was on a platform of connected thinking which encouraged the productive debate among participants, on the identified issues and relevant suggestions for improvement.

While (Ikelegbe, 2005; Jahansoozi, 2006), highlighted the usefulness of stakeholders' relationship building, The application of an action research process in addressing organisation wide issues in the research process, encouraged learning among participants and discouraged conflicting aftermath effect of zero waste practice, between the organisation and the participants. This observation aligns well with the thought of researchers, e.g. (Hines, Howleg, & Rich, 2004; Senge, 2008), who note that learning would be relevant to operational research which was brought to bear in this research.

Finally, the application of an action research approach provided a free opportunity for participants to actively involved in developing real time solutions aimed to address highlighted issues in the research process. This further gave the opportunity to fully explore the unique issues identified in the case study organisation, with full consideration of the affected stakeholders. Such could not have been a possibility with a quantitative approach that could have possibly applied retrospective and sentimental data (Salmon, 1991; Carr, 1994). The various data collection methods effectively complemented the research process. Interviews supported the collection of important data, especially at times when the participants were not available to attend workshop due to their commitments to duties at work.

However, Similar to the findings of (Ufua, 2015; Ufua, Papadoupouloulos, & Midgley, 2018), the entire process was slow. It required long periods to reach decisions, though this was not judged an issue due to the interest of stakeholders in achieving a zero waste operational system in the case study organisation, via addressing identified issues. This suggests that action researchers need to realign their research process to give further consideration to the issue of time and completion schedules. This would further harmonise the credibility of action research findings, especially in addressing critical operational issues that are time bound.

8. CONCLUSION

This paper focused on stakeholder involvement in addressing operational issues in a private sector organisation, resulting in a zero waste practice. The research involved participants, who are stakeholder affected by the operational process. The paper adopted an action research approach, using workshop and interview for data collection. Findings show that stakeholders' involvement is a key factor to achieving an effective zero waste operational process.

However, the research process seemed slow though justified by the acceptance and satisfactory participation of the affected stakeholders in an approach to identify and develop

solutions to address identified issues. In addition to the suggestion for action researchers to recognise time factor in their research process, it is further suggested for researchers to consider a mixed approach that can include quantitative data to explore the numerical impact of zero waste solution to operational issues.

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BIBLIOGRAPHY

- [1] Antunes, P., Stave, K., Videira, N., & Santos, R. (2015). 15 Using participatory system dynamics in environmental and sustainability dialogues. *Handbook of Research Methods and Applications in Environmental Studies*, 346.
- [2] Arnheiter, E. D., & Maleyeff, J. (2005). Research and concepts. The integration of Lean management and six sigma. *The TQM magazine*, 17(1), 5-18.
- [3] Caniato, M., Tudor, T., & Vaccari, M. (2015). Understanding the perceptions, roles and interactions of stakeholder networks managing health-care waste: A case study of the Gaza Strip. *Waste management*, 35, 255-264.
- [4] Carr, L. T. (1994). The strengths and weaknesses of quantitative and qualitative research: what method for nursing? *Journal of advanced nursing*, 20(4), 716-721.
- [5] Danso, G., Drechsel, P., Fialor, S., & Giordano, M. (2006). Estimating the demand for municipal waste compost via farmers' willingness to pay- in- Ghana. *Waste Management*, 26, 1400-1409.
- [6] Escutia, E. Z. (2017). Closing Loops in Cloud City: A Zero-organic Waste District in Aalborg.
- [7] Fasakin, E. A., Balogun, A. M., & Ajayi, O. O. (2003). Evaluation of full-fat and defatted maggot meals in the feeding of clariid catfish *Clarias gariepinus* fingerlings. *Aquaculture Research*, 34(9), 733-738.
- [8] Gable, C., & Shireman, B. (2005). Stakeholder engagement: A three-phase methodology . *Environmental Quality Management*, 14(3), 9-24.
- [9] Ghadban, S., Shames, M., & Mayaleh, H. A. (2017). Trash crisis and solid waste management in Lebanon-Analyzing Hotels' commitment and guests' preferences. *Journal of Tourism Research & Hospitality*, 6(3), 1000169.
- [10] Glatz, P., Miao, Z., & Rodda, B. (2011). Handling and treatment of poultry hatchery waste: A review. *Sustainability*. 3(1), 216-237.
- [11] Greedy, D. (2016). Landfilling and landfill mining. , (34)1, . *Waste Management & Research*, 34(1), 1-2.
- [12] Guerrero, L. A., Maas, G., & Hogland, W. (2013). Solid waste management challenges for cities in developing countries. *Waste management*, 33(1), 220-232.
- [13] Gulyani, A. (2001). Effects of poor transportation on Lean production and clustering: Evidence from the Indian Auto industry. *World development*, 29(7), 1157-1177.
- [14] Gunn, G. J., Heffernan, C., Hall, M., McLeod, A., & Hovi, M. (2008). Measuring and comparing constraints to improved biosecurity amongst GB farmers, veterinarians and the auxiliary industries. *Preventive veterinary medicine*, 84(3-4), 310-323.
- [15] Gutberlet, J., Kain, J. H., Nyakinya, B., Oloko, M., Zapata, P., & Campos, M. J. (2017). Bridging Weak Links of Solid Waste Management in Informal Settlements. *Journal of Environment & Development*, 26(1), 106-131.
- [16] Gwyther, C. L., Williams, A. P., Golyshin, P. N., Edwards-Jones, G., & Jones, D. L. (2011). The environmental and biosecurity characteristics of livestock carcass disposal methods: A review. *Waste Management*, 31(4), 767-778.

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- [17] Henningson, S., Hyde, K., Smith, A., & Campbell, M. (2004, June). The Value of resource efficiency in the food industry: a waste minimisation project in East Anglia Uk. *Journal of Cleaner Production*, 12(5), 505-512.
- [18] Hines, P., Howleg, M., & Rich, N. (2004). Learning to evolve: a review of contemporary lean thinking. *International journal of operations & production management*, 24(10), 994-1011.
- [19] Ikelegbe, A. (2005). The economy of conflict in the oil rich Niger Delta region of Nigeria. *Nordic Journal of African Studies*, 14(2), 208–234.
- [20] Jack, M. W., Coles, A. M., & Piterou, A. (2016). Sustainable project management in urban development projects: a case study of the Greater Port Harcourt City Development Project in Rivers State, Nigeria. *Transactions on Ecology and The Environment*, 21.
- [21] Jackson, M. C. (2000). *System approaches to Management*. New York: Kluwer academic/plenum Pub.
- [22] Jackson, M. C. (2003). *System thinking creative holism for Managers*. United Kingdom: John Wiley & sons Ltd.
- [23] Jahansoozi, J. (2006). Organization-stakeholder relationships: Exploring trust and transparency. *Journal of management development*, 25,(10), 942-955.
- [24] Joseph, K. (2006). Stakeholder participation for sustainable waste management. *Habitat International*, 30(4), 863-871.
- [25] Kang, H., & Schoenung, J. M. (2005). Electronic waste recycling: a review of US infrastructure and technology options. *Resources, Conservation and Recycling*, 45, 368-400.
- [26] Kuehr, R. (2007). Towards a sustainable society: United Nations University's zero emissions approach. *Journal of Cleaner production*, 15(13), 1198-1204.
- [27] Lieder, M., & Rashid, A. (2016). Towards circular economy implementation: a comprehensive review in context of manufacturing industry. *Journal of Cleaner Production*, 115, 36-51.
- [28] Marques, R. C., Da Cruz, N. F., Simoes, P., Ferreira, S. F., Perriera, M. C., & De Jaeger, S. (2014, April). Economic viability of packaging waste recycling systems: A comparison between Belgium and Portugal . *Resources, Conservation and Recycling*, 85, 22-23.
- [29] Matete, N., & Trois, C. (2008). Towards zero waste in emerging countries- a South African experience. *Waste management.*, 128, 1480-1492.
- [30] Metin, E., Erozturk, A., & Neyim, C. (2003). Solid waste management and review of recovery and recycling operations in Turkey. *Waste management*, 23, 425-432.
- [31] Midgley, G. (2000). *Midgley, G. Systemic intervention: philosophy, methodology and practice*. London: Kluwer academic/Plenum publishers.
- [32] Midgley, G. (2007, July). Towards a new framework for evaluating systemic and participative methods. *In Proceedings of the 51st Annual Meeting of the ISSS*, 51 (2). Tokyo, Japan.
- [33] Midgley, G. (2008). Complexity and philosophy. Systems thinking, complexity and the philosophy of science. *E:co Issue*, 10(4), 55-73.
- [34] Midgley, G. (2011). Theoretical Pluralism in Systemic Action Research. *Systemic practice and action research*, 24, 1-15.
- [35] Midgley, G., & Milne, A. (1995). Creating employment opportunities for people with mental health problems: A feasibility study for new initiatives. *Journal of the Operational Research Society*, 46(1), 34-42.
- [36] Midgley, G., & Ochoa-Arias, A. (2012). *Community operational research: OR and systems thinking for community development* . Springer Science & Business Media.

- [37] Midgley, G., Foote, J., Ahuriri-Driscoll, A., & Wood, D. (2007). Towards a new framework for evaluating systemic and participative methods. *Journals.iss.org*, 1-19.
- [38] Mingers, J. C., & Gill, A. (1997). *Multimethodology-The theory and Practice of combining management science methodologies*. Chichester, UK: John Wiley & Sons.
- [39] Munguía, N. E., Diaz, A. M., Valazquez, L. E., Perez, R., Esquire, J., & Zepeda, D. S. (2018). Valorization of Solid Waste Recovery in an Institution of Higher Education . *Green and Sustainable Chemistry*, 8(02), 180.
- [40] Nöremark, M., Frössling, J., & Lewerin, S. S. (2010). Application of routines that contribute to on-farm biosecurity as reported by Swedish livestock farmers. *Transboundary and emerging diseases*, 57(4), 225-236.
- [41] Nuov, S., Little, D. C., & Yakupitiyage, A. (1995). Nutrient flows in an integrated pig, maggot and fish production system. *Aquaculture Research*, 26(8), 601-606.
- [42] Oladipo, F. O., Olorunfemi, O. D., Adetoro, O. O., & Oladele, O. I. (2017). Farm waste utilization among farmers in Irepodun Local Government Area, Kwara State, Nigeria: Implication for extension education service delivery. *Ruhuna Journal of Science*, 8(1).
- [43] Olokundun, M.A., Ibidunni, A.S, Falola, H.O., Salau, O.P & Oyafunke-Omoniyi, C.O. (2018) Entrepreneurship curriculum contents and entrepreneurial development of university students in Nigeria. *International Journal of Entrepreneurship*22(1). 1-9
- [44] Onwurah, I. N., Ogugua, V. N., & Otitoju, O. F. (2006). Integrated environment biotechnology-oriented framework for solid waste management and control in Nigeria. *International Journal of Environment and Waste Management*, 1(1), 94-104.
- [45] Othman, R., & Ameer, R. (2010). Environmental disclosures of palm oil plantation companies in Malaysia: a tool for stakeholder engagement. *Corporate Social Responsibility and Environmental Management*, 17(1), 52-62.
- [46] Poppendieck, M. (2002). *Principles of Lean thinking*. USA: Poppendick. LLC.
- [47] Rawabdeh, I. A. (2005). A model for the assessment of waste in job shop environments. *International journal of operations and production management*, 25(8), 800-822.
- [48] Roberts, O. I., & Okereke, C. I. (2017). Cultural beliefs on waste and the need for integration into present domestic waste management: Evidence from selected communities in Rives state, Nigeria. *International Journal of Social Science & Management Research*, 3(6), 1-12.
- [49] Salmon, G. (1991). Transcending the qualitative-quantitative debate: The analytic and systemic approaches to educational research. *Educational researcher*, 20(6), 10-18.
- [50] Sarkis, J., Helms, M. M., & Hervani, A. A. (2010). Reverse logistics and social sustainability. *Corporate Social Responsibility and Environmental Management*, 17(6), 337-354.
- [51] Sasakia, S., Arakia, T., Tambunanb, A. H., & Prasadja, H. (2014). Household income, living and working conditions of dumpsite waste pickers in Bantar Gebang: Toward integrated waste management in Indonesia. *Resources, Conservation and Recycling*, 89, 11-21.
- [52] Senge, P. (2008). The necessary revolution: How individuals and organisations are working together to create a sustainable world. *Management Today*, 24(10), 54-57.
- [53] Serpell, A., Venturi, A., & Contreras, J. (1995). Characterization of waste in building construction projects. *Lean construction*, 67-77.
- [54] Sharma, S., & Henriques, I. (2005). Stakeholder influences on sustainability practices in the Canadian forest products industry. *Strategic management journal*, 26(2), 159-180.
- [55] Suzaki, K. (1987). *New manufacturing challenge: Techniques for continuous improvement*. Simon and Schuster.
- [56] Troschinetz, A. M., & Mihelcic, J. R. (2009). Sustainable recycling of municipal solid waste in developing countries. *Waste management*, 29(2), 915-923.

Achieving Zero Waste Operation in a Private Organisation through Extended Stakeholders
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- [57] Ufua, D. E. (2015). *Enhancing lean interventions through the use of systems thinking in the food production industry: a case in the Niger Delta Region, Nigeria*. PhD Thesis, . Hull, United Kingdom: University of Hull.
- [58] Ufua, D. E., Papadoupoulou, T., & Midgley, G. (2018). Systemic lean intervention: Enhancing lean with community operational research. *European Journal of Operational Research*, 268(3), pp.1134-1148.
- [59] Weiland, P. (2003). Production and energetic use of biogas from energy crops and wastes in Germany. *Applied biochemistry and biotechnology*, 109(1-3), 263-274.
- [60] Wilkinson, J. M. (2011). Re-defining efficiency of feed use by livestock. *Animal*. 5(7), 1014-1022.
- [61] Wilson, D. C. (2007). Development drivers for waste management. *Waste Management & Research*, 25(3), 198-207.
- [62] Womack, J. P., & Jones, D. T. (1996). Beyond Toyota: how to root out waste and pursue perfection. *Harvard business review*, 74(5), 140-158.
- [63] Womack, J. P., Jones, D. T., & Roos, D. (1990). *The machine that changed the world: The story of lean production*. New York: Rawson Associates, 85.
- [64] Zhang, D., Keat, T. S., & Gersberg, R. M. (2010). A comparison of municipal solid waste management in Berlin and Singapore. *Waste Management*, 30(5), 921-933