EUROPEAN ACADEMIC RESEARCH
Vol. III, Issue 11/ February 2016

Impact Factor: 3.4546 (UIF)
DRJI Value: 5.9 (B+)

ISSN 2286-4822
www.euacademic.org

Deploying a Computational Competitive Intelligence (CI) Framework for Municipal Solid Waste (MSW) Management Decision-Making

PERCY OKAE
Computer Science Department
African University of Science & Technology (AUST)
Abuja, Nigeria
Prof. AMOS DAVID
University of Lorraine
Nancy, France

Abstract:

Organizations normally deploy Competitive Intelligence (CI) strategies in various forms in order to shore up the effectiveness of their performances. During the process of CI, companies deploy personnel and resources to gather relevant data and eventually synthesize the data into actionable intelligence from which top management can make decisions by implementing the results of the CI process. In this paper, we are deploying this concept in the field of municipal solid waste (MSW) management decision-making. We use as our case study, Zoomlion Ghana Limited, the largest solid waste management company in Ghana. The future objective of this research work is to carry over the CI products (actionable intelligence) into an MSW observatory that will also feed a data warehouse (DWH) over time for usage by management. We know for a fact that the impact of CI on organizations is not immediately felt so it becomes a challenge for policy-makers to convince top management to deploy resources to roll out the CI process or formalize it in an organization. But global success stories are there as evidential proofs of the relevance of CI to modern business success. A key finding of this work is that organizations often lack or have minimally functioning CI units especially in developing countries so they cannot see the benefits even in the long-term. Also marketing departments, who are to be the leaders in CI are not well-

motivated enough to even release information they have to their organizations.

Key words: CI, observatory, MSW, DWH, Zoomlion Ghana Limited, decision-making.

1. INTRODUCTION

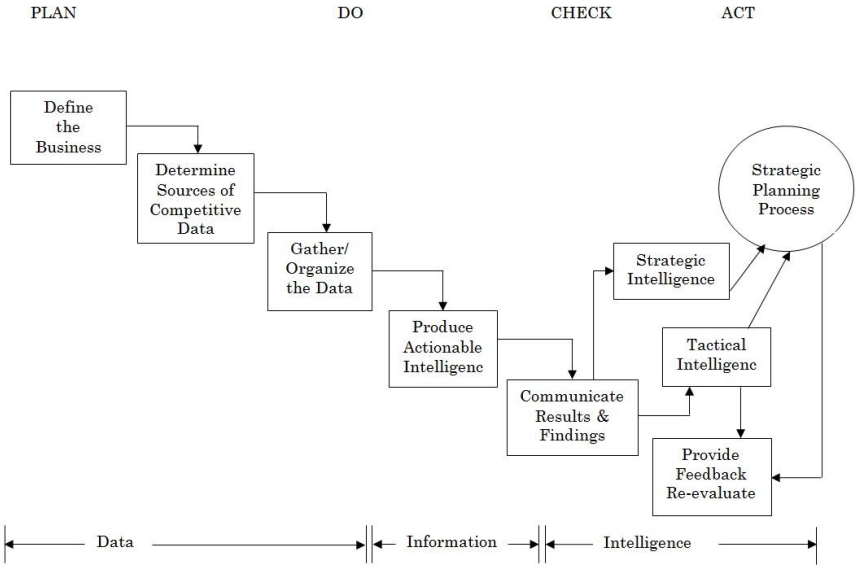
Competitive Intelligence (CI) is simply an information system which emanated in the 1970s and 1980s in America as a concept to enhance the effectiveness of businesses. Currently all over the World, the leading multi-national companies all have very well structured CI units established so as not to be overtaken by events. Products from organizations are every now and again undergoing enhancements and so competitors have to know the latest innovations coming from each other's camp to be able to remain abreast of happenings. In contrast to market research, CI is more general, performed in-house, on a rolling basis, and usually entails more uncertainty about the ultimate value of the actionable intelligence the CI process creates. Competitive Intelligence is a process automated by an organization's information systems to carry out the task of doing the ***right things*** rather than doing ***things right***.

We define CI as the legal and ethical action of defining, gathering, analyzing, and distributing intelligence concerning the latest innovations, customers, competitors, government actions, and other market environment factors that are necessary for effective decision-making from both private and public sources (SCIP, 2001, Jaworski et al., 2002). In fact for long, CI as a process has been mooted as a concept to increase an organization's competitiveness (Montgomery and Urban 1970:226–234); (Montgomery and Weinberg 1979:41–52); and Pearce 1976:115). The fact is that CI can be viewed as both a process and as a product. As a process, CI gathers information

about the external environment and transforms this information through a series of processes into actionable intelligence that is then used to analyze key factors that usually have an impact on the organization's strategy. As a product, it is the information acquired on competitors from research and used as the premise for a specific action.

A more preferred and direct definition of CI is that it is a function that is responsible for the early detection of two key things: (1) market exploitation opportunities before they become obvious to others (by which times these opportunities would be lost) and (2) industry dissonance before market forces threaten the organization (i.e. when the company becomes captive to events). According to Aaker (1998), the CI process must have the singular objective of developing the strategies and tactics necessary to transfer market share profitably and consistently from specific competitors to the organization. However, its definition is also succinctly captured by Van Brakel (2005), as "*a business discipline that is used by companies and countries alike as a means to improve competitiveness by making better use of information*." Also McGonagle and Vella (1990), define CI as "*the use of public sources to develop information about the competition, competitors, and market environment*." According to Gilad and Gilad (1988), CI has the singular goal of monitoring an organization's external environment to obtain information that is relevant to its decision-making process.

In deploying CI in our organization concerned, we apply a seven stage process which we believe suits our purposes very well (see Figure 1).



Source: Adapted from Developing Comprehensive Competitive Intelligence, IMA, 1996

Figure 1: Diagram clearly identifying the roles of each stage of the CI process cycle

Next we briefly describe each of the steps involved in the CI process

1. **Define the business issues:** we need to know the kind of intelligence to gather and for what purpose. How is the intelligence going to be used in the CI process etc? In this endeavor, it is most important that senior management plays a role so that they provide direction as to the systematic collection of information, with priorities set by the users of the data and not its producers.

Examples of typical business issues are:

- What alternative growth directions should be considered? How should they be pursued?

- How can our product or service be differentiated from our competitors? How can perceived quality of our product or service be enhanced?
- Is it possible to employ synergy, or a pre-emptive move to gain advantage?

2. **Determine the sources of competitive data:** key sources of competitive data ought to be identified and if sanctioned, utilized. These sources usually include:

- Commissioned research;
- Internal staff;
- Third-party interviews; and
- Published information.

3. **Gather and organize data:** the importance of organizing competitive data so that they can be logically stored and retrieved cannot be overemphasized. Typically a framework that could be adopted is one that includes a major category for broad industry data, another for data collected on each competitor being tracked, and last but not the least, another for competitive data that relate to specific areas that management is particularly concerned about in its own firm.

4. **Produce actionable intelligence:** all the repository of information collected will not inure to the benefit of the organization if it is not converted into actionable intelligence. We do this by using both line and staff managers. The criteria we usually use to evaluate whether the organization can act upon the intelligence are:

- Have the conclusions been challenged and tested?
- Have any limitations been identified?

- Are the data in the needed format for planning purposes?
- Do they meet users' needs?
- Have alternative views and findings been identified?

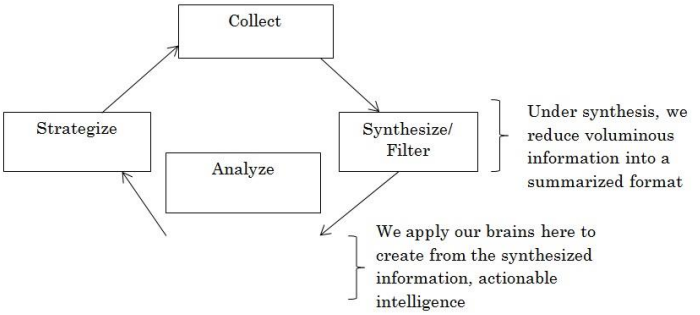
5. **Communicate results and findings:** the dissemination of competitive intelligence throughout a firm can be done in several ways. Generally, this is important because it closes the loop between those who did the collection and analysis of competitive information and those who are responsible for using it to make decisions. One way is to build a competitor profile report for distribution throughout the organization, either in part or in whole. Some organizations have adopted the strategy of creating a competitive intelligence center where the regular maintenance and updating of information about competitors and the firm's own competitive intelligence efforts are done. Managers can regularly hold meetings at this center and discuss the competitive information that is presented.

6. **Provide input into the strategic planning process:** strategic planning pulls together information from throughout the organization and results in the cohesive and purposeful direction of the organization. After all the hard work done in the pursuit of data, all the organization will need is a concise and polished version of data collected. What does the data say and what does it mean? This should eventually result in original research and assessment of the likely effects of the data on business strategy.

By providing management with implications and strategic alternatives, CI can effectively be integrated into the strategic management process.

7. **Provide feedback and re-evaluate:** feedback in any human endeavor is important and the process of CI is no exception. Users can evaluate the market product and feed the organization with their observations for a better performance next time.

We can also summarize the above stages into Figure 2 below so as to also clearly identify the specific roles various stages play in the CI cycle.



Source: Adapted from Liebowitz, 2006.

Figure 2: Diagram clearly identifying the crucial stages of the CI process cycle

2. LITERATURE REVIEW

Competitive Intelligence, since its founding in the 1970s and 1980s has been fully adopted in major organizations in the developed World and its benefits have indeed been substantial for these organizations. Apart from America where it originated, places such as France, UK, Sweden, Japan, to mention these few, have also greatly benefited from its practice

after making it an integral part of business (Fuld, 1985, McKinnon & Burns, 1992).. The practice has been employed in many disciplines such as wind turbine manufacturing, software development, aeronautics, automobile manufacturing, pharmaceuticals etc., with outstanding results. We can illustrate this point further by citing the software giant, Microsoft, ranked by the Futures Group as the leading user of CI (Curtis, 2001). Through a rigorous and aggressive application of CI techniques, Microsoft has been able to obliterate competitive products such as WordPerfect, Lotus 123, and Netscape Navigator etc., by deploying the equivalents namely MS Word, MS Excel, and Internet Explorer (IE) respectively. Guimares (2000) argues that every organization can improve its competitive edge as well as its overall performance if it fully adopts an effective CI program. One major fact is that the acquisition of the information alone is not enough, but getting it early enough so as to outwit competitors before it becomes common knowledge is most crucial (Johns & Van Doren, 2009). As things stand, there is more than enough literature in the body of knowledge of decision support systems (DSSs) for solid waste management. However, there are no explicit publications that have applied the dual concepts of observatory and CI to develop a DSS for MSW. Even if they exist at all, they are in alternate wordings.

2.1 Intelligence Information

For our purposes, we will define *intelligence information* as the data about competitor MSW management organizations and compiled through a sustained cycle over time. We obtain this from both internal and external sources and analyzed by comparing it to the organization's internal data records. The purpose of the intelligence information is to ensure a comprehensive portfolio of the external environment is always

available so that management decision-making will be of very high level of accuracy.

3. PROPOSED MODEL

In this research work, we seek to build a system that will have as its input, the actionable intelligence acquired through the process of CI to build a design that will help in management decision-making. The model is such that actionable intelligence conceptualized through CI is input into an observatory which will eventually form the repository of data for a data warehouse (DWH).

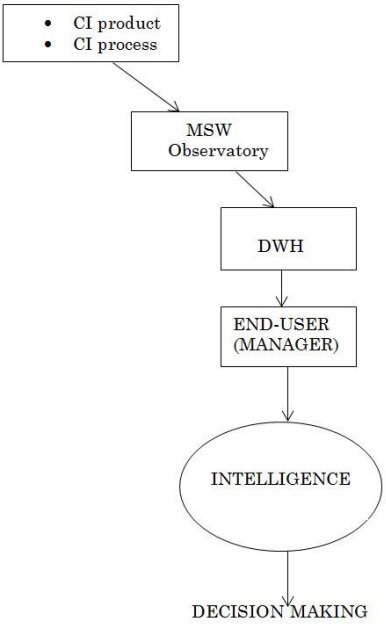


Figure 3: Proposed conceptual model for embedding CI into MSW management

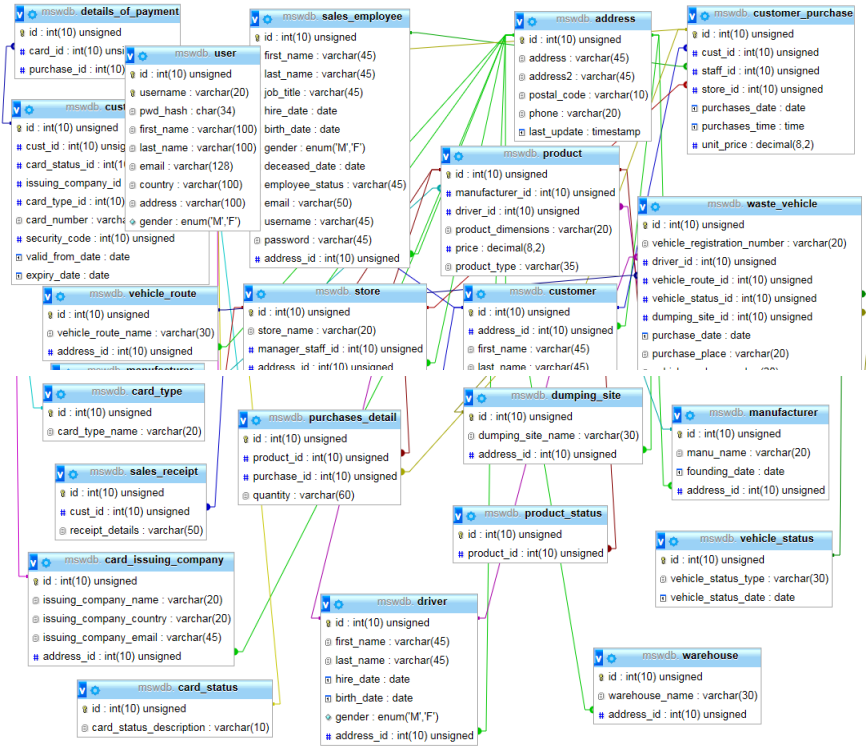


Figure 4: DWH designed through PHPMyAdmin using MySQL with data inputs from CI

3.1 MSW management enhanced by CI

Competitive Intelligence (CI) as a strategic business management process continues to assume prominence in organizations as decision-makers recognize its importance. In the field of MSW, we can also take full advantage of the time-tested benefits of the concept of CI in order to make decisions more effective. This we can achieve by rigorously embedding it in the day-to-day activities of organizations involved in MSW. Our proposed conceptual framework is shown in Figure 5 below.

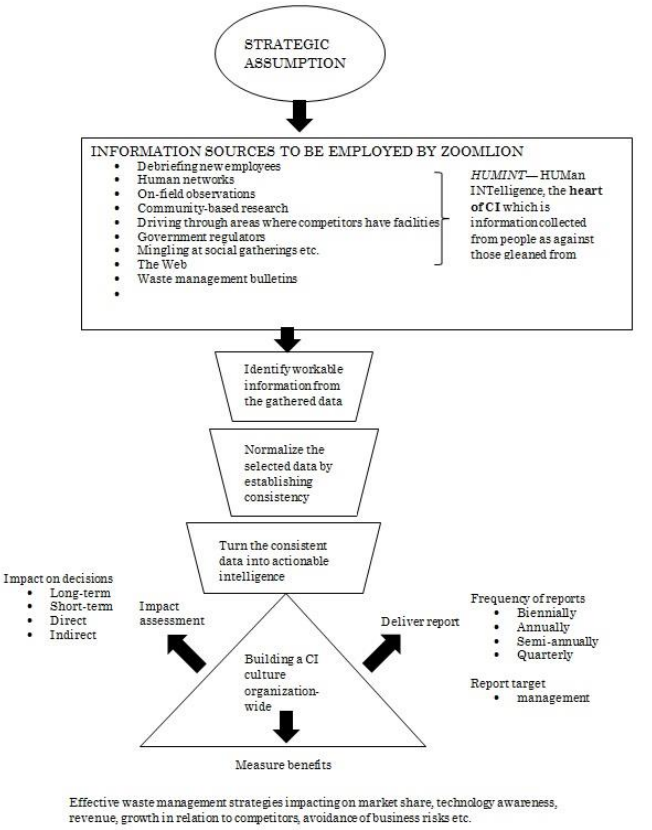


Figure 5: Conceptual framework for the return on CI to Zoomlion Ghana Limited

3.2 Benefits and pitfalls of the CI process

3.2.1 Benefits of CI

- It makes managers proactive so that they are likely to experience few surprises;
- Helps managers to identify new market opportunities and prospective customers;
- Learn lessons from the successes or otherwise of competitors;

- Identification of business trends that can make or mar the business; and
- Have a clear and unambiguous understanding of government policies that the organization has to know to avoid falling foul of the law.

3.2.2 Pitfalls of CI

- There is likely to be misinformation as the desire to acquire information could make one consume anything that resembles one; i.e., inaccurate or incomplete information could pass for genuine information; and
- There is also the possibility of engaging in espionage that is not legally acceptable by the laws of a country which could result in severe sanctions.

3.2.3 Consequences of not implementing CI

- Corporate mistakes often could have been avoided with good CI. For example, companies have:
  - Developed and introduced a new product that was opposite to market trends.
  - Ignored an "inferior" competitor who was going to put them out of business.
  - Believed in a vendor's story that turned out to be an absolute falsehood.

4. CI PRACTICE IN WASTE MANAGEMENT ORGANIZATIONS IN GHANA

4.1 Present status of organizations in Ghana

Presently, there is no waste management organization in Ghana that practices CI for effective decision-making. What could account for this state of affairs could be the total lack of knowledge on both short-term (tactical) and the long-term (strategic) benefits that this could bring to the company. As

stated earlier, in case there exists something of the semblance of CI at all, there is a lack of awareness even on the part of those who should be implementing it. If progress should be made on this front, then a formalization of the process is very necessary. For a fact, the absence of a CI culture company-wide as well as any formalized policies in that direction leaves a gaping loophole in business strategy. Many practitioners are of the view that true intelligence is only created after the thorough analysis and validation of collected information and its subsequent conversion into actionable intelligence which is eventually applied in strategic and tactical decision-making (Gilad & Gilad, 1985a; Gilad & Gilad, 1986; Kahaner, 1997; Calof & Miller, 1997; Herring, 1998).

In this research paper, we are using Zoomlion Ghana Limited as our case study. It is the largest solid waste management company in Ghana with a staff strength of about 80,000. The operations of the company cover the entire country. Yet still, the effectiveness of waste management in its assigned areas of operation is very unsatisfactory as a result of ineffective practices that have remained in place to this day. Most often piled up waste bins are a common sight in the streets and residential areas and could remain uncollected for days and weeks. However, with other waste management companies also in the competition, innovations by any of them is the right way to go since this will impact on the effective waste collection and subsequent effective management .

5. RESEARCH METHODOLOGY

In real terms, CI is a support function in any organization. Thus it is very possible that it could be strictly regarded as an overhead and may suffer a total suspension or extensive budget cuts during austere times. However, we can convince management to embrace the CI process if we can demonstrate

well enough the eventual gains this concept will bring to the organization.

5.1 Implementation of CI in Zoomlion Ghana Limited

To implement the CI process in the organization of study we have identified, we want to refer to Figure 5 above. This is a framework developed to address what we think are the salient steps to take so as to bring innovations into the way solid waste is managed by Zoomlion Ghana Limited.

Firstly, the sources of information must be rigorously pursued in order to ensure that the actionable intelligence to be created eventually is incontrovertible. However, at the heart of the information source, should be *HUMINT*—human intelligence—classified as the heart of CI. This is because it gives more accurate and reliable information to document or hearsay information.

The company should for a start form a small CI group with the primary aim of achieving tactical and strategic targets. This group should be headed by a veteran CI professional most probably recruited from abroad who can provide the needed leadership required. The corporation should then focus on two major drivers; i.e., to improve revenue and service. This can be achieved by ensuring that all the sub-units within the CI group have a very interactive chemistry by always sharing research requests with one another.

5.2 Putting CI into action: Recycling and Composting Strategy

We consider here the specific solid waste management techniques of *recycling* and *composting*. Presently these particular technologies are practiced on a minimum scale by Zoomlion Ghana Limited and likewise its competitors in the solid waste management business. To this end, it has only one recycling and composting plant in Accra called the *Accra*

Composting and *Recycling Plant* (ACARP) that is even operating under capacity. The same situation applies to competitors in the waste management business. This is a very big contribution to the indiscriminate disposal of waste even by customers of these companies because many times they fail to cart away the waste from designated points at the expected times creating a great nuisance for these customers. It is therefore a good business strategy for management to fully concentrate more on recycling and composting and focus more on these two technologies to ease the problem of waste management. In both Accra and all other parts of the country, acquisition of dumping sites is a major problem and soon these will run out. The company can therefore strategize by shifting focus so that it will not be overtaken by events. We can raise an analogy with for instance, the railroad transport system. Over 100 years ago, rail transport was king as the automobile and air transports were in their nascent stages. We all know that over time, the change of transporting from railroad to air and automobiles have been gradual. However, over time, air transport and automobiles have outgrown the railroad even though it still exists alongside them. The key here will be for the organization to recognize the potential in investing in a new technology even though there is an existing one and understanding how it could benefit the organization. This is a very good analogy that the CI group can use to educate management to buy into the idea of prioritizing recycling and composting even though the dumping of solid waste at designated sites will still be practiced. For our purposes, we can equate dumping of waste to the railroad transport system of a hundred years ago. However, recycling and composting can be viewed as the new waste management methods just as the automobiles and air planes replaced the railroad as dominant transportation methods. Just as the railroad transport system still exists though in a greatly reduced role, so can the dumping

of waste as we currently know it coexist with the new technologies of recycling and composting.

Even though there is a great potential for recycling and composting at this company, the real opportunities lie in the new applications they bring. Recycling and composting always generate new products. We therefore need corporate decision makers to do a paradigm shift in their thinking so as to buy into these ideas. They will have to accept that shifting to a new technology will imply that less revenue will likely come from traditional methods already in existence. However, they will have to look to the future positively and accept that the opportunities the new technologies bring and the subsequent new revenues will be unlimited. The secret of success lies in the fact that the company recognizes what kind of technology will ultimately bring satisfaction to customers so that it will draw in new customers and also keep the already existing ones.

We project the CI life cycle as a *U-curve*. This is because from the start of the CI process, the team of researchers tends to have a high level of confidence which dips gradually as the process goes on till it turns around on the up again. This normally happens after the actionable intelligence has been applied to produce a product that eventually brings in the dividends expected in due course. During this stage, there is a reflection in the business returns and awareness is also created which ensures no surprises. Thus the curve is on the positive trend or upward trend at this point.

Below, we construct a U-curve using a scale of 0 to 10, where 0 represents the lowest stage of the process whilst 10 represents the optimum stage where results are showing.

Table 1: Table of values for the U-curve of a typical CI process

X	Y
10	10
9	9.5
8.5	8
8	6

7.5	5.5
7	5
6.5	4.5
6	4.5
5.5	3.5
5	4
4.5	5.5
4	5.7
3.5	6
3	8
2.5	8.2
2	8.6
1.5	9
1	9.2
0.5	9.5
0	9.8

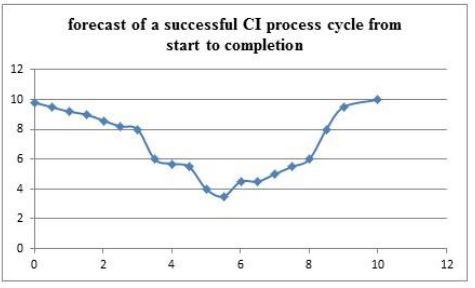


Figure 6: A graphical display of a forecast of the CI process cycle

Looking at the U-curve above, the researcher is generally confident about accomplishing the CI project. However, as it is normally the case, after actually starting to research the project the researcher's enthusiasm bottoms-out and this precipitates a low moral for the entire CI group such that they even entertain the fear that the materials to even complete the project successfully might not materialize. With the passage of time, and with the accumulation of information, the project takes shape and consequently the researcher starts up the far side of the curve.

5.3 Measuring the impact (effectiveness) of CI on Zoomlion Ghana Limited

According to Montes, Moreno, & Fernandez (2004), organizations that are proactive enough to roll out CI in response to environmental changes and develop new capabilities that will counter these external forces will achieve higher performance that will make them more successful. Consequently, we have identified the following measurable items to assess the impact of the value of the CI process (Herring, 1996). These are:

- Client retention;
- Customer satisfaction;
- Market share;
- Acceptance of products as they are on the market;
- Employee keenness to embrace CI;
- Increased revenue;
- Cost savings; and
- Time savings.

6. CONCLUSIONS

We observe that CI helps organizations to avoid unnecessary traps in the business strategies they surely need to adopt so as to remain competitive. However, it is currently not being practiced by any known waste management company in Ghana or if at all, it has not been formalized to this end. In places such as America, France, UK, Japan and Sweden, this concept has been in vogue for decades now and the benefits have been substantial. As a starting point for corporate organizations, they could for instance invite the Society of Competitive Intelligence Professionals (SCIP) to Ghana to organize seminars and workshops for their employees in intelligence-gathering methods and analysis techniques. Moreover, new businesses can also have SCIP give orientation in CI for their

employees right from the start so that the process is rolled out from day one.

We, however, want to reaffirm these salient time-tested objectives about CI.

- It is solely meant for only the top managers of a company who use the insights to identify the bridge between the insights and the bottom-line;
- Generally, you cannot and should not explicitly quantify the value of CI;
- It is important to do surveys with sales people to get ratings on how effective was the inputs from the CI team.
- CI should be viewed as a forecast and not as a crystal ball you can easily see through.

The management of MSW is the singular most pressing job of managers of municipalities and always the decision quality has to be high. However, in most countries, especially developing ones, the level of effectiveness in solid waste management is very unsatisfactory. Thus if the CI concept which is to impact positively on management decision-making is adopted and rolled out organization-wide, there is every likelihood that we can improve on the statistics significantly and relative to the external competition, a major paradigm shift will happen for the better.

What we can do in Ghana here is perhaps develop a curricula that teaches CI as a school subject or discipline so that by the time these students graduate and move on to the work places, they would already be knowledgeable in the field and this would be a good starting point for their prospective employers.

REFERENCES:

Aaker, D. A. (1998). *Strategic Market Management*. (5th Ed.), New York, John Wiley & Sons Inc.

Calof, J. L. & Miller, J. (1997). The status of CI across the globe. *Proceedings of the 12th Annual Conference of the Society of Competitive Intelligence Professionals*: 213-223.

Curtis, J. (May 24, 2001). Behind enemy lines, *Marketing*, 28–29.

Fuld, L. M. (1985). Competitor Intelligence: How to Get It; How to Use It. New York: John Wiley & Sons.

Gilad, B & Gilad, T. (1985a). 'A Systems Approach to Business Intelligence', *Business Horizons*, ***28***(5): 65-70.

Gilad, T & Gilad, B.(1986). 'Business intelligence – the quiet revolution', *Sloan Management Review*, ***27***(4):53-60.

Gilad, B. and Gilad, T.(1988). *The Business Intelligence System*. New York:AMACOM.

Guimaraes, T.(2000). The impact of competitive intelligence and IS support in changing small business organisations. *Logistics Information Management,* 13(3):117-125.

Herring, Jan (1996). *Measuring the Effectiveness of Competitive Intelligence: Assessing and Communicating CI's Value to Your Organization*. Alexandria: Society of Competitive Intelligence Professionals. http://www.scip.org/Publications/ProductDetail.cfm?ItemNumber=11972

Herring, J. (1998). 'What is intelligence analysis?' *Competitive Intelligence Magazine*, ***1***(2):13-16.

IMA, (1996). Institute of Management Accountants, *Developing Comprehensive Competitive Intelligence*.

Jaworski, B. J., Macinnis, D. J. & Kohli, A. K. (2002). Generating Competitive Intelligence in Organizations. *Journal of Market-Focused Management,* 5:279-307.

Johns, P. & Van Doren, D. C.(2010). Competitive Intelligence in Service Marketing: A New Approach with Practical Application. *Marketing & Planning,* **28**(5):551-570.

Kahaner, L. (1997). Competitive Intelligence: How to Gather, Analyze and Use Information to Move your Business to the Top. New York: Simon and Schuster.

Liebowitz, J. (2006). Strategic Intelligence: *Business Intelligence, Competitive Intelligence, and Knowledge Management*. Boca Raton, Auerbach Publications, Taylor & Francis Group.

McKinnon, S. & Burns, W. (1992). The Information Mosaic. Boston: Harvard Business School Press.

Montgomery, D. B. and Urban, G .L. (1970). Marketing Decision-Information Systems: An Emerging View. *Journal of Marketing Research* 7:226–234.

Montgomery, D. B and Weinberg, C. B. (1979). Toward Strategic Intelligence Systems. *Journal of Marketing **43***:41–52.

Montes, F. J., Moreno, A. R., Fernandez, L. M. (2004). Assessing the Organizational Climate and Contractual Relationship for Perception of Support for Innovation, *International Journal Manpower*, ***25***(2), 167-180.

Pearce, F. T. (1976). Business Intelligence Systems: The Need, Development and Integration. *Industrial Marketing Management **5***(2,3):115.

Society of Competitive Intelligence Professionals. "What is CI?" accessed at www.scip.org, on 29th Nov, 2015.

Van Brakel, P. (2005). Innovation and Competitiveness in South Africa: The Case for Competitive Intelligence as an Instrument to make Better Use of Information. *South African Journal of Information management,* 7(1).