

Effective Health & Safety Management Systems: A Benchmark for Success in The Adaptive Age

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Safety Management Systems are a vital component and a legal obligation for organisations across industries in many countries worldwide. Safety Management Systems have existed in various forms for over 20 year, however, with the increasingly growing research interest in Health and Safety on a global scale, little peer reviewed research is available on the actual effectiveness of such systems, in particularly in relation to the construction sector. This paper reports and reflects on the findings from a recent research project that focussed on the detailed examination of the Safety Management System effectiveness, as implemented by a designated safety award winning construction firm in Ireland and explores the particular procedures that were identified as the key factors to the actual effectiveness of its Health and Safety Management system. The paper highlights in particular the innovative 'adaptive' Health and Safety approaches implemented to improve the Safety Management System in a construction management operations environment through a safety culture. The key findings outlined in this paper provide insight into organisational success in the field of Health and Safety Management and suggest methods by which organisations in the construction industry internationally can improve and enhance their Safety Management Systems.

Keywords: Health and Safety, Procedures, Safety Management Systems, Safety Performance

Introduction

"Do I believe in the concept of Zero Harm? Let's just say I believe that nothing is impossible" – Dave Collins

Safety Management Systems are a vital component and a legal obligation for many organisations, irrespective of their industry. Health and Safety legislation typically requires employers to adopt lawful principles of providing a preventative approach to work related accidents (Kinsella, 2012). Procedures and rules form the core component of Safety Management Systems (Mohamed, 2002) and within a legal framework, an effective methodology to manage hazard identification and to assess suitable preventative measures in the workplace is to implement a Safety Management System.

Organisations have implemented Safety Management Systems for a long time but very little academic, peer reviewed studies have been carried out on the effectiveness of such systems (Borys, 2009). The lack of studies on the effectiveness of Safety Management Systems emphasises a critical need to examine specific organisations that have successfully implemented Safety Management Systems with the view to identify and share the key characteristics of their success within the broader construction industry.

Recent research into Health and Safety on specific construction sites in Ireland suggests that firm size is paramount to a successful and effective Safety Management System (Meekel & Hrymak, 2012). Given its status as one of the most hazardous industries in which to work, organisations within the construction industry implement Safety Management Systems for a variety of reasons such as sound economic reasons for reducing work-related accidents and ill-health, as well as ethical and regulatory reasons (Carter & Smith, 2001). By having a Safety Management System in place, organisations are showing their commitment at senior organisational level to the environment, quality and safety in the workplace (HSA, 2006).

The purpose of this paper is to reflect on the recent case study research of the particular Safety Management System of Walls Construction in Ireland, a Health and Safety award winning Irish construction company with an excess of 120 employees. The effectiveness of the Safety Management System in place is attributed to the adoptation of unusually high Health and Safety standards and the dedication from senior organisational management to ensure an incident free culture (Walls, 2013). Therefore, the primary aim of the original research was to examine the specific Safety Management System implemented by Walls Construction and to develop a conceptual benchmark for success within the Irish construction industry.

Evolution of Safety Management Systems

The topic of Health and Safety within the construction industry is well studied and documented. One explanation for the relative high level of interest in the construction industry and Health and Safety could be the high fatality and accident rates that exist and persist year on year. Since the establishment of the Health and Safety Authority (HSA) in 1989 in Ireland, fatality and accident rates within the construction industry in Ireland have reduced, however the Irish construction sector remains the second most dangerous profession in the Irish economy.

The evolution of the Safety Management Systems can be described as an organic growth as it developed from a number of haphazard, best practice activities. Originally, the safety, health and welfare of employees and the general public was managed through the adherence to prescriptive regulation set out by government bodies. Organisations abiding by these prescriptive regulations on a technical protection basis were deemed legally to have effectively managed Occupational Health and Safety (OHS). This approach of regulation placed the responsibility on the governing bodies' inspectorate to ensure compliance with relative legislation and regulation by organisations.

Various catastrophic events in the European Union in recent history, such as the Seveso Disaster 1976 in Italy and the Piper Alpha Disaster 1988 in the United Kingdom led to the introduction of improved legislation under which the implementation of Safety Management Systems was made mandatory. More specifically these specific events led to significant regulatory reform, reallocating the onus of safety management responsibility from the aforementioned inspectorate to individual organisations. In this evolving safety environment, the role of the inspectorate also evolved and legislation required the inspectorate to specifically support and to evaluate the strengths and weaknesses of Safety Management Systems.

The idea of self regulation was first realised in the Watershed Report of 1972 by the Robens Committee in the UK. (Hale, 1998). In the latter years of the twentieth century this shift in Occupational Safety Management responsibility from prescriptive regulation to organisational responsibility led to the grouping of specific practices for organisational safety management becoming known as a 'Safety Management System'. The accumulation of these specific practices developed into a strategy through which an organisation could ensure, so far as is reasonably practicable, the Safety, Health and Welfare of its employees (ATSB Transport Safety Report, 2011)

A number of different theories describe the progression and growth of workplace safety. It has been argued that safety has evolved through different ages (Borys, 2009). More specifically, Hale and Hovden (1998) put forth the original argument that safety evolved through three ages. These are the Technical Age, the Human Factors Age and the Management Systems Age. Glendon et al. (2006) later posits the view that at the time, safety was heading into the Integration Age or the Fourth Age of Safety. He believes that previous ways of thinking are not lost but built on, so that more complex perspectives evolve.

It is believed that we have now entered the Fifth Age of Safety or the Adaptive Age. This new age puts forward the premise that management has relied too much on paper and document based management systems and in stead needs to focus on a more adaptive safety culture. In the adaptive age, learning from successful performance variability is as important as learning from failure. Reason (2000) suggests that there is insufficient emphasis on safety culture in the workplace, which is ultimately one of the key determinants for the success or failure of such systems.

Case Study

Case study research excels at bringing us to an understanding of a complex issue or object and can extend experience or add strength to what is already known through previous research. Yin defines the case study research method as an empirical inquiry that investigates a contemporary phenomenon within its real-life context (Yin, 1984).

The concept behind choosing to examine Walls Construction was based a large project which Walls Construction won and thus they were asked to meet certain Health and Safety criteria. Walls Construction, were contracted to work for Company B, at Company A's campus in Ireland. Company B are a global engineering and construction partner for technology-based clients with over 7,700 employees worldwide. Company B, are a direct construction contractor for Company A, a world leading manufacturer of silicon products, with over 4,500 employees. (Due to strict privacy issues it was not possible to disclose the names of Company A or B).
It is widely known and accepted that the level of Health and Safety at Company A's campus is of the highest international standards. The success rate of the Safety Management System in place at Company A is accredited to the dedication for an Incident Free Culture from senior organisational level down.

The primary objective of the case study research was to examine the specific Safety Management System implemented by Walls Construction and identify the key components that led to the Health and Safety performance and ultimately to the successful zero-tolerance and incident free safety culture. Knowledge is a known source of organisational advantage in projects and this has led to a great deal of interest in how organisations create, transfer and apply knowledge (Sole and Edmondson, 2002). To achieve a comprehensive examination of the Walls Construction Safety Management System, a case study was carried out through repeated site visits over the course of nine months and semi-structured interviews with Environmental Health and Safety (EHS) subject matter experts, both within Walls Construction and the key stakeholder companies to gain a more specific in-depth knowledge.

The primary objectives of the case study research are:
- Examine the Safety Management System implemented by Walls Construction
- Appraise the key characteristics and contributing success factors of such Safety Management System
- Develop a conceptual benchmark for an effective health and Safety Management System for the Construction Industry, in Ireland.

The aim of the case study was to gain detailed knowledge of the precise procedures that the company follows in order to achieve the high Health and Safety standards. In addition, the case study also aimed to identify the specific documentation and practices used by Walls Construction to ensure the Safety, Health and Welfare of their employees on-site. Furthermore, the EHS subject matter experts' experience, expertise and reflection also contains valuable tacit knowledge that should be captured and utilised to assess the effectiveness of the Safety Management System and facilitate continuous improvement.

Study Design

The primary objective of this case study research was to examine and document the key characteristics and contributing success factors that determine the effectiveness of the Safety Management System implemented by Walls Construction that led to the zero-tolerance and incident free safety culture in the company. A qualitative research methodology was chosen due to the attitudinal and exploratory nature of the objectives. The chosen methodology enables the opinions and attitudes of the research sample to be determined and allows for the examination of the Walls Construction Safety Management System.

A qualitative research method was adopted to collect the data and the research was carried out through semi-structured interviews with designated and qualified subject matter experts. This qualitative method of research enables rich explanations of complex Health and Safety phenomena and a conceptual base for clarifications providing the validity of the information received. Bryman and Burgess (1999) point to the fact that the use of qualitative interview techniques and probing for more in-depth views provides richer data.

According to Polanyi (2009), there are two types of knowledge: explicit and tacit knowledge. Explicit knowledge can be articulated and recorded. However, tacit knowledge cannot be operationalised in this manner and is displayed or manifested in what people do (Tsoukas 2003). The qualitative aspect of the study enhances the particular topics through a detailed inquiry process and analysis of the unstructured information. In addition, the chosen questionnaire - semi structured interview methodology, enables to compare and contrast the findings and expand on the knowledge over time.

The case study research includes a comprehensive set of Health and Safety areas that could provide the keys to a successful Safety Management System. This paper focuses on key areas, which include: the origin of safety within an organisation; the size of an organisation and related safety success; importance of employee participation; importance of Safety Culture and importance of information sharing and communication.

In terms of the limitation of this research, the research sample could be considered small, since the undertaken research study was particularly focused and exploratory in nature. The opinions of the EHS professionals may therefore not be a full representative reflection of the views or opinions of the entire construction population. In addition, some sensitivity in relation to specific Health and Safety related issues could lead to ambiguities in the research findings.

To develop a conceptual benchmark based on this specific research the best practice models from multiple organisations should be pooled and formatted to support a more comprehensive benchmark representative for the construction industry in Ireland.

Analysis and Findings

Walls Construction uses the Occupational Health and Safety Assessment Specification (OHSAS) 18001 Safety Management System series. OHSAS 18001 is an international Safety Management System specification created through a concerted effort from a number of the world's leading national standards bodies, certification bodies and specialist consultancies. It provides a formal framework of standardised documentation to help organisations facilitate the implementation of Health and Safety Management into their existing management scheme (OHSAS 18001 Occupational Health and Safety Zone, 2007).

OHSAS 18001 is based on a number of principles. These are:

- Clear demonstration of leadership and management commitment
- Setting of objectives leading to improvement of Occupational Health and Safety (OHS)
- Effective hazard identification, risk management and risk control
- Competence of work force
- Consultation and communication with all stakeholders
- Clear lines and definitions of responsibility
- Systematic approach to managing OHS
- Monitoring the effectiveness of the safety management system through audit and review

Walls Construction implements OHSAS 18001 for a number of specific reasons. Legal Obligation: Although it is not a legal requirement to use OHSAS 18001 specifically, it is a legal requirement to have a Safety Management System in place as a minimum. Financial Protection: In the event of a serious accident in the workplace, a Safety Management System, implemented correctly, can help protect the firm in the result of a claim against them. Ethics: Implementing a Safety Management Systems shows the public, employees, investors and potential clients a dedication to safety in the workplace, a dedication to protect them. Tender Advantage: By having such a system in place, it gives Walls Construction a distinct advantage over tender competitors. Systems Synergy: Walls Construction uses ISO 9000 and ISO 14000 to control Quality and Environmental Management. OHSAS 18001 was updated in 2007 so it could be easily adopted by organisations with existing management systems i.e. ISO 9000 and 14000. The use of these three specifications allows for a strong, well rounded management system core. Certification and Recognition: Implementation of a highly regarded specification such as OHSAS 18001 gains Walls Construction certification and recognition from certifying bodies such as British Standards Institution (BSI). Safety Culture: Using the OHSAS 18001 system means everybody within the organisation abides by the same rules

and policies from managerial level to subcontractor level. This helps create a safety culture within the organisation. Compliance: The use of OHSAS 18001 gives Walls Construction an advantage with regards to compliance with legislation and regulations. The OHSAS 18001 system sets out a standardised framework of documentation created in compliance with legislation and regulations allowing for a 'plug-in-and-go' approach.

Surveillance Visits

Walls Construction receives surveillance visits from the British Standards Institute (BSI) every 6 months. When carrying out surveillance visits the BSI conduct a number of activities as listed in Table 1.1 below:

Table 1.1 BSI Surveillance Visits

A walk through of the company Head Quarters, the procedures in place and the companies records
An audit of the existing emergency procedures
An audit on material storage procedures
An audit on training records
An audit of plant records
Site Visits
Interviews with staff
An audit on conformance
An audit of the previous report and conformance with recommendations made

Walls Construction receives the surveillance visit report 2-3 weeks thereafter and is expected to have acted upon this report in full before the next surveillance, in 6 months time. The tolerance for non conformance is very low and Walls Construction run the risk of having their certification revoked if found outside the minimum conformance criteria. This tight time frame between surveillance visits requires constant work from the EHS Department to continually improve the system.

Walls Construction are expected to go above and beyond the recommendations made in the surveillance visit report. A 'tick-the-boxes' mentality falls outside of the minimum conformance criteria, the company need to be seen to be making a conscious effort to improve on their own. On top of the BSI surveillance visits, Walls Construction conduct internal, weekly audits for the purpose of keeping all records and documentation up to date and up to code. This is an example of the conscious effort to improve.

Employee Participation and Consultation

A key concept of OHSAS 18001 is the idea of employee participation and consultation. Employee participation and consultation is a direct requirement of the OHSAS system and sets the following criteria for interaction as listed in Table 1.2 below:

Table 1.2 OHSAS key criteria for Employee Participation

Involvement with hazard identification, risk assessment and control determination
Appropriate involvement in incident investigations
Involvement in the development of OHS Policies and objectives
Consultation with regards to change that affects their OHS and subcontractor OHS
Representation on OHS matters
Communication of arrangements for participation
Consultation with external parties, when relevant, of safety procedures

Communication & Information Sharing

Communication is pivotal in the smooth running of the OHSAS 18001 Safety Management System. Effective communication allows all employees to be 'on the same page'. Good communication between employees and the system means everyone is complying with the law and regulations and abiding by the rules and policies of the company. Internal communications are essential so that employees on all levels are involved with Health and Safety issues. It is also important that any and all documentation be readily available to personnel.

Record Keeping is vital for the Walls Construction Safety Management System, it helps demonstrate satisfactory operation of the system. Up to date and up to code records make their surveillance visits flow faster and smoother and make it easier for employees to find the right document i.e. the correct revision of that document. In order to ensure the records are in order, Walls Construction use a cloud server to which every employee has their own login details. If an employee is working on a document it must be logged out and it cannot be edited by another employee, this helps eliminate confusion and communication paths crossing.

Key requirements of the communication set by OHSAS 18001 are:
- Internal communication between various levels and operations of the company
- Communications with contractors and other visitors to the workplace
- Documentation of communication between company and external interested parties

Inter organisational information sharing in relation to Health and Safety issues, between Walls Construction and its external stakeholders is regarded as critical to avoid injuries. Walls Construction encouraged the relevant external construction project stakeholders, including direct and indirect contractors to share their specific best practice procedures in their areas of expertise. This enabled the creation and development of comprehensive procedures to protect the workforce from frequent occurring minor injuries and accidents on site. This inter organisational information sharing has been a cornerstone of the development and continuous improvement of Walls' Health and Safety Management System.

Company Size

It is found that the size of the firm is directly related to a company's Health and Safety performance.
In particular larger construction firms have the distinct advantage of larger organisational structures with dedicated departments and specialist resources assigned to the management of Health and Safety. The recent recession in Ireland had a significant effect on smaller firms as the economic downturn forced them to cut expenses and to save money, affecting Health and Safety related budgets. Although it is believed that with time, effort and commitment to the Safety Management System the Health and Safety performance of any company can be improved to achieve similar results as described.

Walls Construction have created an adaptive culture within the company to continuously improve its Health and Safety performance. The concept of a safety culture within the company is embedded in the successful implementation of the OHSAS 18001 system to ensure shared views and attitudes towards safety in the workplace among all employees. Their continuous improvement and success to date demonstrates the employee's understanding of Health and Safety Management, their ability to successfully implement and actively use the OHS system effectively to achieving a zero-tolerance and incident free safety culture.

Keys to Successful Safety Management System

Summary of the key elements to an effective Safety Management Systems based on interview findings':
- 'Top Down' Commitment to Safety
- Procedures for Measurement and Improvement
- The PDCA Cycle
- Communication
- Clear Records
- Continuous Training and Education
- Competent and Dedicated Staff

- Adaptive Safety Culture
- Teamwork
- Up to date and up to code Documentation
- A Focal Point for Safety within an Organisation
- No Ambiguity, No Doubt
- 'Best Practice' Adopted
- Employee Participation and Consultation

Reflection and Recommendations

The case study research demonstrates that Walls Construction have developed and maintained a highly successful Safety Management System and an effective systematic approach to safety management. This system is the product of continued measurement and improvement over a number of years and a continued effort by all of the staff at all levels and inter-company communications with its external stakeholders.

The success that Walls Construction hold in the field of Health and Safety Management does not lie solely with their systematic approach to safety management. The company have also managed to create an adaptive safety culture within the workplace which is considered the most advanced. The results of this case study research have also brought to light a number of key elements to effective safety management that Walls Construction incorporates within their Safety Management System. In addition, the sharing of information between external stakeholders eliminates ambiguity and enables to create one system that companies can successfully implement by collaboration and sharing best practice procedures through inter organisational information sharing.

The success of Walls Construction's Health and Safety Management is fundamentally modelled on the use of the OHSAS 18001 specifications combined with the commitment from every employee within the firm to ensure consistent implementation and continuous development. The standalone EHS Department within its company structure and a central team dedicated to the management of Health and Safety within company further helps to eliminate confusion and ambiguity

The case study research suggests that a number of key characteristics to successfully implementing an effective Health and Safety System would favour larger organisations, suggesting that firm size is key to Health and Safety performance. Although, the research does highlight a number of key factors that smaller firms could implement to improve their Safety Management System. If smaller companies learn to adopt a more adaptive and collaborative approach to Health and Safety Management Systems it enables them to also benefit from best proactive procedures and achieve improved safety performance.

More research needs to be carried out with regards to effectively managing Health and Safety in smaller firms or ways to address the challenges directly related to firm size. In addition, it is recommended to also incorporate smaller firms and their specific requirements to achieve more effective Health and Safety Management Systems in smaller companies.

In conclusion, a conceptual benchmark for success can be created based on this case study research. To develop a benchmark it is however recommended to expand the research to incorporate an increased number of large companies. Walls Construction have been extremely successful in their pursuit of high quality safety management and to model from their effective system could lead to higher success rates in other large firms on an international scale and potentially across different industries.

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Appendix

(EHS Manager with Company A) Sample Interview Transcript Extract

What are the criteria placed on companies to work here at Company A?
There are 3 strict prequalification criteria that need to be met before a company can even be considered for tender, these are:

- Financial Stability
- Safety Performance
- Job Specific Experience

These minimum performance criteria are brought down to Sub-Contractor level. Walls Construction never prequalified for Company A directly, they would have prequalified for one of our Direct Contractors as a General Contractor. The Tendering process is very much like that of the Traditional method you would see used in the industry and the Tenders are sent out on an Environmental and Risk basis i.e. where on campus the work is to take place, what are the surroundings, is it specialist work etc.

What issues do you see, with regards to Health and Safety in the Construction Industry today?
The industry needs a cultural change, the mentality needs to change. We have an IFC but that is not necessarily the case outside of here. I've seen a lack of commitment from management; larger firms tend to manage safety better because we have health and safety departments, a team solely dedicated to safety. Not every firm has this, especially smaller firms because they can't afford it...So you would say firm size is a big issue within the industry?...Yes, absolutely, our direct contractors are the biggest in the country and have the best safety records; which contributes to ours.

What are the Health & Safety Management Systems you have in place here?
Company A runs a Corporate Wide OHSAS 18001 system.

In your opinion, what is it that makes a Safety Management System effective and successful?
An effective system requires commitment from all parties, from managerial level to worker level. Commitment from the top down is vital and a key driver is the safety culture. We try to have an Incident Free Culture or IFC and we achieve this through communication and dedication to safety. We also have a next to zero tolerance policy which drives our contractors to be the best they can.

What is your opinion, with regards to sharing information on best practices and creating effective Safety Management Systems?
Well here we collaborate with our Direct Contractors to create our best practice models we don't pretend to be experts in everything. Most of our in house procedures were created through collaboration with our DC's so for me I think it is an important aspect. We shouldn't do things alone, working as a team is in important within a firm and so it should be within the industry.