Programme design dimensions explored for a professional occupational safety and health management qualification for Africa

R. J. Steenkamp

Business Management, University of South Africa (UNISA), South Africa. E-mail: steenrj@unisa.ac.za.

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Workplace injuries and illnesses cost companies huge amounts in wasteful and often preventable expenses. Hazards can be eliminated and controlled through proper education in production and operations management (POM) and occupational, safety and health (OSH), yet no South African higher education institution provide this need. The complexity and multi-disciplinary nature of the OSH profession is fundamental to the problem. The research report discusses the problem in terms of the need, the large scope of the OSH function, contents (curricula) of a proposed OSH degree and programme implementation realities. The problem was explored by means of a mixed method survey including two questionnaire surveys. The results created a hypothesis for further investigation, but the exploratory qualitative investigation clearly indicates the need for degrees in POM (with several OSH based modules) and a similar qualification with specialisation in OSH. The comprehensive secondary research survey supported the findings and only a few new developments were identified that will not influence the OSH curricula significantly. Both questionnaire surveys confirmed the proposed OSH qualification and the feedback from industry experts indicated the urgency for an OSH degree and provided potential solutions to implementing such a qualification.

Key words: Workplace injuries, higher education, the occupational, safety and health (OSH) function, production and operations management (POM) and occupational, safety and health (OSH) degrees, degree qualification, programme implementation.

INTRODUCTION

Unsafe workplaces in manufacturing industries are on the daily agenda of top management within their strategic corporate social responsibility (CSR). In theory, a perfect operation should have zero risks in terms of safety hazards, bad hygiene or health risks. The POM function of any manufacturer is responsible for transformation processes which may cause different types and levels of occupational risk. Safety and health does not start with a professional OSH function because process design of operations systems determines the nature of the transformation processes and the manner how value is added. POM is therefore the heart of any business and this makes it the most important business function (Krüger and Steenkamp, 2008: iii, 6). This is fundamental to the philosophical debate that POM excellence will eliminate the need for an OSH function. It could thus be argued that a proper and comprehensive qualification in POM should be established first and should precede a qualification in OSH. The real world tells a different story and both POM and OSH related qualifications were explored.

Workplace injuries, illnesses and fatalities still occurs world-wide causing immeasurable pain and suffering to employees, their families as well as harm to the business itself. OHS is therefore a multidiscipline involving the social, mental and physical well-being of employees. It endeavours to protect all employees, family members, customers, suppliers, communities and other members of the public affected by the workplace environment (Barnett-Schuster, 2008: 1).

The role of POM is broadening in terms of safety, health and environment (SHE) management. The challenge to create and sustain a healthy and safe workplace is increasing (Nieuwenhuizen, 2011: 154) and
there is a culture shift towards the human element, philosophy of work and productivity within a sound OSH culture. Goetsch (2011) is a leading authority in the OSH field and a major part of his recent publications focuses on the human element. The International Journal of Occupational Safety and Ergonomics (IJOSE), for example, only focused on the protection of the human in the workplace and new approaches to measuring work-related well-being in a recent publication (IJOSE, 2011).

OSH should therefore consist of a multi-functional team to address the complex and multifaceted challenges such as explosives, stress, standards, noise, laws, radiation, product safety, ergonomics, acquired immunodeficiency syndrome (AIDS) and ethics to mention a few. The OSH manager must have a team of expertise to address the different types of risks. The team may also be referred to as the SHE-team and may consist of several specialists such as: an occupational physician, occupational health nurse, health physicist, industrial hygienist, environmental engineer and a safety engineer. An effective OSH manager will have an effective OSH team that will form the core of the OSH function. The roles of each specialist will vary from industry to industry. The mining sector has different challenges and engineers (for example, mine ventilation engineers) can make a significant contribution to safety and quality of work-life (OWL). The engineer has more potential to affect safety in the workplace than most other persons (Goetsch, 2005).

The need for a multi-disciplinary OSH qualification

POM managers are concerned with many functions of which design (of process, work methods, layout and product) is a major sub-function. They design transformation systems for specific products while they also design a healthy and safe working environment. Slack et al. (2010: 251-252) highlights four primary OSH dimensions of which each are separate sciences on its own, namely ergonomics, working temperature, illumination levels and noise. If POM managers can have these challenges under control (by means of design excellence and control), then they have eliminated major hazards, potential risks and contributed significantly to OSH. Earlier publications and conventional views of OSH were more towards risk concepts, risk control, risk assessment, risk perception, risk communication and cost-benefit analysis (Fuller and Vassie, 2004) instead of prevention of hazards through technology, improved operations design and improved human behaviour.

OSH excellence should be a strategic priority in view of the global World Health Organisation (WHO) statistics. Business pressures of time to market, high productivity targets and the competitive markets are factors working against OSH, demanding professional OSH management. The large need for trained and educated professional safety and health practitioners is not only a South African phenomenon. The International Labour Organisation (ILO) revealed that, despite global efforts to address OSH concerns, an estimated 2 million work-related fatalities and 330 million work-related accidents still occur each year (ILO, 2009:xi). Productivity is at stake apart from the human suffering that results from work-related injuries and deaths. The direct and indirect costs at national and global levels are huge, taking into account compensation, lost working time, interruption of production, training and retraining, medical expenses and social assistance. Culture precedes action and the South African government should enforce efforts to address this challenge once and for all. The mergers of South African higher education institutions was not a success and capacity decreased in most cases.

OSH education became a strategic priority and the provision of OSH-related training must occur at all levels in most industries as part of a national OSH system (ILO, 2009: 164). Basic management skills are lacking in the manufacturing industry and the short learning programmes (SLPs) are very limited to address the scarce skills. The popular 12 month programme in safety management offered by Unisa’s Centre for Business management is sufficient for very basic entry-level OSH representatives (Van Loggerenberg, 2011).

Industries have their own challenges and training needs. Dust and noise may be some of the primary hazards in mining. The Mine Health and Safety Council (MHSC) (South Africa) has set targets for the mining industry of no percentage loss of hearing (PLH) greater than 10% by 2008 and no machinery emitting noise of higher than 110 dBA by 2013. The targets are an attempt to improve the prevention of noise-induced hearing loss (NIHL) in the mining industry and are based on current statistics that 67% (or 209 666 people) of South African mineworkers are exposed to high noise levels of 85 to 105 dBA (TWA8h). Second-level noise control in terms of hearing conservation excellence through education may therefore be more important in the mining industries (Vinck, 2011). Vinck also actively supports and is involved with new models and standards to eliminate NIHL of which quality personal protective equipment (PPE) in terms of custom-made hearing protectors is an example.

Professional OSH managers (or SHE managers) will therefore need multiple competencies. They may vary between leadership, ethics, organisational culture, business management, operations management, quality management, economics, engineering, ergonomics, mathematics, physics, chemistry, biology, risk management and project management, etc. The literature study in the next area elaborates on these functions and related skills needed.

One of the most important skills is the understanding of industrial hygiene. This science is devoted to the control of environmental factors in the workplace that may cause sickness, impaired health or discomfort. They address
toxic materials, work processes, ventilation systems, good housekeeping and proper PPE. The science of air quality demands highly trained professionals and the same applies to noise control and hearing conservation excellence. Regulations, laws, high standards or so-called “best practices” do not necessarily work in practice. It becomes clear that OSH managers must succeed within a very complex than ever before dynamic internal and external environment. The South African Mine Health and Safety Act (Act No. 29 of 1996 [MHSA]) established legal obligations that include the “proper use and care of PPE”. This is the theory, but in practice, supervisors must monitor and insist on the proper use of PPE (or face disciplinary action). The human ear is very sensitive for any material such as earplugs regardless of the modern more comfortable acrylic hypo-allergenic materials used. This is a good example of conflict between “proper use and care of PPE” and human resistance to wear hearing protection devices (HPD’s). Many workers, including supervisors, still prefer not to wear HPDs.

NIHL statistics is alarming because noise is regarded as the “silent disease” due to its insidious nature. To manage noise and hearing conservation (second-level noise control) is a science on its own demanding sophisticated management skills to control (Vinck, 2011). The World Health Organization (WHO, 2009) has provided the following statistics related to the problem:

1. Noise can adversely affect a worker’s performance, for example in reading, attentiveness, problem solving and memory.
2. Prolonged or excessive exposure to noise, whether in the community or at work, can cause permanent medical conditions such as hypertension and heart disease.

It becomes clear that the OSH function has become more complex than ever before with reference to OHSA (1993) and MHSA (2008) and owing to advances in technology, new legislation, the potential for costly litigation and a proliferation of standards (Goetsch, 2005: 628). This concludes the background to the problem and the next areas will deal with a deeper insight and investigation to the research problem in terms of secondary and primary research data.

Research problem

Takala (2009) from the European Agency for Safety and Health at Work hopes to formalize OSH education closer to and within the classroom in a quest for risk education in schools and other education institutions. Smit (2011) was involved with multiple OSH curricula design projects in South Africa but without the success to implement such degree programs. The current (at the time of this investigation) lack of a proper OSH qualification can be regarded as the symptom of the problem. The need (or its absence) for such a qualification and ability (or inability) to offer such a program must be investigated to determine the essence of the problem. Does the need justify a degree qualification and if so why is no South African higher education institution offering (at the time of this investigation) such a program?

It does seem that the need for a proper OSH qualification is very significant and obvious – this causes increasing frustration and an outcry to government (or sponsor) to intervene. The BTech in safety management degree is being phased-out by most South African universities and professionals have to equip themselves abroad or by means of several local and international SLPs of which most are limited in scope and of which some are not recognized/accredited. Other OSH managers rely on internal training (and mentorship) and others are forced to compromise when they accept positions without the necessary skills. This exploratory investigation focused on the importance of OSH, the need for proper OSH education, proposed POM and OSH curriculums, program (degree qualification) compositions and to examine the difficulties of rolling out such a program.

RESEARCH METHODOLOGY

Mixed methods (with some epistemological differences from different research paradigms) were used to increase the breadth and depth of understanding and to address the research problem. The researcher also selected this approach due to some overemphasis on quantitative methods, although some are against competing paradigms in qualitative research. Although, the quantitative survey method took dominance over the other qualitative methods, an attempt was made to apply triangulation (measure and confirm the same aspect by different means). This research was not only inductive (to test curriculums) but also deductive to develop and enrich theory. Cooper and Endacott (2007: 816) refer to generic qualitative research of which phenomenology and action research is applicable in this study. The phenomenon is explored in depth by also including several participants (academics, consultants and OSH managers) in terms of their “lived experiences”.

The research is exploratory and therefore did not commit to a singular paradigmatic research practice nor did it attempt to generalize results through external validity. The primary challenge of this type of research study is to find “gatekeepers” of different information sources and requires limited inference or conclusion drawing (Cooper and Schindler, 2011: 18). A combination of personal surveys, observations, questionnaire surveys, interviews with experts and research reports have been studied. Qualified occupational hygienists and lecturers (previous and currently employed) at higher education institutions in the discipline were consulted and meetings with a group of OSH officials from leading industries provided more insights.

The main instruments (methods) used were based on a generic exploratory design by observing and interviewing small samples, to answer the “what” question of OSH qualifications, applying content analysis and to increase insight. The quantitative research method used was surveying larger samples. The following three specific methods were utilized:

1. Although, literature plays a minor role in qualitative research, recent thematic paper publications from industry OSH experts were
The broad scope of the OSH function justifies a degree qualification

The broad scope of the OSH responsibilities (ASSE/BCSP, 2007: 5-6) depends on the nature of the industry, but most of them do at least the following: management, training (communication), operational and administrative functions:

**General and safety management**

Planning, organising and control activities intended to achieve safety objectives in an organisation. Implement administrative and technical controls that will eliminate or reduce hazards. Judging the effectiveness of existing safety and health related programs and activities. Assessing safety and health risks associated with equipment, materials, processes, facilities or abilities. Assist staff to determine safety objectives and programmes to achieve objectives. Integrate safety into the culture of an organisation. Ensure that dangerous chemicals and other products are procured, stored, and disposed. Identify conditions or actions that may cause injury, illness or property damage. Control hazards that can lead to undesirable releases of harmful materials into the air, water or soil. Ensure that mandatory safety and health standards are met. Determine facts related to accidents or incidents based on real evidence.

**Training, consulting and effective communication**

Provide employees and managers with the knowledge and skills necessary to recognize hazards and perform their jobs effectively. Coordinate and conduct training based on specific training and educational needs. Empower, mentor and advise staff on different levels to be and become professional OSH officials. Training includes a wide spectrum of aspects such as communications pertaining to emergencies (fires, accidents or other disasters), reducing fire hazards by inspection, layout of facilities, process design, design of fire detection and suppression systems. Communication in OSH should focus on the issues the recipients need to understand and it requires authoritative and trustworthy sources. Effective OSH communication must be ongoing and includes giving information, instruction, training and supervision. All these dimensions of OSH communication play a role in awareness, knowledge and understanding in order to improve the health and safety of the work environment (Bonehill, 2010: 23).

**Operational activities**

Understanding the operations system (the transformation processes) causing hazards and risks. Improve ergonomics, processes, layouts and the general workplace based on an understanding of human physiological and psychological characteristics, abilities and limitations. Identifying and implementing design features and procedures to protect facilities and the businesses from harm.

**Administrative**

OSH managers have an important administration function
such as general record keeping and documentation of quality management systems. The maintenance of OSH information is crucial to meet government requirements, as well as to provide data for problem solving and decision making.

The six primary responsibilities of OSH management

Besides the broad scope of OSH responsibilities justifies a proper OSH qualification. The six primary responsibilities were taken from the ASSE and BCSP career guide to the safety profession (ASSE/BCSP, 2000: 3-4) and they were also used/tested in one of the questionnaire surveys (next area). The immense responsibility of the OSH professional is hereby confirmed and also highlighted by Fuller and Vassie (2004) and Goetsch (2011):

Hazard assessment, anticipate hazardous conditions and risk assessment

There are multiple types (and combinations) of hazards. Some examples are: pressure hazards, electrical hazards, vibration hazards, mechanical hazards, falling hazards, lifting hazards, temperature hazards, noise hazards, etc. Safety practitioners must be alert to the possibility of the unplanned interaction of hazards and energy exchange which could result in harm or damage. The focus on hazard identification, hazard analysis and risk assessment with the view to preventing harm or damage is irrevocable part of the functions of safety practitioners.

Assist in the development of prevention and safety control measures

Based on the results of the risk assessment the safety practitioners needs to advise line staff on the development of risk mitigating practices and safety control measures. This includes hazard prevention, promoting safety and preparing for emergencies. Consideration must be given to the best internationally accepted practices that keep track with cutting edge technology and procedures.

Assist with the implementation of safety control measures

Once developed in accordance with the outcome of the risk assessment line management have to implement the risk mitigating and risk control measures. The implementation of such control measures needs to be planned and supervised by line management. The safety practitioner has a very explicit guidance and monitoring function during the implementation of controls.

Assist in evaluating success of control measures

Safety practitioners must play an active role in determining the efficacy of existing and new safety processes of work. It is the responsibility of the safety practitioner to advise line managers on determining the efficacy of safety risk control measures through an effective auditing process.

Assist with analysis of safety incidents and implementation of recommendations

Rigorous analysis of any incident forms the basis of revealing and understanding flaws or deficiencies in safety management control measures and programs. Line management is responsible for analysing safety incidents with the view to ascertain root causes. Root cause analysis result in the implementation of recommendations to prevent re-occurrences.

Maintaining the process of continual improvement

Continuous improvement in all respects, including the management of change is an indispensable element of ensuring and sustaining organisational viability. It is the responsibility of line management to innovate and to manage change on a consistent basis.

Primary OSH degree topics

The body of knowledge of the OSH function seems to be relatively standard. A few hundred research papers were presented at the recent ASSE conferences and the topics did not provide many new insights. It also confirmed the core modules included in the proposed OSH curricula tested in the surveys (results of the two questionnaire surveys). After analysing the proceedings and paper abstracts (ASSE conference, 2010) and (ASSE conference, 2011), the following seven topics (and related topics) can be regarded as a collective summary of the main themes:

Safety leadership and corporate sustainability

It is unimaginable to have excellent OSH leadership without a strong safety culture based on certain behaviours, norms and values. OSH excellence resides in corporate leadership. Visible leadership in the workplace is supported and the “Twenty Foot Rule” is an example of a process-driven concept that allows organizations to improve employee communications and increase their participation in the success of an organization. The principle of “Point of Action is inherent to this where management efforts are most effective when they focus at the point where the work is actually done.
**Key strategic issues influencing global workplace safety and health**

The key strategic issues are the Global Harmonization Standard, ISO 26000 SR, ISO 31000 RM and chemicals and hazardous materials management.

**A zero-incident safety culture**

Large companies have invested significantly in developing work standards, processes and engineered solutions to workplace conditions that protect employees. Behaviour-based safety (BBS) concepts began engaging employees across, as well as up and down, the organization in improving awareness and resolving observable workplace issues.

**Improve human safety behaviour**

With reference to BBS (Cooper, 2004) the interventions to address the human dynamics of injury prevention have improved dramatically since the early 1900s. Focus and distraction are human factors that impact both performance and the risk of error. Unlike observable conditions, such as human behaviour, the conditions that give rise to human error are largely unobservable and unmeasurable. Addressing these factors requires the application of psychological principles to the manger's toolbox.

**Continuous improvement of an effective OSH management system**

Most experts agree that an effective OSH program will be based on the following four elements:

1. Leadership, management commitment and all employee involvement,
2. Workplace analysis,
3. Hazard prevention and control,
4. Safety and health training of all employees to eliminate or avoid hazards.

**Risk management**

Risk management needs to be embedded into every aspect of core “modern” management. In the face of ever-present uncertainty, risk management is fundamentally about how well an organization can consistently understand / manage associated threats. The following new international standards were popular topics: (1) ISO 31000, *Risk Management- Principles and guidelines on implementation*; (2) ISO/IEC 31010, *Risk management- Risk assessment guidelines*.

**Combustible dust is an insidious hazard**

Many manufacturing environments fraught with hazards have slow but steady accumulation of fine “dust” particles in often unseen areas such as ceilings. Machinery can seem innocuous compared with more immediately obvious dangers of bodily injury posed to workers. Several factors contribute to the interplay of an explosion. As a rule, these five elements interact in order for an explosion to occur:

1. Combustible dust (fuel),
2. Ignition source (heat),
3. Oxygen (oxidizer),
4. Confinement of the dust cloud,
5. Dispersion of dust particles in sufficient quantity and concentration.

**OSH rated qualifications offered in Australia**

Some international OSH curricula benchmarks were investigated. South Africa has a much stronger mining industry (for example) than Australia and yet we do not offer a formal OSH qualification for mining. The following programs are available in Australia (http://fastfound.com/study-in-australia/best-safety-sciences-degrees) and this is an indication of South Africa’s tertiary education position in terms of an OSH bachelor degree education. It also provides additional benchmarks for curricula design purposes. The following seven bachelor degrees are offered in Australia:

1. New South Wales: Bachelor of Environmental and Occupational Health and Safety; Bachelor of Occupational Health and Safety at University of Wollongong,
2. Queensland: Bachelor of Occupational Health and Safety, Central Queensland University; Bachelor of Occupational Health and Safety Science at University of Queensland,
3. Victoria: Monash University: Bachelor of Occupational Therapy,
4. Western Australia: B.Sc. on Health, Safety and Environment at Curtin University,
5. South Australia: OHS bachelor, University of South Australia.

**OSH related qualifications offered in the USA**

The majority of the programs offered in the USA are undergraduate Bachelor of Science (BS) programs. However, by comparison there are 35 accredited Masters of Science (MS) industrial hygiene programs and 6 BS industrial hygiene programs and overall, 2800 accredited programs (www.abet.org). The following universities in...
Table 1. A BS in OSH curriculum.

<table>
<thead>
<tr>
<th>Group A</th>
<th>Group B</th>
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<tbody>
<tr>
<td>Fundamentals of OSH</td>
<td>Risk management</td>
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<tr>
<td>Legal compliance</td>
<td>Project management</td>
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<tr>
<td>Construction safety</td>
<td>Leadership</td>
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<tr>
<td>Industrial ergonomics</td>
<td>Training and development</td>
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<tr>
<td>Interactions of hazardous materials</td>
<td>Accident investigation</td>
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<tr>
<td>Total SHE</td>
<td>Fleet safety</td>
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<tr>
<td>Introduction to fire protection</td>
<td>Hazardous material management</td>
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<td>OSHA standards</td>
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<tr>
<td>Industrial hygiene</td>
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<td>Toxicology</td>
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</table>

The USA can be used as benchmarks: Central Missouri (Occupational Safety and Health, BS); Fairmont State University, (Occupational Safety, BS); University of Houston-Clear Lake (Environmental Science and Safety, BS); Indiana University of Pennsylvania (Safety Sciences, BS); Marshall University (Safety Technology BS); Oakland University (Occupational Safety and Health), and others.

The well-known international OSH curricula from the Columbia Southern University were used as a detail benchmark in this study. A large majority of South African students will be working adults that would need to study part-time. A distance learning (open distance learning) Bachelor’s degree would be appropriate and the popular offerings of the Distance Education and Training Council (DETC) accredited Columbia Southern University was used as a benchmark. Their Bachelor of Science in OSH consists of 17 major modules (besides other general modules required) listed in Table 1.

This syllabus can be regarded as sufficient for a bachelor’s degree with the assumption that the entry-level general modules (not shown in the table) are appropriate and the variety of electives (not listed in the table) is sufficient. This example also shows the interdisciplinary make-up of such a qualification.

**OSH priorities according to the American regulatory compliance requirements**

The occupational safety and health administration (OSHA) is the only entity created under the OSH Act given the power of the law. The professional development conference (ASSE, 2011) highlighted the core dimensions of the regulatory compliance requirements presented by (Fisher and Hudson, 2011) in terms of OSHA regulations and compliance guidelines. They covered important topics such as using common sense and intelligence (making the comment that nobody gets cited or fined for being more safe than the minimum required by the law), the judicial branch, the legislative branch, understanding OSHA, federal regulations, understanding health standards, understanding safety standards, distinguishing between performance and specification standards, violation of the law and the general duty clause) proper record-keeping and the compliance process, the air contaminant standard, hazard communication, hazardous waste operations, emergencies response, environmental legislation, regulations and standards. Regulatory compliance requirements (and compliance to several safety management system standards) were included in the proposed OSH curricula discussed in the next area.

**Questionnaire surveys**

**Results of survey one (1) - The need for a degree qualification in POM**

As mentioned in the introduction, the OSH function does not cause hazards. It is a staff function and therefore need to consult, provide advice and negotiate. The POM function is responsible for manufacturing which implies potential hazards. OSH management would not be necessary without factories, mines and industries with several types of operations systems. These systems imply transformation processes designed and operated to produce outputs from inputs. The dynamics of these production processes cause risks and the presence of risks will always be relative. The risks are a combination of unsafe work conditions and unsafe acts committed by fellow workers. In addition, modern competitive markets of today demands agility, time to market, high responsiveness and speediness. These pressures may also increase safety risks as deadlines, peer pressure and budget factors may lead to unsafe behaviour.

The University of South Africa (Unisa) has recently approved a commerce degree (BCom) in “Supply chain and operations management” with several OSH-related modules. This is a good indication of the need for an OSH degree and the qualification is certainly much
needed, but it will not address the need in OSH education sufficiently. A brief summary of this new POM qualification (to be introduced in 2014) is provided in Table 2 and 51 respondents (Steenkamp, 2010) rated the modules from first year level to third year level. The ten OSH (and SHE) related modules are indicated in bold.

The survey confirmed the need for a POM degree and the ten OSH-related modules scored high in importance. All respondents indicated inclusion of safety management on the second level, but they were doubtful (41.7%) of making it an elective on the third level. This may be due to the focus on the POM specialization.

Results of survey two (2) - To determine the need and contents of an OSH degree

Van Loggerenberg (2011) recently obtained his MSOSH degree in USA (Southern Columbia University) and he is the programme leader of the 12-month safety management certificate programme offered at the Centre for Business management, Unisa. He was instrumental in this survey among a wide spectrum of safety practitioners and safety managers. They selected a set of OSH competencies (with reference to most of the core OSH functions (responsibilities) discussed in the previous area on the literature study of OSH curriculum benchmarks) and applied the inductive Delphi approach to determine the core of a proposed OSH degree curriculum.

Safety responsibilities

The core responsibilities were taken from the ASSE and BCSP career guide to the safety profession (2000: 3-4). All (six) responsibilities were identified by an overwhelming majority as integral to the function of the safety practitioner/officer. The responsibility to anticipate, identify, analyse and evaluate hazardous conditions was rated the highest (93%) out of 292 respondents. The other responsibilities with high ratings were:

1. Analyse incidents to identify deficiencies in SHE-systems - 90%,
2. Advise in developing of control designs, methods, procedures and programmes – 89%,
3. Measure, audit and evaluate effectiveness of controls – 89%,
4. Measure, audit and evaluate effectiveness of controls – 87%.

Primary modules to be considered in a proposed bachelors OSH degree

Respondents had to rate a predetermined proposed list of subjects in terms of their importance of inclusion in a proposed OSH degree (for example, BCom OSH). From Table 4, it follows that the subjects can be grouped into four clusters with regard to importance. The most important subjects were safety management, SHE legislation and safety risk management, all three considered “very important” (90.1, 89.8 and 88.9% respectively) for inclusion. A summary is given in Table 3.

Respondents also listed the most important modules. A summary of the most important topics are:

1. Incident analysis and analysis techniques (92.0%),
2. Hazard analysis, risk assessment and evaluation (90.4%),
3. Safety systems (89.8%),
4. Developing SHE culture (89.8%),
5. Emergency preparedness (88.5%),
6. Task process safety (86.6%),
7. Behaviour based safety (86.6%),
8. Auditing (86.6%),
9. Safety training (85.4%).

Additional skills required

A relative large majority of the respondents (76.4%) indicated that students should perform a mandatory three month practical internship for vocational skills. The three stakeholders that can benefit from OSH internships are the students, employers and universities. Work integrated learning (WIL) involves “periods of required work that integrate with classroom study” (DoE 2007: 9) to contribute to training of a professional standard.

General observations and feedback from industry experts

Lotter (2011) CEO of Noise Clipper (Pty) Limited (winner of the AHI business of the year award in 2004) had many networking opportunities with members of the Mine Ventilation Society (MVS) and OSH managers from the entire South African manufacturing industry. Although the mission of the company was to combat NIHL by means of excellent hearing conservation (second level noise control), many other needs such as education were identified. Most of these OSH officials were in agreement with the need for an OSH degree.

Badenhorst (2011) and his colleagues from Anglo American Platinum investigate the educational options to improve career paths for their OSH officials. Most OSH managers will confirm the desperate need for a formal OSH degree in South Africa. Regular contact (and formal consultation) with OSH managers and discussions with stakeholders at conferences (for example, the annual NOSA Noshcon conference) confirms the urgency. The managing director of NOSA (Hobday, 2011) supports the development of a bachelor degree in OSH as an articulation gateway and career path for their
Table 2. Comments on POM modules.

<table>
<thead>
<tr>
<th>First level</th>
<th>To include (%)</th>
<th>Move to 2nd year (%)</th>
<th>Move to 3rd year</th>
<th>Omit (%)</th>
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<tr>
<td>Business management 1A (NQF 5)</td>
<td>100</td>
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<td></td>
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<tr>
<td>Business management 1B (NQF 6)</td>
<td>92.3</td>
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<tr>
<td>Economics 1A (NQF 5)</td>
<td>92.3</td>
<td></td>
<td>7.7</td>
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<tr>
<td>Economics 1B (NQF 6)</td>
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<td>7.7</td>
<td>15.4</td>
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<tr>
<td>Accounting, concepts, principles and procedures (NQF 5)</td>
<td>100</td>
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<td></td>
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<tr>
<td>Accounting reporting (NQF 6)</td>
<td>92.3</td>
<td>7.7</td>
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<td>Introduction to financial mathematics (NQF 5)</td>
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<td></td>
<td>7.7</td>
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<td>Elementary qualitative methods (NQF 5)</td>
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<table>
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<tr>
<th>Second level</th>
<th>Include</th>
<th>Move to 1st year (%)</th>
<th>Move to 3rd year (%)</th>
<th>Omit (%)</th>
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<td>15.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production and operations management</td>
<td>84.6</td>
<td></td>
<td>15.4</td>
<td></td>
</tr>
<tr>
<td>Purchasing management</td>
<td>84.6</td>
<td></td>
<td>7.7</td>
<td>7.7</td>
</tr>
<tr>
<td>Method and work study</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality management</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enterprise risk management</td>
<td>84.6</td>
<td></td>
<td>7.7</td>
<td>7.7</td>
</tr>
<tr>
<td>Ergonomics</td>
<td>84.6</td>
<td></td>
<td>7.7</td>
<td>7.7</td>
</tr>
<tr>
<td>Safety management</td>
<td>100</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Third level</th>
<th>Include</th>
<th>Move to 1st year (%)</th>
<th>Move to 2nd year (%)</th>
<th>Omit (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic management</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strategy implementation</td>
<td>91.7</td>
<td></td>
<td>8.3</td>
<td></td>
</tr>
<tr>
<td>Production and operations management</td>
<td>92.3</td>
<td></td>
<td>7.7</td>
<td></td>
</tr>
<tr>
<td>Project management</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>Total quality management</td>
<td>92.3</td>
<td></td>
<td>7.7</td>
<td></td>
</tr>
<tr>
<td>Strategic sourcing</td>
<td>75</td>
<td></td>
<td>25</td>
<td>7.7</td>
</tr>
<tr>
<td>Environmental management</td>
<td>92.3</td>
<td></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Possible electives for third level</th>
<th>Include</th>
<th>Make it man-datory (%)</th>
<th>Move to 2nd year (%)</th>
<th>Move to 1st year</th>
<th>Omit (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global business environment</td>
<td>78.6</td>
<td></td>
<td></td>
<td>21.4</td>
<td></td>
</tr>
<tr>
<td>Safety management</td>
<td>41.7</td>
<td>50</td>
<td></td>
<td>8.3</td>
<td></td>
</tr>
<tr>
<td>Method and work study</td>
<td>84.6</td>
<td>7.7</td>
<td></td>
<td>7.7</td>
<td></td>
</tr>
<tr>
<td>Strategic sourcing</td>
<td>91.7</td>
<td></td>
<td></td>
<td>8.3</td>
<td></td>
</tr>
<tr>
<td>Supply chain alignment</td>
<td>84.6</td>
<td>15.4</td>
<td></td>
<td>7.7</td>
<td></td>
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<td>Supplier relationship management</td>
<td>69.2</td>
<td>15.4</td>
<td>7.7</td>
<td>7.7</td>
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</tr>
</tbody>
</table>
Table 3. Important modules for an OSH degree.

<table>
<thead>
<tr>
<th>Subject</th>
<th>No response (%)</th>
<th>Irrelevant (%)</th>
<th>Not so important (%)</th>
<th>Important (%)</th>
<th>Very important (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety management</td>
<td>5.1</td>
<td>0.3</td>
<td>0.3</td>
<td>4.1</td>
<td>90.1</td>
</tr>
<tr>
<td>SHE legislation</td>
<td>5.1</td>
<td>0.6</td>
<td>0.3</td>
<td>4.1</td>
<td>89.8</td>
</tr>
<tr>
<td>Safety risk management</td>
<td>6.1</td>
<td>0.3</td>
<td>0.3</td>
<td>4.5</td>
<td>88.9</td>
</tr>
<tr>
<td>Environmental management</td>
<td>5.7</td>
<td>0.3</td>
<td>1.6</td>
<td>24.8</td>
<td>67.5</td>
</tr>
<tr>
<td>Occupational hygiene</td>
<td>6.4</td>
<td>0.3</td>
<td>2.5</td>
<td>24.2</td>
<td>66.6</td>
</tr>
<tr>
<td>Quality management</td>
<td>5.4</td>
<td>0.3</td>
<td>1.3</td>
<td>26.8</td>
<td>66.2</td>
</tr>
<tr>
<td>Ergonomics</td>
<td>6.4</td>
<td>0.3</td>
<td>3.8</td>
<td>27.4</td>
<td>62.1</td>
</tr>
<tr>
<td>Industrial and organisational psychology</td>
<td>5.7</td>
<td>0.6</td>
<td>4.1</td>
<td>34.1</td>
<td>55.4</td>
</tr>
<tr>
<td>Financial risk management</td>
<td>5.4</td>
<td>1.6</td>
<td>14.6</td>
<td>41.4</td>
<td>36.9</td>
</tr>
<tr>
<td>Organisational development</td>
<td>5.4</td>
<td>1.3</td>
<td>11.5</td>
<td>49.0</td>
<td>32.8</td>
</tr>
<tr>
<td>Management of production and operations</td>
<td>5.7</td>
<td>2.9</td>
<td>13.7</td>
<td>47.1</td>
<td>30.6</td>
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<tr>
<td>Business management</td>
<td>5.7</td>
<td>1.6</td>
<td>10.5</td>
<td>55.1</td>
<td>27.1</td>
</tr>
<tr>
<td>National corporate and enterprise economics</td>
<td>7.0</td>
<td>11.1</td>
<td>38.5</td>
<td>33.8</td>
<td>9.6</td>
</tr>
<tr>
<td>Accountancy</td>
<td>5.7</td>
<td>15.3</td>
<td>40.4</td>
<td>29.0</td>
<td>9.6</td>
</tr>
</tbody>
</table>

Table 4. A proposed BCom OSH curriculum.

<table>
<thead>
<tr>
<th>Group A (level 6)</th>
<th>Group B (level 7 and electives)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to occupational safety management</td>
<td>Safety management in world context</td>
</tr>
<tr>
<td>Introduction to occupational health management</td>
<td>Safety auditing</td>
</tr>
<tr>
<td>Introduction to occupational hygiene management</td>
<td>Electives to be decided. such as:</td>
</tr>
<tr>
<td>OSH law (level 6)</td>
<td>OSH law (level 7)</td>
</tr>
<tr>
<td>Safety risk assessment</td>
<td>Hearing conservation excellence</td>
</tr>
<tr>
<td>Managing safety in the workplace</td>
<td>Dust control</td>
</tr>
<tr>
<td>Introduction to environmental management</td>
<td>BBS (behaviour-based safety)</td>
</tr>
<tr>
<td>SHEQ system standards</td>
<td>Process safety management</td>
</tr>
<tr>
<td>Safety incident analysis</td>
<td></td>
</tr>
<tr>
<td>Safety leadership and culture</td>
<td></td>
</tr>
</tbody>
</table>

undergraduate SLP offerings. The only debate will be regarding the syllabi. The second potential issue is if industry will support a degree offered by a non-public university (a private higher education institution). This option need to be investigated further because of the limitations at the public universities (discussed later in this area).

Smit (2011) is widely known as an industry expert in OSH. He is actively involved as consultant and was professor at several public universities. His brief feedback on an OSH curriculum is that the outcomes of the qualification should be in line with the following:

1. Anticipating, identifying, analysing and evaluating hazardous conditions,
2. Advising in development of control designs, methods, procedures and programs,
3. Advising in implementation and administration of safety control programs,
4. Measuring, auditing and assessing the effectiveness of safety management controls,
5. Analysing incidents to identify deficiencies in occupational safety, health and environmental protection management.

Smit (2011) provided his preferred OSH curriculum and recommends that quality management, POM and project management must be included in the business management group and that hearing conservation excellence be considered to be one of several electives. A summary of his altered curriculum (excluding the first-year modules) is provided in Table 4.

Program roll-out through an accredited higher education institution

After many years of teaching and learning experience at
tertiary institutions and discussions with academics it became evident that the skills to teach such a qualification may never reside in one single public (subsidised) university. The capacity is simply too limited and qualified OSH managers (SHE managers) do not teach or consider such a career as financially viable. This is the reason that only basic qualifications (eg. certificate programmes) are offered in South Africa. The conventional university Bachelor’s degree in OSH will have to be found in unconventional ways.

Private higher education institutions (PHEIs) accredited at the DOE seems to be a good alternative. They have similar challenges (for example, no or limited subsidy) and have limited permanent faculty (lecturing staff), but they are much more flexible. There are many examples of only a few will be discussed briefly. The Independent Institute of Education (IIE) (one of the largest PHEIs) is Johannesburg Stock Exchange (JSE) and offer a wide variety of qualifications. Some smaller private “universities” specialize in certain disciplines and OSH may fit some of these institutions more than others. The following are three examples of private higher education institutions (PHEIs) (a college, an institute and a foundation) that specialize:

1. Cranefield College is a PHEI specializing in project management,
2. Da Vinci institute is known for innovation and technology management,
3. Foundation for Professional Development (FPD) is known for health and medical related training.

Should a large company (for example, a mine house) want to extend their “training academy” capabilities and credibility, it could consider a strategy to engage in a partnership with a suitable PHEI to offer such an OSH related offering (for example, BCom OSH degree). It will be necessary to sponsor a few permanent employed professors (senior lecturers) to ensure sustainability. The results will be discussed in the same sequence A, B and C.

A) Aspects highlighted from the secondary research survey

Besides the background to the problem, the literature provided confirmation and guidelines for the questionnaire surveys including the following:

1. The large scope of broad OSH responsibilities (and the six primary responsibilities) justifies a degree qualification. They were also tested in one of the questionnaire surveys.
2. Primary OSH degree topics could be verified and tested in our questionnaire survey. Only a few new developments were identified which may not influence an OSH curricula.
3. The variety of programs available in Australia (as an example) indicates South Africa’s position in terms of an OSH bachelor degree education. The seven bachelor degrees offered in Australia were listed. It also provides additional benchmarks for detail curricula design purposes.

4. The well-known international OSH curricula benchmark from the Columbia Southern University was explored. The distance learning (open distance learning) Bachelor of Science degree offered by Columbia Southern University was used as a benchmark, also in terms of its 17 major modules. This product is a good guideline for a distance learning OSH degree.
5. The OSH priorities according to the American regulatory compliance requirements, provided confirmation of content to be included in an OSH qualification.

B) From the questionnaire surveys the following aspects were highlighted

1. The first survey confirmed the need for a POM degree and the ten OSH-related modules scored high in importance. All respondents indicated inclusion of safety management on the second level, but they were doubtful (41.7%) of making it an elective on the third level. It may be indication that POM should be a separate degree with a stronger emphasis on supply-chain management, than OSH. The new BCom degree in “Supply-chain management and operations management” will be offered by Unisa which will address the fundamental needs regarding OSH, but specialist OSH officials have a large responsibility and industry is in desperate need of a separate professional local OSH degree qualification.
2. The second survey confirmed that all six primary OSH responsibilities must be integral to the function of the safety practitioner/officer. The responsibility to anticipate, identify, analyse and evaluate hazardous conditions was rated the highest (93%). The most important subjects for the proposed OSH qualification were safety management, SHE legislation and safety risk management, all three considered “very important” (90.1, 89.8 and 88.9%, respectively) for inclusion. A relative large majority of the respondents (76.4%) indicated that students should perform a mandatory three month practical internship for vocational skills.
3. Although, the second survey showed that accounting and economics subjects are not so popular for inclusion in a degree, these subjects (and business management, general management and strategic management) are necessary requirements for safety professionals. A survey of certified safety professionals (CSPs), Ferguson (1994: 79-81) found that baccalaureate course work in risk management and in areas associated with business, such as total quality management (TQM) and the financial aspects of safety was needed. The inclusion of human behaviour related subjects such as personality in work context, organisational psychology and
organisational development is in line with the role of the safety professional as advisor, communicator, facilitator, trainer and mentor of people. These skills are all also fundamental to behaviour-based safety (BBS) and supported by Swuste and Arnoldi (2003: 15-27).

C) From the general observations and personal surveys from industry experts, the following can be highlighted

The researcher and other consultants confirm the results of the study based on face-to-face interaction with top managers in the OSH field. Badenhorst (2011) and his colleagues from Anglo American Platinum (and OSH officials from Lonmin) investigates the educational options to improve career paths for their staff. The managing director of NOSA (Hobday, 2011) supports the development of a bachelor degree in OSH as an articulation gateway and career path for their undergraduate speech-language pathology (SLP) offerings. Smit (2011) is widely known as an industry expert in OSH. He is actively involved as consultant and was professor at several public universities. He confirmed the results of the study and provided his summative version of an OSH degree based on years of experience in the academic and OSH field. Most of these industry experts indicated that the qualification should not be perceived as inadequate should it be offered by a PHEI – especially if they can participate as education partners.

CONCLUSION AND RECOMMENDATIONS

Appropriately qualified POM and OSH practitioners will be able to contribute to curbing the high level of occupational incidents, injuries and fatalities. The offering of a professional degree in OSH at a higher education institute (or PHEI) would contribute substantially to recognising the professional status of OSH managers. OSH practitioners need to be recognised and treated as a profession. They deserve the same respect and status as the industrial medical doctor, occupational health nurse, human resource manager, POM manager, industrial engineer, hygienist, environmental manager etc.

The exploratory study confirmed the research problem and provided more insight in terms of the significant need and contents for a formal OSH qualification (such as an OSH bachelor degree). Although this study may be regarded as exploratory (and work-in-process) it is unthinkable to wait another decade for a proper OSH degree qualification. More surveys will be done by the researcher (for example, via the Mine Ventilation Society of South Africa and during the presentation of this paper at the annual Noshcon conference in September 2012), but the details in terms of the need and the design of the qualification should not change much. Further research is needed to address the “how” and “who” research questions – who will offer this qualification and how? The viability of an OSH degree is clearly more dependent on capacity and resources than on the complexity of the curricula. In developing the curriculum for an OSH degree is almost a given (as indicated in detail) and much less of a challenge than to obtain an appropriate institution with appropriate skills and capacity to offer the degree.

Takala (2009) emphasise the global need for OSH and reports on a huge step backwards by taking a twin-track approach to the safety of young workers through the classroom and in the workplace. The field of OSH held a prominent position in the European Community since 2002 and mainstreaming OSH into education, the European Agency for Safety and Health at Work has wide support. OSH is a rapidly developing area and they also hope to formalize OSH education closer to and within the classroom in a quest for risk education in schools, colleges and universities. The South African government should intervene to make OSH education a reality.

REFERENCES


Session 101A.