A review of the modern operations management curricula for a new programme qualification mix (PQM)

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ABSTRACT

The POM (production and operations management) function is less understood than any other business function. In manufacturing industries it is usually taken to be production management and best left to specialists (such as engineers). In some service organisations, the term is still not recognised. In addition to this, the persistent gap between what is being taught and what is relevant to the practitioner needs to be addressed. The purpose of this article is to lead up to a revision and design of the POM function curricula and to promote its core overriding value as the theme for a bachelor's qualification in higher education that meets the needs of South African industry.

The methodology used as part of this curriculum design process was based on secondary research sources (current academic reports and established syllabi) and two empirical surveys among a subset of the population, namely industry leaders in South Africa. The resultant qualification design is presented as a conceptual draft as part of the recommended new degree in POM to be submitted to the DOE (Department of Education) by a South African university. The overall implications of this article would put POM back at the top of the corporate agenda. A further study is recommended based on the application of the Collective Causal Mapping Methodology (CCMM) for creating (revising) course curricula (Hays, Bouzdine-Chameeva, Hill, Scavarda & Goldstein 2007).

Key words: production and operations management (POM); curricula; qualification; supply-chain management (SCM); total quality management (TQM); lean production; sub-disciplines; theory of constraints (TOC); project management; safety, health and environmental (SHE) management

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Introduction

The field of production and operations management (POM) in South Africa has certain unique characteristics, such as an unlimited body of knowledge surrounding it. Unfortunately it does not hold a strong position in terms of a specific qualification offered by a higher education institution. One of the reasons for this is the broad scope of the body of knowledge being offered by the decision sciences, industrial engineering and business management departments. The International Annual EurOMA Conference is a major forum for the presentation of new ideas and developments in the field. Over the past several years, they have expanded their research, course development and course offerings to encompass new issues (for example, supply chains).

A review of studies dealing with the interface between POM academia and industry practitioners indicates the existence of a gap between what is being taught and what is relevant to the practitioner. Practitioners favour qualitative concepts, while academics prefer to teach quantitative techniques. A review of the POM curriculum literature (Visich & Khumawala 2006) shows some divergent opinions resulting from the expansion of POM into new topical areas such as service management, international operations, supply-chain management and the new e-economy. It may seem that the field of POM is losing specific direction and cohesion. This problem is not due to a loss of importance or a lack of interesting developments, but because the various active subfields are pulling the discipline in different directions, thereby threatening its unitary integrity. These developments may have caused an identity crisis for POM and a declining interest (or declining ability) in the study of POM at university level.

Although POM has been at pains to differentiate itself conclusively from operations research (OR) and industrial engineering (IE), some sceptics still argue that POM has failed to develop its own body of literature, lacks a distinct intellectual structure (body of knowledge), and that there is not enough appreciation for what it stands for. This does not make sense, because operations are the mainstay of any business, and the factory can become the launchpad for a brilliant, ground-breaking career. A high percentage of CEOs have come through the POM ranks. In fact, almost half of CEOs cite operations as the most important employee know-how, and the factory or production unit is a long-standing primary laboratory for developing managers and management theory (Santos, Powell & Sarshar 2002: 788–796). This could be one of the reasons why several international universities have dedicated POM (or related) academic departments that offer such programmes (for example, MBA in Supply and POM).

In order to address these matters, this article addresses the need for a POM degree and describes its requirements. A draft qualification was tested in the market (n=51) and a second (open-ended) survey (n=25) was also done to give sufficient scope for new insights. The article will provide a brief theoretical background (indicators of both established and new developments in the POM discipline), followed by the problem statement and objectives, research methodology, results of the survey, conclusions and recommendations.

Theoretical background

This section provides a brief overview of the importance of and developments in POM. POM involves the management of the transformation processes in a business given to providing for the manufacture of goods and/or for rendering of services. POM is the closest that business comes to the act of creation and to creating value. As POM entails creativity, productivity and adding value, it should be given pride of place in the affairs of any business. POM has passed through several stages of development – from basic agricultural activities to fast-growing cities with factories. POM grew out of the industrial revolution when Adam Smith, for instance, was known for his emphasis on the specialisation of labour. Henry Gantt, Frank Gilbreth and Frederick Taylor are among the prominent contributors to POM. Henry Gantt used charts for scheduling, and Frank Gilbreth used time-and-motion studies. Taylor used process analysis, Shewhart used statistical sampling, and Deming applied other statistical methods. The first textbooks were produced by Robert Fetter in the late 1950s and his contemporary, Elwood Buffa. In the past 100 years, POM has evolved from a set of newly discovered ideas to a portfolio of developed and integrated concepts. POM has evolved from a set of heuristic ideas to a portfolio of developed management concepts (Steenkamp 2004).

POM is a developing discipline with reference to lean thinking, theory of constraints (TOC), workload control, environmental and social awareness and performance management. The POM body of knowledge is changing dramatically in that it is increasingly becoming a socially integrative discipline that crosses functional borders and pervades the whole organisation. This naturally implies that particular attention must be given to interfaces and the need for cross-functional coordination (Krajewski & Ritzman 2004: 91). Silvestro and Westley (2000: 551–558) support the thinking towards integrative learning across lines and improving processes horizontally. Lapré and Van Wassenhove (2002: 107–111) reported in the *Harvard Business Review* that learning across lines was the secret to more efficient factories. The two most prominent developments related to this are:

- The lean paradigm: The lean paradigm has been regarded as a major factor contributing to business success by trimming fat from all operations, with a stable marketplace and relatively small product variety. 'Lean operations' represent a state of an operation in which all waste has been eliminated, and the operation is faster, more dependable, produces higher quality products and services, and runs at low cost (Martin & Towill 2000). (Note that the lean or just-in-time [JIT] approach is described by other terms such as 'continuous flow manufacture', 'high value-added manufacture', 'stockless production', 'fast throughput operating' and 'short-cycle time manufacturing').
- The TQM (total quality management) approach: This is a holistic, comprehensive business management philosophy that is applied in an effort to excel at meeting the needs and expectations of the organisations's customers/clients (Oakland 2003). TQM covers and includes all parts of the organisation. It involves every person in the business; it examines all costs related to quality; and it strives 'to design quality in' rather than 'inspecting it in' (in other words, 'to get things right the first time').

POM has a rich body of knowledge consisting of established and new POM subdisciplines. This can be observed if one considers the curricula (offerings) taught by well-known POM authorities such as Lee J. Krajewski (Professor of Manufacturing Strategy at the University of Notre Dame). Over the years, he has designed and taught courses at both graduate and undergraduate levels on topics such as operations strategy, introduction to operations management, project management, supply-chain management (SCM), master production scheduling, operations design, and manufacturing planning and control systems.

POM addresses bottlenecks, which are a generic every-day operational challenge. TOCSA is an educational business consultancy that disseminates and implements the Theory of Constraints (TOC), the philosophy developed by Dr Eliyahu M. Goldratt (TOCSA 2010). TOC consists of problem-solving and decision-making tools referred to as the thinking processes (TP) essential to any process of ongoing improvement. TOC is being taught worldwide in over 200 colleges, universities and business schools, and Goldratt's books have been translated into 23 languages. Nicholas and Steyn (2008: 259) define the theory of constraints (TOC) as a systems approach to improving business systems. The TOC 'philosophy' applied to project scheduling is called the Critical Chain Method (CCM).

Business ethics is more associated with POM than before. The King III Report (Deloitte 2010) and the research contributions regarding the principles of business ethics by Rossouw and Van Vuuren (2004) are relevant to the discussion. King III has broadened the scope of corporate governance in South Africa, with

its core philosophy revolving around leadership and sustainability. Sustainability is now the primary moral and economic imperative, as well as being one of the most important sources of both opportunities and risks for businesses. Nature, society and business are interconnected in complex ways that need to be understood and managed. Changes in the economy, corporate governance and society worldwide have resulted in a workforce that no longer accepts being treated like another piece of machinery. POM has recently developed a stronger humanistic focus, since many operations solutions lie in employee motivation and well-being. POM increasingly includes safety, health and environment (SHE) management, and quality initiatives also address the quality of worklife (QWL). Continuous improvement as a concept for upgrading all types of operating resources firstly refers to people and suggests improving people's work lives, the environment and standards of living (Schonberger & Knod 1997: 670–674).

SCM (supply chain management) is another relatively new discipline that originated as an extension of the purchasing management discipline. SCM is basically a long-term relationship between a firm and its suppliers, and the way a firm works with its suppliers, and therefore addresses the entire supply chain in terms of inbound and outbound logistics (Davis & Heineke 2005: 104–105). It can be concluded from the Supply Chain Consortium (2010) that supply-chain networks are formed by firms that strategically and actively participate in such a chain from the raw material to the ultimate consumer.

Although project management is a well-established body of knowledge, its popularity is increasing, and the need for project management education is remarkably significant. Project management is needed when the scope of a job becomes complex. Project management is therefore a special and unconventional kind of management approach that uses several kinds of organisations (teams), tools, networks and charts.

The Association for Operations Management (APICS) is a global leader and premier source of the body of knowledge in POM. Since 1957, individuals and companies have relied on APICS for its consultation, training and worldwide network of accomplished industry professionals (APICS 2010). It seems that most POM-related courses, textbooks and programmes are presented in a somewhat similar fashion. The body of knowledge is usually set out in a sequence that progresses from the strategic, to the tactical, to the operational. The summary in Table 1 is a good example.

The focus areas can also be observed from a number of recent publications on POM topics: An integrated approach to POM (Reid & Sanders 2010); Project management (Meredith & Mantel 2010); A modern introduction to statistical process control (SPC) (Montgommery 2008); Operations and supply chain management (Russell 2009); Global logistics and supply chain management (Manga, Lalwani & Butcher 2008); Project management in practice (Mantel, Meredith, Shafer & Sutton 2008); Operations management for MBAs (Meredith & Shafer 2007); Quality management

(Dale, Van der Wiele & Van Iwaarden 2007); Global logistics management (Gourdin 2006); and Advanced POM (Loader 2006).

Table 1: An example of a POM syllabus

Part 1: Introduction to POM Introduction to POM (operations management defined in today's business environment); strategic role of operations; productivity; performance objectives; SCM; IT-based POM; social responsibility; environmental responsibility; technology; innovation; knowledge management; etc.
Part 2: Translate customer needs to products and processes Customer needs (demand management), product and process design decisions; facility decisions; layout; process technologies; work organisation; improvement decisions (this would typically also include types of operations systems, lean production, project management, process measurement, process improvement and TQM).
Part 3: Planning and control of the transformation process Aggregate planning and inventory decisions; capacity planning and control; master scheduling; supply chain planning and control; lean production planning; project planning and control; quality management.
Part 4: Improvement and sustainability Operational optimisation; TOC; TQM; operations improvement; failure prevention; maintenance management.

The focus of these ten relatively recent publications on OPQ (operations, project and quality management) and an integrative approach to operations management (strongly linking the business itself with its operations) is apparent, and the operations function as the integral part of the entire global supply-chain is evident. New (2000) and Operations Management Articles (2010) list the main POM topics as an indication of important research topics, both current and recent, which are categorised into the following main areas: agile manufacturing, operations design, business process re-engineering, continuous improvement, demand management, enterprise resource planning (ERP), SHE, innovation, inventory management, JIT, lean manufacturing, logistics, maintenance, manufacturing requirements planning, master scheduling, process control, process improvement, purchasing, TQM and SCM.

Summary: prominent indicators of both established and new developments in the POM discipline

The theoretical background provides a clear indication of the content to be included in the draft framework of the new curriculum of a commerce degree in POM. The

following categories from the 2007 list of Top 25 Hottest Articles published in the *Journal of Operations Management* are a good guideline:

- Purchasing and supply-chain management (SCM), IT-based POM/supply-chain management systems and strategic outsourcing, and ERP
- Lean production and JIT
- Six sigma, quality management and TQM
- Innovation (innovation culture), process innovation and process management (an inherent part of POM with reference to operations systems design).

The theoretical background also indicated that the sub-disciplines of a specialised bachelor's degree in POM (for example, BCom Operations Management) should include the following broad subfields, which may form part of the four categories mentioned, or may be additional to them:

- A fundamental knowledge base of business management and TOC
- Project management and the PMBOK (project management body of knowledge)
- Health, safety management and environmental management (SHE management, green concepts, social awareness and QWL).

Problem statement and objectives

The problem has the following two main dimensions:

- If POM is a core business function, then it would be unthinkable to offer any commerce degree without POM. The irony is that there is a decline in POM offerings by universities, while there is a growing need for a related bachelor's degree. The growing student numbers for POM-related SLP (short learning programme) offerings may also be an indication of a growing need for a bachelor's degree specialising in POM.
- The second dimension of the problem is uncertainty about the curriculum for a specialised POM-related bachelor's degree. Some higher education providers may offer programmes with scientifically unsound curricula. Although the benchmarks and textbooks provide relatively sufficient confirmation, not all of these represent the South African market (students and employers) or new developments in POM. Some institutions may offer parts of POM as a quantitative subject (for example, decision sciences), and the problems may be exacerbated by a scarcity of lecturing staff in these subjects.

The purpose of this study is to address the problem and can therefore be summarised as follows:

- To determine whether a qualification in POM is needed and valid
- To test (and adapt) a conceptual (draft) curriculum for a bachelor's qualification specialising in POM.

Research methodology

The theoretical background was used to construct the surveys. The two surveys were conducted during the period November 2007 to June 2009 with the following objectives:

- Understanding the POM environment from the point of view of prospective employers of graduate students
- Evaluating (and adapting) the proposed POM degree in terms of meeting the needs of industry.

The first survey was conducted among a subset of the population and comprised 51 POM managers working for food, cosmetics, motor, engineering and general manufacturing industries. They were contacted telephonically, and the proposed course content was discussed with each respondent while general comments were noted. The respondents were then asked to link to a website and complete a short questionnaire in which they were asked to rate the subjects scheduled for each year. Nine respondents were selected from this group to conduct personal interviews probing the preliminary design of the POM programme.

The second survey was conducted during the period May 2009 to June 2009 with the following objectives:

- To obtain summative and collective feedback by conducting telephone interviews with 25 operations managers from various industries (the industries were randomly selected from the top 500 listed companies in South Africa) to indicate the core outcomes of a BCom POM qualification.
- To compare the results with those of the first survey.

Results

The results of both surveys are summarised in this section. The specific ratings of the test curriculum (obtained by the first survey) are provided in Table 2, which indicates the way in which the 51 respondents rated the modules from first- to third-year levels.

Table 2: The specific ratings of the test curriculum

FIRST-YEAR LEVEL	To include	Move to 2nd year	Move to 3rd year	Delete: irrelevant
Business management (module A) (NQF 5)	100%			
Business management (module B) (NQF 6)	92.3%	7.7%		
Economics 1 (module A) (NQF 5)	92.3%			7.7%
Economics 1 (module B) (NQF 6)	76.9%	7.7%		15.4%
Accounting, concepts, principles and procedures (NQF 5)	100%			
Accounting reporting (NQF 6)	92.3%	7.7%		
Commercial law 1A (NQF 5)	69.2%	7.7%		23.1%
Introduction to financial mathematics (NQF 5)	92.3%			7.7%
Elementary qualitative methods (NQF 5)	92.3%			7.7%

SECOND-YEAR LEVEL	Include	Move to 1st year	Move to 3rd year	Delete: irrelevant
General management	84.6%	15.4%		
Production and operations management	84.6%	15.4%		
Purchasing management	84.6%		7.7%	7.7%
Method and work study	100%			
Quality management	100%			
Enterprise risk management	84.6%		7.7%	7.7%
Ergonomics	84.6%		7.7%	7.7%
Safety management	100%			

THIRD-YEAR LEVEL	Include	Move to 1st year	Move to 2nd year	Delete: irrelevant
Strategic management	100%			
Strategy implementation	91.7%			8.3%
Production and operations management	92.3%		7.7%	
Project management	100%			
Total quality management	92.3%		7.7%	
Strategic sourcing	75%			25%
Environmental management	92.3%			7.7%

continued

Table 2 continued

Possible electives for third-year level	Include	Make it mandatory	Move to 2nd year	Move to 1st year	Delete: irrelevant
Global business environment	**78.6%**				21.4%
Safety management	41.7%	**50%**	8.3%		
Work study	**84.6%**	7.7%			7.7%
Strategic sourcing	**91.7%**				8.3%
Supply chain alignment	**84.6%**	15.4%			
Supplier relationship management	**69.2%**	15.4%	7.7%		7.7%

General comments on the proposed new qualification included that the degree qualification meets the market's needs. The 51 respondents were asked to rate the degree on a scale of 1 to 10, and the results are summarised in Figure 1.

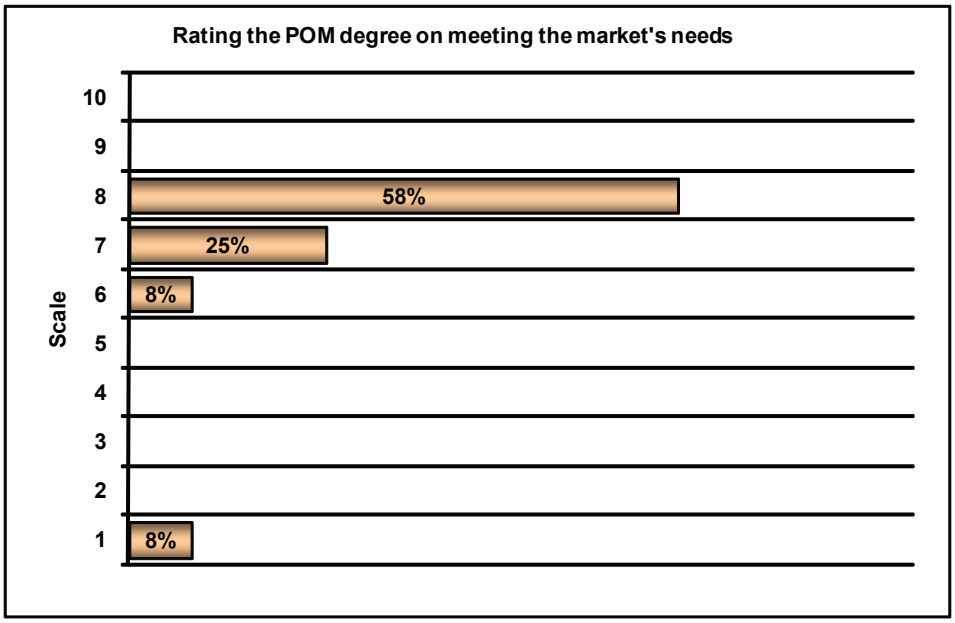

Figure 1: The degree qualification meets the needs of the market

The majority (83% of the respondents) agreed that the POM degree meets the market's needs (rating of 7 or above). In general, respondents recommended that POM subjects be included from first-year right through to third-year levels. There should also be an emphasis on project management. The 8% who rated the POM programme relatively low were from an advertising agency, amongst others. The

POM degree will provide students with the opportunity to enter a wide range of careers and put them in a favourable position for employment at entry-level. The engineering industry still requires a student to have an engineering degree, but regards the POM degree as advantageous.

It is suggested that less emphasis be placed on general economic subjects. Subjects that are more business related should be considered. It was suggested that organisational psychology be considered as an option. In terms of the focus of teaching and learning per level, the results of the survey (including feedback regarding optional modules/ elective modules) can be summarised as in Table 3.

Table 3: The focus of teaching and learning per level

First-year level: Ninety per cent of the respondents agreed that all the mandatory subjects be included in the course. Some suggested changes including replacing economics with business economics and removing commercial law and replacing it with business ethics. As regards the optional subjects, just more than half (54%) agreed that work-related psychological processes should be included, whereas 46% wanted personality in the work context to be removed and suggested that human resource management be considered as an option.
Second-year level: Ninety per cent of the respondents recommended that the mandatory subjects all be included as optional subjects; 67% agreed to include all subjects. Recommendations include that human resources management, supply chain management, the Health and Safety Management Act (Act No. 85 of 1993) and integrated logistics be considered mandatory subjects.
Third-year level: Ninety-two per cent of the respondents agreed that the proposed mandatory subjects be included. Some suggested that strategic sourcing should rather be optional. Only 75% agreed that all optional subjects should be included. Fifty per cent of the respondents suggested that safety management be made a mandatory subject.

Regarding new developments, the survey indicated several significant aspects in line with the theoretical background. The POM function has certainly changed over the last few years, having evolved from a less vocational, practical, hands-on approach to a more managerial, people-oriented, technology-based and strategic approach. At second-year level, it was recommended that the five optional subjects (integrated logistics, SHE, financial management, SCM and human resources management) be mandatory. It was also confirmed that emphasis should be placed on the following subjects: SCM, POM, project management, TQM, SHE (which would have to offer safety management independent from environmental management in order to be considered) and strategic management.

The following section is a summary of the in-depth personal interviews regarding the POM degree. Nine respondents took part in personal interviews, which were

mainly focused on the proposed POM degree. Only the following significant (additional and new) comments are summarised:

- Specific skills required for production or operations managers from an entry-level employee: An entry-level employee starting as a POM manager must have the right type of personality for the job and be capable of being trained. He/she would need a technical background for the job as well as the ability to work and learn independently. He/she would need to understand concepts related to quality control.
- Specific skills required for production or operations managers from a mid-level employee: Mid-level POM managers must have experience in project management, be able to manage people and be familiar with and have knowledge of safety issues.
- Would the proposed degree course provide students with the opportunity to enter a wide range of careers? Is the curriculum too specific, or alternatively too wide? In light of the very positive comments, the proposed degree is regarded as uniquely suitable. None of the respondents were aware of any similar competing degree programme. The course is diverse, covers a wide area, and offers suitable subjects. However, the focus may be too specifically commercial, and more focus should be placed on production, operations and project management, and human resources. This would serve to make the course more marketable.
- How have production and operations management changed during the past years? The combination of resources has changed and is now more strategic than ever. The role of POM managers has become important and more specialised. The field has become more strictly regulated in the past few years, for example, with respect to safety requirements and ISO standards. Safety management is growing in importance and complexity. Globalisation has impacted on logistics and SCM. The POM manager's role has changed to a strategy- and technology-driven position. The respondents confirmed the main POM sub-disciplines, including strategic management.

As regards the results of the second survey, 25 POM managers from various industries were telephonically interviewed to re-confirm the core outcomes of a POM degree. Most confirmed the POM sub-disciplines (especially project management and IT-based POM) and the significant new insights were related to the engineering industry (a need for interpersonal skills, mathematical skills, analytical thinking and problem-solving skills), the manufacturing industry (a need for human relations and people skills); SHE management including disposal of hazardous waste; waste

management, municipal bylaws and recycling of waste) and the agricultural industry (business ethics and multi-cultural sensitivity are crucial).

Conclusions and recommendations

The identity crisis with respect to POM may not be as serious as it seems. It would appear that practitioners and the academic establishment are prepared to address the declining interest in the study of POM at university level. The proposed POM degree is unique and should be well received by the market – it has the primary purpose of providing a well-rounded broad education that equips graduates with the POM knowledge base and major sub-disciplines. The POM degree will meet a need in the marketplace, but the subjects need to be reviewed and reconstructed before the curriculum is finalised. The mandatory and optional elective subjects need to be reconstructed and reviewed.

The results of the surveys mainly influenced changes in the title of the draft qualification as well as the separation of environmental management from safety management. The other changes were related to including quality management (at second-year level) and retaining TQM at the third-year level. Finally, another SCM-related module has been included at third-year level. It should also be noted that personal academic preferences and lecturing capacity played a minor role. This article, with its research limitations, did not (and could not) answer all the questions, thus allowing the experienced academics who developed the PQM to make small changes to what this article indicated. The academic team decided to ignore the influence of possible lecturing capacity limitations during the final composition of the qualification. Although lecturing capacity is a matter of concern, it should not influence the curriculum and will have to be in place if the qualification is approved for roll-out in 2013.

The draft qualification (with possible minor changes), as shown in Table 4, will be submitted for approval by the HEQC/DOE in 2010.

The composition of the proposed qualification is shown in Table 5. (The prerequisites and codes are excluded due to space limitations.)

As regards formative assessment, learning and assessment are integrated, and the study guides (and tutorial letters) will contain self-assessment tasks with feedback. The process is continuous and focuses on smaller sections of the work and a limited number of outcomes. Assignment marks contribute 10% towards the student's final mark.

With respect to summative assessment, a representative selection of outcomes practised and assessed in the formative stage will be examined. Summative assess-

Table 4: A summary of the proposed BCom qualification

Title of the qualification: Bachelor of Commerce in Supply Chain and Operations Management
Field: Business management
Sub-field: POM
NQF level of qualification: 7
Number of credits for the qualification: 360, made up of six modules at NQF level five (72 credits), 14 modules at NQF level six (168 credits) and 10 modules at NQF level seven (120 credits).
Rationale for the qualification: This programme was designed to meet the industry need for supply and operations managers in all sectors. It is designed to provide the learner with generic management, human relations, financial, and specific supply-chain and operations knowledge and skills that can be applied in different sectors. It provides the student with skills to become competent supply chain and operations workers and managers at a tactical (functional) level as well as at a more strategic level.
Purpose of the qualification: Qualifying students can demonstrate knowledge, specific skills and applied competence within opportunities for continued personal intellectual growth, gainful economic activity and the ability to function in the field of integrated supply chain and operations in manufacturing and service organisations.

Table 5: Composition of the proposed BCom qualification and aspects of assessment, articulation and outcomes

Entry-level modules at NQF level 5:
Business management; accounting concepts, principles and procedures; economics; commercial law; psychological processes in work context; elementary quantitative methods
Second-level modules at NQF level 6:
Personality in work context; business management; accounting reporting; economics; general management; purchasing management; supply chain management; financial management; production and operations management; business-to-business marketing; quality management; safety management; environmental management; integrated logistics
Third-level modules at NQF level 7:
Strategic management (two modules); strategic sourcing; supply chain alignment; supplier relationship management; production and operations management; project management; total quality management; global business environment; corporate citizenship

ment will be based on a two-hour examination per module per semester. Unless otherwise stated, a sub-minimum of 40% must be obtained in the examination. The mark obtained in the examination contributes 90% to the student's final mark. Supplementary examinations at the end of the following semester are available for students who obtained at least 45% as a final examination mark.

The qualification will articulate with those of other universities and other qualifications. For example, recognition will be given to similar modules completed at other tertiary institutions or for unit standards completed.

The primary outcomes are that on completion of the BCom Supply Chain and Operations Management, the qualified student would have been actively engaged in becoming a well-rounded, educated person, specifically preparing for further study and/or the work environment as a POM and supply chain management practitioner or manager.

Limitations and future research

No similar benchmark qualifications exist apart from MBA programmes. The respondents were influenced by their experiences of general BCom students and had to provide a subjective anticipated view of a potential new degree programme. A larger sample of respondents would therefore not influence the results much. The proposed degree (if approved and rolled out) would also have to be tested among students and employers during study and after graduation.

A further study is recommended to aid lecturers in determining which topics (within modules) should be taught in a course and how these topics might be grouped and sequenced. It is recommended that this study apply the newly developed Collective Causal Mapping Methodology (CCMM) (Hayes, Bouzdine-Chameeva, Hill, Scavarda & Goldstein 2007). CCMM collects information from a group of geographically dispersed and diverse subject matter experts via web technologies. Over three rounds of data collection, analysis, mapping and interpretation, CCMM is used to develop a collective causal map. Hayes et al. (2007) applied CCMM in developing a POM programme, and topics such as SCM and organisational transformation via six sigma programmes were identified, but some of the principles traditionally taught in POM courses are not as applicable to the information-intensive operations of 'new economy' organisations. Their study brought forth an inductive framework for understanding and teaching POM based on the collective input of POM experts (250 academics and practitioners representing 63 countries and 173 universities, across a variety of sub-disciplines in the field of POM). The causal map is employed as the graphical syllabus; it may be a useful guide for a holistic perspective. CCMM in particular improves understanding of the course design and can provide a valuable innovative approach to course curriculum development.

References

APICS (Association for Operations Management). 2010. About APICS. [Online] Available at: www.apics.org. Accessed: 8 July 2010.

Dale, B.G., Van der Wiele, T. & Van Iwaarden, J. 2007. *Managing Quality*, 5th edition. USA: Wiley-Blackwell.

Davis, M.M. & Heineke, J. 2005. *Operations Management: Integrating Manufacturing and Services,* 5th edition. New York: McGraw-Hill Irwin.

Deloitte. 2010. King III: Audit Committee and integrated report and disclosure. [Online] Available at: www.deloitte.com. Accessed: 8 July 2010.

Gourdin, K. 2006. *Global Logistics Management: A Competitive Advantage for the 21st Century*, 2nd edition. USA: Wiley.

Hayes, J., Bouzdine-Chameeva, T., Hill, A.V., Scavarda, A.J. & Goldstein S.M. 2007. 'Applying the collective causal mapping methodology to operations management curriculum development', *Decision Science Journal of Innovative Education (DSJIE)*, 5(2): 267–287.

Krajewski, L.J. & Ritzman L.P. 2004. *Operations Management: Processes and Value Chains*, 7th edition. New Jersey: Pearson Prentice Hall.

Lapré, M.A. & Van Wassenhove, L.N. 2002. 'Learning across lines: the secret to more efficient factories', *Harvard Business Review,* Oct: 107–111.

Loader, D. 2006. *Advanced Operations Management*, 2nd edition. West Sussex, England: Wiley.

Manga, J., Lalwani, C. & Butcher, T. 2008. *Global Logistics and Supply Chain Management*. USA: Wiley.

Mantel, S.J., Meredith, J.R., Shafer, S.M. & Sutton, M.M. 2008. *Project Management in Practice*, 3rd edition. USA: Wiley.

Martin, C. & Towill, D.R. 2000. 'Marrying the lean and agile paradigms', *POM Conference Proceedings*, Ghent, Belgium, 114–121.

Meredith, J.R. & Mantel, S.J. 2010. *Project Management: a Managerial Approach*, 7th edition. USA: Wiley.

Meredith, J.R. & Shafer, S.M. 2007. Operations Management for MBAs, 3rd edition. USA: Wiley.

Montgommery, D.C. 2008. *Statistical Quality Control: a Modern Introduction*, 6th edition, International Student Version. USA: Wiley.

New, C. 2000. 'The state of operations management in the UK: a personal view', *International Journal for Operations and Production Management,* 18(7): 675–677.

Nicholas, J.M. & Steyn, H. 2008. *Project Management for Business, Engineering and Technology: Principles and Practice,* 3rd edition. Burlington, MA: Butterworth-Heinemann Elsevier.

Oakland, J.S. 2003. *TQM: Text with Cases*, 3rd edition. London: Butterworth-Heinemann.

Operations Management Articles. 2010. Search for operations management articles. [Online] Available at: www.operations-management-articles.co.uk. Accessed: 10 June 2009.

Reid, R.D. & Sanders, R. 2010. *Operations Management: An Integrated Approach*, 4th edition, International Student Version. USA: Wiley.

Rossouw, D. & Van Vuuren, L. 2004. *Business Ethics,* 3rd edition. Cape Town: Oxford University Press.

Russell, R. 2009. *Operations and Supply Chain Management*, 6th edition, International Student Version. USA: Wiley.

Santos, A. Powell, J.A. & Sarshar, M. 2002. 'Evolution of management theory: the case of production management in construction', *Journal of Management History,* 40(8): 788–796

Schonberger, R.J. & Knod, E.M. 1997. *Operations Management: Customer-focused Principles,* 6th edition. London. Irwin.

Silvestro, R. & Westley, C. 2000. 'Implementation of BPR: moving away from functional structures', *POM Conference Proceedings*, Ghent, Belgium, 551–558.

Steenkamp, R.J. 2004. Production and operations management trends and challenges for productive operating value chains. Inaugural lecture, University of South Africa, 24 August 2004.

Supply Chain Consortium. 2010. Supply chain. [Online] Available from: www.supplychainconsortium.com. Accessed: 8 July 2010.

TOCSA (Theory of Constraints Southern Africa). 2010. Theory of constraints. [Online] Available at: www.tocsa.co.za. Accessed: 8 July 2010.

Top 25 Hottest Articles. 2007. Top 25 Hottest Articles published in the *Journal of Operations Management*. [Online] Available at: www.top25.sciencedirect.com. Accessed: 8 July 2010.

Visich, J.K. & Khumawala, B.M. 2006. 'Operations management curricula: literature review and analysis', *Journal of Statistics and Management Systems*, 9(3): 661–687.