Quality Management – If Japan can, why can't Africa?

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Abstract

The aim of this paper is to discuss how Quality Management theories could be successfully adapted for organisations in developing countries. In the 1980s when various industrial sectors in the USA and Europe were being decimated by superior quality Japanese products, the question was asked in the USA - "If Japan can why can't we?" Today the African population and African economy are growing rapidly. Companies are growing and many new ones are created. However, the level of quality culture still appears to be low. Like in Japan after the Second World War, basic quality management knowledge should be of important help for development. This paper discusses Quality Management in developing countries in Sub Saharan Africa and asks the question – If Japan can why can't Africa?

Keywords

Quality Management; Africa; Japan; Kenya; Tanzania; Sub Saharan Africa

1. Introduction

The development of Quality Management is often described in steps going from Quality Control to some type of Quality Development (Dale *et al*., 2007, Bergman and Klefsjö, 2010). Western quality literature presents this process as something, which has already taken place. This description might to some extent be true for developed countries, but is not a valid description for most developing countries, where even basic Quality Control could be non-existent. This implies that basic quality approaches could be of significant help.

The quality management area has evolved since post World War II Japan and there have been modifications and presumably improvements in quality philosophies. Notably the quality standard ISO 9001 has become an important part in quality work as have the quality awards such as MBNQA and EQA (BPEP, 2013), (EFQM, 2016). Also, Six Sigma, Lean Management and the Lean Six Sigma have emerged as important quality philosophies (Anthony et al. 2004), (Anheiter and Maleyeff, 2005).

Africa is a continent with a rapidly growing population and also a rapidly growing economy. Some of the poorest countries in the world are found in the Sub Saharan Africa. Quality initiatives in the East African country Kenya have included work with ISO 9000-standards, Quality Awards and work with Lean Six Sigma (Douglas *et al.* 2014). Compared to the southern neighbour of Tanzania work with quality management seems to be more developed.

Based on observations in the building material sector in Dar es Salaam most of the SMEs do not seem to have introduced any quality control (Sabai *et al.* 2016). Not controlling and consequently not improving performance could become a problem with increasing competition from imports and from larger companies with international ties. It should be of interest to study the elements of the Kenyan approach to find key factors and to see if these could be applied in the Tanzanian context. Results could be used to highlight challenges for Quality Management in Sub Saharan Africa.

In the 1980s, when various industrial sectors in the USA and Europe were being decimated by superior quality Japanese products, the question was asked in the USA - "If Japan can why can't we?" This paper looks at Kenya and Tanzania as examples for developing countries in Sub Saharan Africa and asks the question – If Japan can why can't Africa? The aim of this paper is to identify how Quality Management theories and practices can be successfully adapted to support organisational excellence in developing countries.

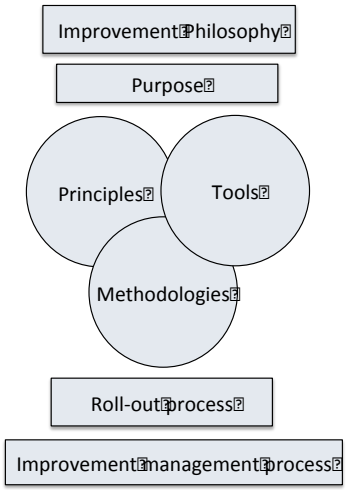
2. Methodology

The historic Japanese approach to quality is described and compared with the Kenyan approach. Quality Management initiatives in Kenya have been studied and key success factors identified in what can be described as a quality management process at macro and micro levels. In order to organise the findings we have used Isaksson and Taylor (2014) who suggest a model for describing any chosen quality philosophy. The model defines the elements of purpose of philosophy, principles, methodologies, tools, philosophy roll-out and philosophy management, see Figure 1. The model can be used for identifying key elements of a change philosophy without necessarily fitting it into any specific quality philosophy. By the help of the model the main elements found when studying quality management in Kenya and Tanzania have been categorised and compared at the strategic level.

The approach chosen for the operational level is to work with case studies. Three SMEs within the building block production sector in Dar es Salaam Tanzania have been studied. The

model in Figure 1 has been used to compare a benchmark and the current situation. Focus here is on how quality management could support the proposed solutions.

Figure 1. Elements of a quality philosophy, based on Isaksson and Taylor (2014)



3. Kenyan Adaptation of Japanese Quality Practices

Post WWII the National agenda of Japan was to improve the quality of life of the people as well as the nation's wealth. In 1946 JUSE (Japanese Union of Scientists and Engineers) was formed and they identified quality as critical to achieving the national objectives. In the 1950s JUSE instigated a mass education programme for organisations, organised conferences on quality, published research papers on quality and offered training courses. A national quality award – The Deming Prize –was introduced. The process of cascading the quality agenda down through organisations then began.

In a tactical or organisational level improvement JUSE set about convincing the nation's industrialists that improving quality was the way forward. They held seminars for company executives (Deming and Juran were invited to give many of these seminars). The senior executives committed themselves and their organisations to quality.

In the operational or micro level organisational managers recognised the need for quality and then delivered that quality. They adopted the quality concepts such as TQM and SPC and their associated methodologies and tools and used them in everyday operations. Improvements were based on teamwork and continuous improvement was built into every day activities (Douglas *et al*., 2014).

The Kenyan approach on the strategic or Macro Level has been manifested through the creation of a Kenya Government National Agenda, which aims to create a globally competitive and prosperous nation with a high quality of life by 2030 – Vision 2030. The Kenya Institute of Management (KIM) was formed in 1963 and has been at the forefront of promoting quality management in the East Africa region. In 2000 KIM launched the Company of the Year Award (COYA) and the Kenya Bureau of Standards launched the Kenya Quality Award (KQA). In 2009 KIM developed an Excellence Model (Organisational Performance Index- OPI) based on international models such as EFQM, MBNQA and the Deming Prize.

On the tactical or organisational level the top down approach was adapted. Organisations' senior executives were encouraged to adopt the OPI or ISO 9001 Quality Systems Standard. In 2000 there was an upsurge in sectorial quality improvement initiatives backed by various

award schemes. By 2015 over 500 companies had achieved ISO 9001 certification. Both the KQA and COYA awards application process encouraged improvement by benchmarking with best in class.

Operational or micro level work is based on committed senior management. This commitment to improving quality was cascaded down through organisations to the people who produced the goods or delivered the service. Staff were trained in the necessary improvement techniques and empowered to deliver quality. Training covered OPI and ISO 9001 implementation courses as well as management, leadership and governance courses. Training was viewed by CEOs as an investment not a cost. An example of this is the Kenyan Banking Sector, which is extremely competitive with over 40 banks. The sector became aware of continuous improvement initiatives such as Lean Six Sigma through KIM promoting quality conferences and publishing articles in its membership "Management" magazine. Public open courses were offered delivered by international experts and the banks would send along 1 or 2 delegates to gain information and knowledge about what such concepts could offer them. Following that a number of banks funded in-house Lean Six Sigma training courses at Yellow and Green Belt level. One bank in particular adopted the top-down approach by putting all its senior executives (including the CEO) through Yellow Belt courses. That bank then went on to training scores of staff to Yellow and Green Belt levels and a few staff to Black Belt level. Continuous improvement became second nature to staff who would set up projects to improve the effectiveness and efficiency of their processes saving millions of Kenya shillings in reduced waste and enhancing customer satisfaction by improving the speed and quality of their service delivery (Ndiata *et al*,2015).

4. Elements of the Kenyan Quality Approach

The Kenya Government realised that many of its large organisations across all sectors were going to be open to competition from International organisations. Competition would be fierce based on the criteria of cost, quality delivery and service. It became obvious that the introduction of new technology would reduce production costs in the long term and even more obvious that by improving quality, costs would also come down and allow organisations to compete better at both national and international level. The Kenya Institute of Management took a lead, along with the Kenya Bureau of Standards and developed an Excellence Model based on other successful models such as EFQM and the Deming Prize. The focus was very much on improving processes. Organisations were encouraged to implement the excellence model framework and to implement ISO 9001. The successes of organisations following the quality route were used to attract other companies into the "quality family". Meanwhile KIM and other agencies would import international experts on various methodologies such as Six Sigma, Total Productive Maintenance and Kaizen to train people from across a wide range of organisations. This training required time and money as well as senior management commitment. The qualifications gained by employees who attended these training courses then became highly valued in the jobs market and they would be head-hunted by competitors, enticed by higher salaries. This helped in spreading the message about the need for such skills and the organisations that employees moved to, realising the benefits of having more trained and skilled employees, would themselves embark on more training. Therefore the methodologies and skills that were initially rolled out within organisations were subsequently spread to other organisations within an industrial sector and then across sectors.

The only way to bring about real change in quality is through changing the processes at operational level. This was true regardless of context, so what worked in the banking sector would work in manufacturing. However, context (for example a bank or manufacturing

organisation) provides variation in a number of areas, including, the processes themselves, culture of the organisation and educational level of the employees.

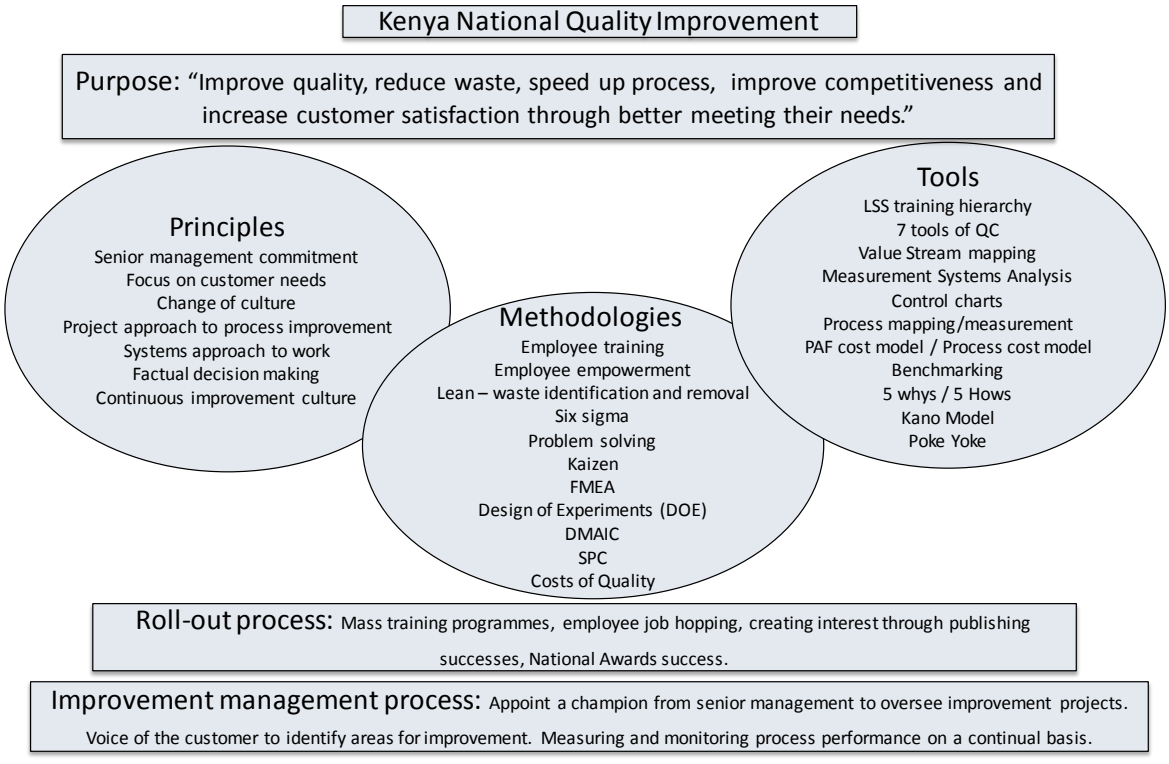
Processes in manufacturing tend to be high volume, technology driven, dependent upon inputs from external suppliers and the final product customer is another business with the key performance indicators of cost and defect free. In banking many of the processes are not high volume, they are people and computer driven and the final product is both business and individual customers with the key performance indicator time and error free.

In Lean Six Sigma the level of the training is set at Yellow, Green and Black Belt with an examination at the end of the training to validate the knowledge gained. This meant that some trainees did not meet the required standard for achievement, they fail the examination.

The banking system in Kenya is highly regulated but many staff are highly educated and there is some degree of autonomy for workers. In manufacturing the culture is very much about "command and control" so the shift to a continuous improvement culture is more difficult to achieve than in a bank.

In order to achieve the necessary changes to culture, skills levels and processes required mass in-house training programmes of staff at all levels but most importantly at operational level Groups of staff from the same work area would then return to their jobs equipped with the skills necessary to improve their own processes and were empowered by senior management to deliver such process improvements. Initially employees would aim to improve their own work processes using the basic skills such as the 7 tools of quality control. These initial improvements would generally focus on the removal of waste and the acceleration of the process. However, once confidence improved the projects became more ambitious and the processes to be improved would cut across different areas and functions of the business.

Figure 2. Elements of a proposed Quality Management philosophy as adapted in Kenya, based on Isaksson and Taylor (2014)



5. Comparing Kenya and Tanzania – Macro Level

Kenya has a population of 46 million (2015), which is projected to reach 95 million by 2050 (Populationpyramid, 2016a). The economy in Kenya has been growing at a rate of about 5% during the last years and GNI/capita was 1290 US$/person in 2014, (World Bank, 2016). An estimated 22 million people live below the poverty line. The labour market is divided between public and private formal (wage) sectors, the informal economy, self employed and unpaid family workers. The informal economy accounts for 82% of those in employment (11 million people). The formal sector employs 17 % of people split between the private sector (70 %) and the public sector (30 %).

The Kenyan economy grew by 4.7% in 2013. This growth was due to improved performance in *inter alia* manufacturing, construction and mining and quarrying. Mining and quarrying recorded a significant growth of 9.9% mainly due to increased production and consumption of cement. The construction sector is booming and this is having a positive effect on the demand for cement. The manufacturing sector grew by 5.6% between 2012 and 2013 mainly due to the manufacture of cement and food and drinks. The challenges for the manufacturing sector include high costs of production, competition from cheap imports and low value addition.

Micro and small enterprises (MSEs) account for 75% of all modern establishments in Kenya with an estimated 11 million people work in MSEs. MSEs represent 67.7% of manufacturing firms but account for only 14.3% of manufacturing value addition (Kenya Institute for Public Policy Research and Analysis (KIPPRA), 2014).

Tanzania has a population of 53 Million people (2015). By 2050 the population is expected to increase to 137 Million (Populationpyramid, 2016b). The GNI/capita was in 920 UD$/capita in 2014 with an economic growth of about 7% (World Bank, 2016). Tanzania has been and is poorer and less developed than Kenya that has a GNI/capita that is 40% higher than Tanzania. The situation in Tanzania is similar to that of Kenya with a large part of the work being done in the informal sector and in SMEs, which often would belong to the informal sector. Within branches like cement manufacturing and breweries, multinational companies are already on the market. These companies would have modern quality management including ISO 9001-certification. This could increase the interest for quality management. The number of ISO 9001 certificates in Tanzania was 79 in 2014 compared with 565 in Kenya (ISO, 2014). Tanzania has installed the Tanzania Leadership Awards but information on the activity is still scarce. There seems to be no Tanzania Institute of Management as there is a Kenya Institute of Management. However, there are companies promoting courses in Lean Six Sigma.

The initial comparison indicates that Kenya has a lead in quality development and quality promotion compared to Tanzania and that Tanzania therefore should be able to learn from the Kenyan experience.

6. Case Study of Building Material Production in Dar es Salaam

The building sector is important and is growing rapidly in Tanzania. One clear sign of this is the increasing number of cement plants. In an overview of the cement industry from February 2016 the Nairobi business monthly writes concerning expansion plans in East Africa:

"Tanzania would account for all the new capacity pushing the country's total installed capacity to 9.4 million tonnes per annum. For the first time in the history of East Africa's

cement, Tanzania's installed cement capacity by 2018 would surpass Kenya's. By 2018, Kenya's total installed cement capacity would stand at 8.1 million tonnes per annum."

The current cement consumption in Tanzania is estimated to about 3 million tonnes with large parts of it consumed in Dar es Salaam, which is the economic hub of Tanzania.

Cement drives both building costs and the carbon footprint. This means that it is important to make best use of cement building capacity with the purpose of providing affordable housing with a minimised carbon footprint. Cement building value is best used in proper concrete using modern technology. However, the few multi storeys residential buildings currently built in ordinary concrete are all modern buildings with prices that are beyond the means of most of the population. Instead smaller houses are built using sand cement or sandcrete blocks. These blocks are relatively cheap and enable people to do parts of the building themselves or to employ low cost labour. The problem is that cement is poorly used in these blocks, which significantly increases the carbon footprint (Isaksson and Babatunde, 2016). Providing sustainable buildings, which are both affordable and with a low carbon footprint is a challenge. The currently favoured solid blocks are environmentally a very poor solution. However, even in the production of these blocks there could be substantial options for quality improvement that could improve affordability and reduce the carbon footprint.

6.1 Background of block production in Dar es Salaam

It is estimated that out of the total cement consumption in Dar es Salaam some 70%, or about 0.8 million tonnes is used for producing sandcrete blocks (Isaksson and Babatunde, 2016). The yearly sales value of these blocks is estimated based on Isaksson and Babatunde (2016) and Sabai *et al.* (2016) to about 400 MUS$ with all blocks calculated as 6-inch solid blocks. The indication is that there is substantial waste both in the form of design of the main products and in producing the chosen design (Sabai *et al.* 2016), (Mrema and Isaksson, 2016). Here, as an example, focus is on the solid blocks and opportunities to improve them. Isaksson (2015) estimated that the solid block performance could probably be improved by some 20-50% by optimising sand quality and the compaction. This indicates a substantial opportunity both for producers to reduce costs and for consumers in the form of lower prices. Assuming an improvement possibility of 25% in better cement use in solid blocks and a yearly cost for cement of about 100 million US$ the yearly cost saving potential in cement would be 25 MUS$. This means that there should be a strong incentive to improve performance on all levels.

Still, there seems to be little or no quality improvement, which is benefiting the block producers. There is practically no quality control of these blocks (Sabai *et al.* 2016). Based on the experience of one of the authors in work with block makers the currently presented reasoning is that if customers buy the products they must be good. As an afterthought producers often add that customers only care about price.

6.2 Producing sandcrete blocks

The production of blocks is simple and can be carried out almost manually or using some simple equipment. Sand, cement and water are mixed and compressed into blocks. The blocks are watered for some 5-7 days and then left for a few days to mature before they are sold. The manufacturing process is described in Table I.

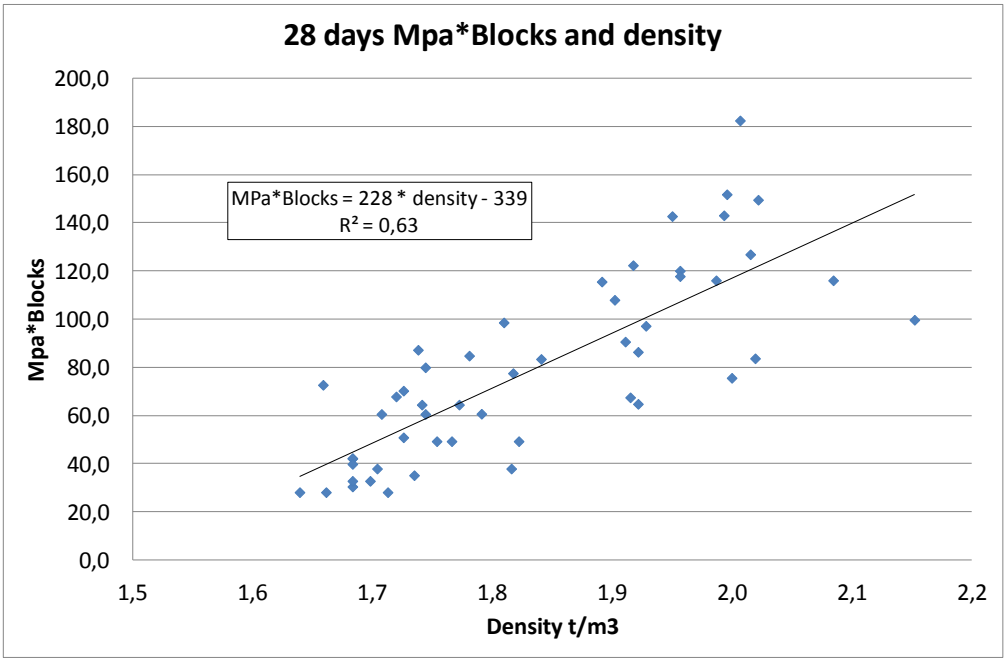
Table I. The block making process (Isaksson and Taylor, 2009).

Sub-process	Input	Output	Comment
Proportioning of materials	Cement, water, sand, aggregates	Materials are blended in a mixer or in a heap on ground	Water to cement ratio has a major effect on the strength development
Mixing	Blend	Mouldable concrete mix	Type of mixer and time of mixing are important
Moulding the block	Concrete in mixer	Block mould is filled with concrete mix	Correct amount of material is moulded
Compacting the mix into mould	Plastic concrete mix in mould	Compacted and de-aerated concrete block is in mould	Correct vibration time, intensity and force are all important
Moving to first storage	Placed concrete in mould	Block on ground	Often moved manually on a plate
First day curing	Block on ground	Block in final curing area	Important to cover block to prevent quick drying
Final curing	Block in final curing area	Block loaded on transport	Water quality and curing time before sale is very important

6.3 Measuring block quality

The first challenge is that there is no simple indicator that assesses performance. Blocks are occasionally taken to testing laboratories for recording the compressive strength in MPa. However, since this is reasonably expensive and time consuming only a minority of the producers do this and practically nobody does it regularly. This means that for quality control there is normally no indicator to follow. Isaksson *et al.* (2012) propose that block bulk density could be used as proxy for compressive strength. This would mean that block weight could be used to assess strength performance for mixes with the same cement content. Since mix ratios are often quoted as number of blocks the performance indicator could be seen as MPa*blocks.

Figure 3. MPa*blocks for six inch blocks, (Isaksson *et al.*, 2012)



The indicative figure for describing quality is the same as for cement productivity, number of blocks produced per 50 kg bag of cement. This makes productivity improvement difficult, since customer would be sceptical to an increased number of blocks produced per bag. For the supplier there is no simple way to demonstrate that block strength is according to requirements. With a clear y-value missing it becomes difficult to analyse the effect of different x-values such as water content, quality of sand used and compaction.

In Figure 3 the performance indicator MPa*blocks is compared with the bulk density of six inch blocks. Cement productivity in concrete could also be expressed as MPa*tons with this figure being obtained by measuring the concrete or sandcrete strength and then dividing it with the percentage of cement (Isaksson and Babatunde, 2016). For research purposes the MPa*tons could be used a proxy for customer value. This could be the y-value compared with important x-values such as water content, sand quality and compaction.

6.4 Quality philosophy elements for Tanzanian block production – strategic level

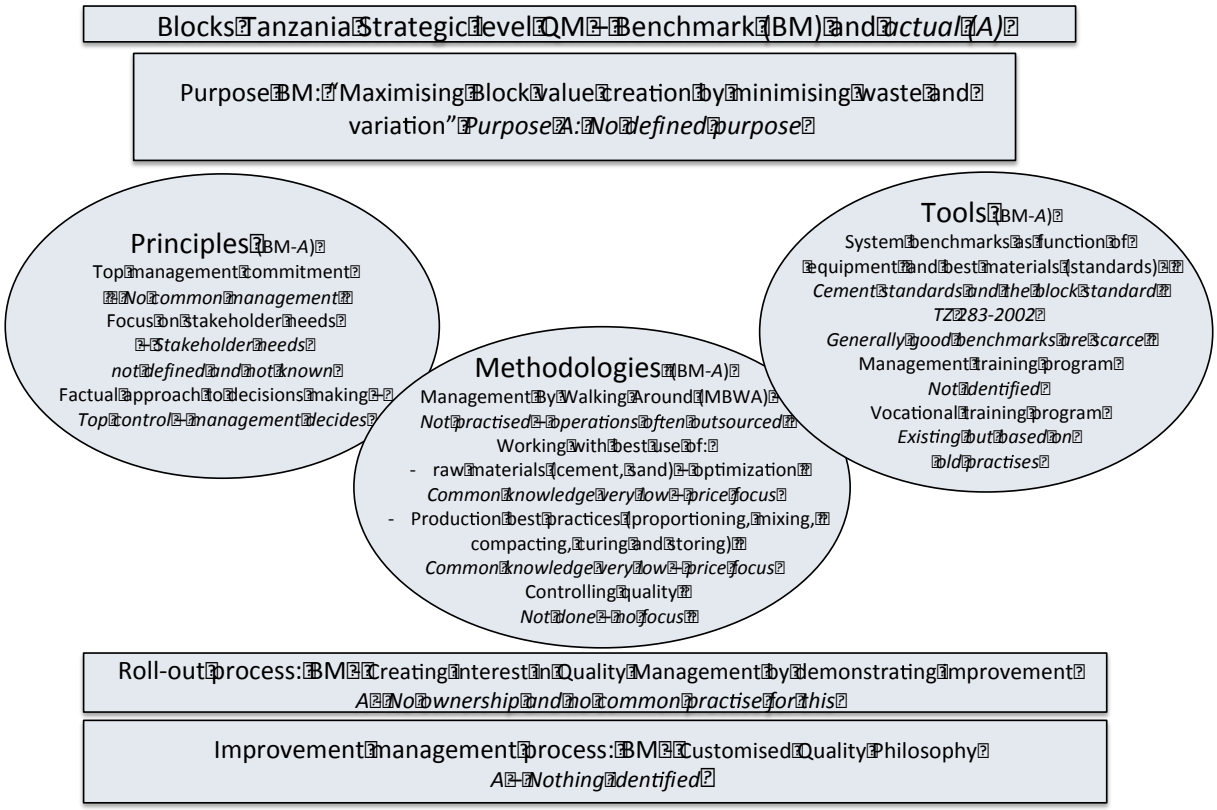
Based on the study of block manufacturing in Dar es Salaam, there seems so far not to be any clear ownership of the improvement opportunities on a strategic level. Formally, the Tanzania Bureau of Standards, based on the standard TZS 283-2002, controls block-manufacturing quality. In practise this is seldom done due to several problems. The number of block making companies is large. The estimated number in Dar es Salaam is 500. Out of these only about 1% has been certified based on the standard. If controls would be done a large number of the companies would not conform to the standard creating considerable problems in the block supply. Sabai *et al.* (2016) estimate that conforming to the standard could increase the cost of production in the market with some 20 million US$ per year. This increase would probably not add to any customer value, since it seems that the standard requirements might not be relevant for the current block applications (ibid). This situation is commonly known and block makers therefore base their judgements on if blocks can be sold or not. There seems to be no active block makers association or similar organisation. In the supply chain from raw materials to building materials used in construction the largest players are the cement manufacturers, often belonging to multinational companies. These companies provide some support to block making by organising seminars. These seminars are part of cement branding and marketing and do not go to any depth. Generally it seems that block makers are left to their own devices when it comes to strategic support. This indicates considerable challenges for quality management on the operational level.

A proposed quality philosophy and its elements for sandcrete block production in Tanzania are presented in Figure 4. On the overall level of purpose and principles the benchmark situation would not differ significantly from a general approach. However for Methodologies and Tools and also for roll-out and the management of improvement a considerable adaptation to the context is needed. Figure 4 shows that there are several challenges where the main challenge could be that there is no clearly perceived driver for change and no identified management to support improvement. It seems that what can be found in Kenya in the form of promotion of ISO 9000 and quality awards is not been done in the same way in Tanzania. When comparing with the situation in Kenya there seems to be a big difference at the strategic level. However, it could also be that the business studied is an area where these initiatives have not penetrated. Even if Tanzania is one of the poorest countries in the world there does not seem to be the same sense of urgency perceived for using quality management as when rebuilding Japan after the Second World War. Studying the strategic level more thoroughly is left for further research.

The choice of principles, methodologies and tools in Figure 4 is indicative. Main elements in the model have been identified by the authors as an example of how the work could be done, but also as a best assessment based on current understanding. With structure and

commitment missing at the top level as well as in the operational practise introducing Quality Management appears to be a tough challenge on the strategic level. Like in Japan, it could be that external support is required.

Figure 4. Elements of a proposed Tanzania Strategic Quality Management philosophy for building blocks compared with actual, based on Isaksson and Taylor (2014)



6.5 Case study of solid block performance and operational quality philosophy

Three case study companies have been studied in a longitudinal study with contacts to two of the three companies starting in 2009 and in early 2014 with the third company. Work with the companies is continuing. In Table II an overall summary of the performance and situation is described based on sampling done in 2016.

From Figure 2 we could assess the average performance as 90 MPa*blocks, which with an average of 30 Blocks/bag (50kg cement) and about 29 kg per block translates into about 50 MPa*tons. Compared to these older values, all case study companies are performing well with values ranging from 60 to 95 MPa*tons.

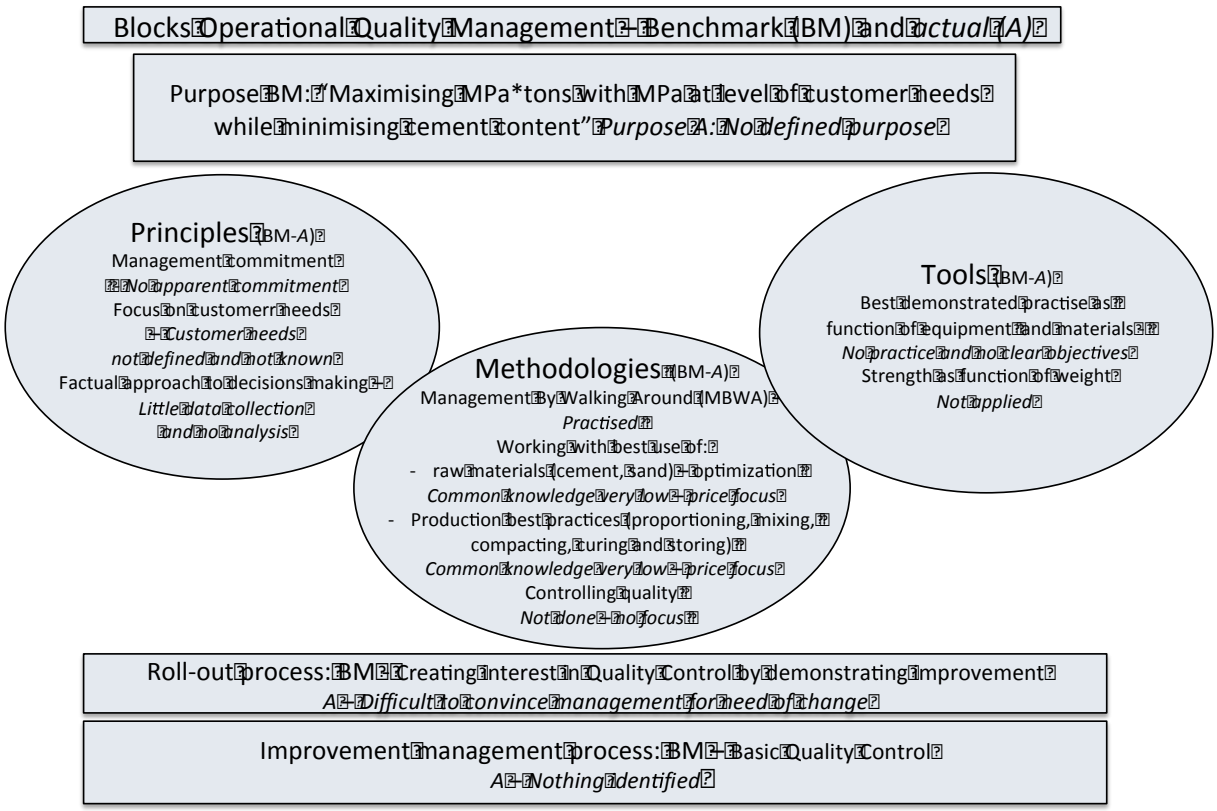
There are big relative differences with the best relative strength performance in MPa*tons being 50% above the lowest performance and building value in MPa*tons being almost three times for company A compared with company C. The company with the simplest technology is outperforming the two more modern companies indicating that some material or operational factors are decisive. For all tests 30 random blocks have been weighed and a prepared conversion from block weight to strength has been used. For the conversion some 6-10 blocks per plant have been used with the blocks being tested in testing laboratories for compressive strength. Companies B and C occasionally send blocks for testing and the performances recorded are in line with the latest results.

Table II. Case study results from Dar es Salaam, Six-inch blocks

Co	Products	Type of business	Price per block US$	14 days strength	Cem %	Mpa*t /US$	Aver. MPa*t	Std dev MPa*t
A	Solid blocks	Small (<10 employees) - local equipment only	0.56	5.4	5.7	170	95	21
B	Solid and hollow blocks and other building products	Medium (30-50 employees) with imported equipment	0.84	3.3	7	79	66	10
C	Solid and hollow blocks	Medium (20-30 employees) with imported equipment	0.74	4.6	5.5	69	60	14

Plant B is struggling with finding customers and only sells block for special orders. Only a fraction of the capacity is used. Many customers would be influenced by how the used equipment looks like, which still makes it possible for plant B - that has the most sophisticated equipment - to find customers.

Figure 4. Elements of a proposed Operational Quality Management philosophy for block production compared with actual, based on Isaksson and Taylor (2014).



Plant C is struggling with costs but produces at full capacity. Plant A is producing regularly and seemingly close to full capacity. All plants have obvious improvement possibilities. These are such as needs to sell more, needs to reduce costs and to make best use

of facilities. However, these opportunities are seemingly not translated into drivers for working with improved quality.

At the operational level there is no available written information on material quality or best production practises. Some information could be found on Internet, but none of the case companies have used this opportunity. Each company relies on their own best practises defined mostly by the team employed to do the production. The operators are often consisting of casually employed ambulating teams. The situation on the operational level is presented in Figure 4. In spite of improvement opportunities that could triple the customer value per price there is no management awareness of this. Since the facts needed are not collected the opportunity does not translate into a driver for change.

7. Discussion and Conclusions

The findings support the assumption that there are substantial cement productivity variations in block production representing an important opportunity for improvement. The suspected reason for this is that neither customers nor producers can properly assess performance and quality performance. Decisions based on facts cannot be made because there are no available facts. The indicated improvement opportunity for the studied solid blocks of some 25 million US$ in Dar es Salaam seems realistic and could well be on the low side based on results in Table II. The brief analysis on main reason for the existing opportunity indicates that the problem is lack of measurements. Performance has not been quantified which makes it impossible to assess the influence of different factors affecting the strength. The simple solution would be to introduce quality control to track performance and to enable optimisation. However, there seems to be little or no management interest for this in the companies worked with. At the level where the studied companies are working there is no macro level support as indicated in Figure 3, which makes quality work at the operational level difficult as described in Figure 4. In this case it seems that market forces are not enough to drive the needed improvement for sustainable building materials.

Future work should focus on finding companies interested in introducing Quality Inspection by weighing of the blocks and Quality Control by monitoring performance over time and relating it to the main influencing parameters. With the introduction of data, optimisation of sand, water addition and compaction can be done. This would hopefully lead to cost savings while maintaining a stable and defined quality. With increased sales and better earnings it should be possible to increase interest in Quality Management.

Here, we only have briefly looked at Kenya and Tanzania. We believe that the situation described could be typical for most countries in Sub Saharan Africa. The main indication is that there could be substantial opportunities that go unnoticed because of lack of performance measurements and Quality Control. On the macro level results from Kenya have shown profitable improvements when working systematically with Quality Management. The case study in Dar es Salaam indicates that the Cost of Poor Quality seems to be > 25% in terms of increased costs for cement, or about 25 million US$ per year. The indication is that a good part of this improvement potential could be realised provided management commitment. It could well be that block production could serve as a general example of the level of improvement opportunities.

The situation in Sub Saharan Africa seems to provide great possibilities for using Quality Management in national and organisational development. The Kenyan experiences are encouraging. For Tanzania the study at the operational level indicates that main things missing are the managerial drivers for change. The crucial issue is how to create the managerial commitment where there is none.

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