

# Critical Soft Factors for Optimum Performance of Maintenance Operations

Bertha Ngereja<sup>1</sup> and Bassam Hussein<sup>2</sup>

<sup>1</sup>PhD Candidate, Department of Mechanical and Industrial Engineering, NTNU, NO-7491 Trondheim, Norway. E-mail: [bertha.ngereja@gmail.com](mailto:bertha.ngereja@gmail.com) (corresponding author).

<sup>2</sup>Associate Professor, Department of Mechanical and Industrial Engineering, NTNU, NO-7491 Trondheim, Norway. E-mail: [bassam.hussein@ntnu.no](mailto:bassam.hussein@ntnu.no)

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**Abstract:** Over the past three decades, an increasing trend has been observed in research related to the consideration of human factors instead of solely based on the traditional aspects of project and operations management. However, much of the research done to date on human aspects has been conducted in developed countries in Europe, America and Australia, leaving developing countries, especially those in Africa, deprived of similar research. The purpose of the paper is to bridge this gap in knowledge by comparing the soft factors in the two contexts in order to provide an understanding of whether they have the same level of importance, regardless of their differences in economic, social and environmental aspects. The authors used semi-structured interviews to identify the critical soft factors for optimum performance of maintenance operations at a natural gas processing plant in Tanzania. The uncovered soft factors included top management engagement and oversight, trainings, ergonomics, collaboration, safety and security, recognition programs, and education and career growth. There was a high degree of conformity between the soft factors uncovered in the Tanzanian context and those in other African countries and other developing countries around the world. However, there was also conformity between the soft factors uncovered in developing and developed countries, which only differed in the level of the emphasis they placed on implementation.

**Keywords:** Soft factors, organizational performance, human factors, ergonomics.

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## 1. Introduction

The aspect of soft (i.e., intangible) factors in organizations first gained recognition in the 1980s (Homburg et al., 2003). The recognition was spearheaded by the Aloha Boeing 737 fuselage-failure accident in 1988, which was the first of various significant events that focused attention on the impact of human factors (Johnson and Hackworth, 2008). Since then, there has been significant increase in the interest of human factors and their influence in organizations. In 1991, Meister (1991) suggested that this trend demonstrates an increasing awareness on human factors in technology. Of the selected literature reviewed for the research, only 5% of the studies were conducted prior to the 1990s, which supports the claim that the human aspect phenomenon gained popularity relatively recently. The claim is supported by Gadenne and Sharma (2009), who found that before that period researchers mainly focused on hard (i.e., technical) factors.

Hollnagel (2014) argues that the modern nature of work is quite different compared to how it was 70 years

ago. There is a need to reassess the current changes with regards to soft factors and infuse them with management tactics. This requires decision-makers in organizations to have a proper understanding of what these human factors entail and of their contribution towards overall performance.

Existing literature on soft factors has largely been based on developed countries, and this has led to questions about whether same factors would affect developing countries homogenously, given the countries' differences in terms of culture and level of economic development. Hofstede (1983) found that people from different countries behave quite differently depending on what they have experienced and how they have evolved as a nation.

Although many studies of soft factors have been conducted, very few have been done in the African context. Of the forty publications reviewed for this paper, only two were conducted in the African context. While this may have posed a limitation on the information obtained it has highlighted a need for further studies to be done in Africa.

Therefore, the overall goal of this paper is to broaden our understanding of the subject on soft factors and we focus solely on the African context. The findings are based on a case study conducted in Tanzania. The case organization is a natural gas processing plant in Tanzania.

Tanzania is one of the emerging nations that has seen major natural gas discoveries with proven natural reserves of about 57 trillion cubic feet. Since this discovery of natural gas in Tanzania, various projects have been implemented to enable the extraction, processing, transportation and generation of electric power.

The day to day management and operations of these facilities require expertise, knowledge and skills in both managerial and technical areas for both personnel and equipment especially that this is a novel industry that the country is taking full control for the first time.

The goal of this study is to identify the soft factors that are necessary to be incorporated in the maintenance operations so that these maintenance systems can become best-in-class. To achieve this goal, the soft factors that are considered important in the Tanzanian context considering the culture, level of national development and infrastructure level will be identified, the soft factors that are practiced and those that should be practiced will be identified through interviews with key personnel from the maintenance operations at the plant. We shall then compare the identified soft factors from this study with reported soft factors identified earlier in literature in order to assess the similarities and dissimilarities between African context and other contexts.

## 2. Literature Review

### 2.1. Soft Factors - Definition and Terminologies

It is currently becoming accepted wisdom that people deliver value to projects and operations, not processes or systems (Cooke-Davis, 2002). Wohlin and Algren (1995) state that soft factors are used to describe the influence of the human elements in projects and operations, which is difficult to quantify. In various studies, both these factors and a number of other terms have been used interchangeably to describe the human elements. Yang and Yang (2013) refer to human factors and soft factors as people factors; Nah et al. (2001) refer to them as critical factors; Homburg et al. (2003) refer to them as intangible factors; Sudhakar et al. (2011) refer to them as non-technical factors, while Pinto and Prescott (1988) suggest that having proper human factors is a critical success factor. The variation in terms of reference provides an indication that the topic of human elements has gained popularity.

Although in some cases human factors are used to represent ergonomics, various researchers have used human factors to mean more than just ergonomics. Galar et al. (2011) defined human factors as “*physical and psychological capabilities of the individual, like training, education and experience.*” Abdullah and Uli (2007) defined soft factors as “*behavioural aspects of management or human factors*”. This include, organizational culture, leadership and top management commitment, human resources or customer and stakeholder orientation (Calvo-Mora et al., 2013) and we have adopted the definition for the purpose of our research.

### 2.2. The Influence of Soft Factors on Organizational Performance

Abdullah et al. (2008) found that organizational performance is significantly influenced by implementation of soft factors. Homburg et al. (2003) found that soft factors play an important mediating role in the link between a service-oriented strategy and organizational performance.

Abdallah (2013) found that soft practices significantly and positively affected the total productive maintenance implementation level on organizations. By contrast, Chan et al. (2017) and Abdullah and Uli (2007) found that soft factors directly influenced quality improvement in an organization while Sudhakar et al. (2011) found that soft factors influence team performance. However, studies by (Shams-urRahman and Bullock, 2005; Gadenne and Sharma, 2009; Yang and Yang, 2013; Calvo-Mora et al., 2014) all revealed that combining both soft and hard factors fostered organizational performance.

According to Gadenne and Sharma (2009), hard factors comprise benchmarking and quality measurement, continuous improvement, and efficiency improvement. Chroust (2002) found that soft factors had a strong influence on performance and often impeded the successful introduction of technology systems in the organization. Overall, the cited studies have affirmed the significance of soft factors on organizations.

### 2.3. Soft Factors in the Context of Africa and other Developing Countries

A study conducted in Kenya by Azadeh et al. (2017) revealed the most important soft factors as procedure usage, fatigue, knowledge and experience, and time pressure, followed by training, task planning and/or shift management, knowledge management, scheduling and incident report programs.

In Ghana, Smith-Jackson and Essuman-Johnson (2002) identified training as the most critical factor for ensuring proper communication in organizations. Communication breakdown is carries risks and may result in unplanned costs for the organization. A few other studies conducted variously in Malaysia, India, and Taiwan identified corresponding soft factors, as shown in Table 1.

### 2.4. Soft Factors in the Context of Europe, US and other Developed Countries

In the USA, various researchers have identified several soft factors important for facilitating organizational performance. Lewis et al. (2006) found that customer focus and satisfaction, people training, top management commitment, teamwork, employee involvement, continuous improvement and innovation, information flow, and performance measurement were deemed important in small and medium-sized enterprises (SMEs). There is homogeneity in the aforementioned factors and those identified by Nah et al. (2001) in their comprehensive literature review, in which they found that teamwork, top management support, good coordination and communication, change management program and culture, training, education, and support were important soft factors to be implemented in the organization. However, (Wiersema and Bantel, 1992; Pinto and Slevin, 1987) specify top management as the most important factor with a major influence in an organization.

**Table 1.** Soft factors in selected developing countries

Country	Literature	Soft factors
Malaysia	Abdullah et al. (2008); Abdullah et al. (2009)	Management commitment, customer focus, and employee involvement
Malaysia	Chan et al. (2017)	Management commitment, customer focus, supplier relationship, employee involvement, training and education, and reward and recognition
Malaysia	Abdullah and Uli (2007)	Management commitment, customer focus, employee involvement, training and education, reward and recognition, supplier relationship
India	Kumar et al. (2015)	Motivation, fitness for duty, technical knowledge, skills and experience, emotional stability, attention and alertness, and perception skills
Taiwan	Yang and Yang (2013)	Job security, respect for people, direct authority, culture, innovative work, environment

Various studies conducted in Europe have identified top management support, number of stakeholders, and project team skills as important soft factors in managing project complexity (Gutierrez and Hussein, 2014). Additionally, Maurer (2010) found that trust was an important factor in project management and was influenced by project team composition and rewards scheme. Hussein (2018) suggested that factors such as trust, openness, respect and loyalty has significant impact on creating a positive and encouraging working conditions in project organizations. Lack of these factors could cause power struggle, resistance and poor knowledge sharing.

Galar et al. (2011) conducted a research based in Sweden and Spain that led to the identification of employees’ skills level, motivation, experience, attitude, physical capability, vision, self-discipline, and training as the important soft factors to facilitate worker performance. Based on a separate study in Sweden, Wohlin and Algren (1995) identified competence, product complexity, requirement stability, staff turnover, geographic distribution, methods and tools, time pressure, information flow, priority, and project management as important soft factors in organizations. Homburg et al. (2003) highlight two important soft factors that require significant attention in an organization, namely corporate culture and human resource management. Hussein and Hafsel (2016) have examined the impact of organizational factors on information systems success and they have found out level of competence and working culture as key soft factors that affect project performance in an organization.

Table 2 shows soft factors identified in Australia and Trinidad and Tobago.

**Table 2.** Soft factors in developed countries

Country	Literature	Soft factors
Australia	Shams-ur Rahman and Bullock (2005)	Workforce commitment, shared vision, customer focus, use of teams, and cooperative supplier relations
Australia	Gadenne and Sharma (2009)	Top management philosophy and supplier support, employee training, increased and interaction with employees and customers
Australia	Antonovsky et al. (2014)	Assumption, communication, design, and maintenance
Trinidad and Tobago	Lewis et al. (2006)	customer focus and satisfaction, people training, top management commitment, teamwork, employee involvement, continuous improvement and innovation, information, and performance measurement

**3. Method**

As we have previously indicated, the results presented in this paper are based on a case study conducted in Tanzania. The case organization is in the field of oil and gas processing. We aim to answer the following questions: How is the subject of soft factors addressed and understood in the Tanzanian in context, and what are the consequences of this understanding or lack of understanding? Are there any unidentified unique factors in the Tanzanian context that would have a greater impact on operations or performance than those already identified in the existing body of knowledge?

Since the study conducted was exploratory, a qualitative research method was adopted. Qualitative research method was adopted because it gave the informants opportunity to reflect on the less tangible aspects such as values, attitudes, perceptions (Gutierrez and Hussein, 2015).

Seventeen semi-structured interviews were conducted using two sets of open-ended questions, one for management and one for other informants. The interviews were carried in a period of two weeks and each interview lasted 45–60 minutes. All interviews were conducted by the first author. Informants sampling was based on convenience and availability. The convenience criterion was chosen because the case organization had people working day shifts and night shifts and therefore the interviewer could have easy access during the day. The availability criterion was chosen because operations were ongoing and therefore the interviewer had to check the worker schedule with management daily to confirm the work schedule and who would be available for interviews on that day. The list of informants included technical workforce, management, and line managers (Table 3).

**Table 3.** Sample of informants

Category	Position	Quantity
Management	Manager and superintendent	2
Technical workforce	Supervisors, engineers and technicians	12
Line managers	Safety, security and procurement	3
TOTAL		17

Each interview was divided into three sections. The first section covered the demographic profile of the informants with information on their age, gender, education level, work experience, and years worked for the organization. The second and third sections respectively consisted of a discussion on their understanding about soft factors and their perception of whether the soft factors were implemented in the organization. To uncover which soft factors were implemented and not implemented, the informants were asked to give their opinions on what non-technical strategies the organization had implemented to make them feel valued, enabled, and considered when performing their tasks. The interviews were recorded with each informant's permission in order to enable an efficient qualitative review of the responses. In the cases in which the informant felt uneasy about the use of tape recording, notes were taken instead. Given the purpose of the research, it was important that all informants were locals therefore the organization selected for the case study was fully managed and staffed by a local workforce.

A thematic method for data analysis was adopted with the use of NVIVO software, whereby the interviews were first transcribed and uploaded in the software. Thereafter the authors went through the transcripts several times to become familiar with the information. We coded the data into similar patterns in NVIVO software which enabled us to recognize meaningful themes and used those themes to derive to our conclusion.

#### 4. Findings

During interviews, the informants acknowledged that they are not familiar with the term soft factors. This may have caused uncertainty in their answers during the interviews, as they might have not had fully understood the purpose of the question. However, the informants were familiar with other terms such as human factors or people factors, and could describe relevant examples. The term "human factors" was the most familiar term for the informants, but those informants expressed variations in their understanding of it. Some informants associated human factors with personal issues such as attitudes when working, trust between workforce, lack of experience in work, uncomfortable working environments, and relationships between workforce. For instance, one interviewee stated that:

*a "human factor is when a person operates wrongly due to personal issue or because [he or she] has not had enough training or [has an] uncomfortable environment."*

Others considered that human factors were directly linked to human errors that resulted in incidents in the workplace. However, the majority of the informants associated human factors with safety in the workplace. One informant stated,

*"soft factor is a new term. It is my first time to hear about it but, human factor, I have heard it from the safety aspect about causing accidents or incidents when one is tired."*

#### 4.1. Significant Soft Factors in the Case Organization

The interviews uncovered the following soft factors as important for achieving optimum maintenance operations in the case organization; training, ergonomics, collaboration, top management engagement, education and career growth, safety and security, and having established recognition programs.

##### 4.1.1. Training

The case organization implemented trainings in three ways: in-house, out of location, and through mentorship programs. One informant commented,

*"normally, we have trainings both conducted locally and internationally. Everyone is put on the plan to attend these trainings."*

Additionally, supervisors in the case organization make efforts to mentor their team members to ensure that they are capable and confident to perform all of their tasks. The training sessions are considered important because they enable the staff to perform the tasks as required. Muller (2010) mentions that the attitude and personality of the leader, supervisor, or manager will have an impact on the entire performance of their subordinates.

##### 4.1.2. Ergonomics

Sheikhalishahi et al. (2016) state that stressed and fatigued operators are a weak link and may lead to errors in their work and thus affect an entire system. Therefore, our investigation focused on three issues: (1) tools and safety equipment, (2) workplace environment, and (3) task design. With regard to task design, some tasks were found properly designed while others forced the operator to be in awkward poses, use excessive force or rub their skin when accessing tight places, such as placing their fingers, palms, and thighs between hard and/or sharp objects in order to perform maintenance work on them. There were enough safety tools and equipment required for the accomplishment of tasks, and there were no complaints about shortages of appropriate tools or safety equipment required to perform maintenance tasks. The supervisors ensured that the tools and equipment were properly stored and maintained by making every operator take responsibility for his or her own set of tools. The workplace environment was very conducive and supportive to the workforce when performing their assigned tasks. The lightning was adequate, such that all parts of the equipment were visible day and night, and the temperature in the workplace was at a desirable level in the laboratories and control room. Some outdoor areas where the workforce were expected to spend time using equipment had a roof above them to protect the workforce from the sun and rain. The maintenance operators had a designated working area for the times when they were not working outdoors.

##### 4.1.3. Collaboration

The informants expressed the existence of a good working environment, supportive, sociable and welcoming in the case organization. The growth of trust in the case organization was influenced by the mentoring programs, which enabled the subordinates to be open to their

supervisors (mentors) in expressing not only their work-related challenges but also their personal challenges. This had built a bond between them, enabling the smooth flow of communication and in the process the workforce felt at ease about expressing their opinions. Additionally, because the supervisors were aware of the operators' strengths and weaknesses, involving them in task planning had become easier within the various units. The workforce described how they were highly involved in all aspects of planning and implementation of tasks. The working environment had enabled the case organization to have not only strong relationships within the units but also strong interdepartmental relationships. Such relationships were very useful in cases when there was a need for personnel in another unit, and meant that supervisors could handle arrangements without the need to consult higher ranking members of the organization, as one informant said, *"there is good relationship between units which helps that during need to ask for more people from other units, the supervisors are always willing to help."*

#### 4.1.4. Top management engagement

Top management refers to "the group of most senior executives and decision makers with responsibility for the overall strategic direction of the organization" (Wiersema and Bantel, 1992). The interviews revealed that the performance objectives of maintenance operations were strongly anchored at the top management level. Every decision or procedure done in the lower ranks was first approved by higher ranking personnel. Top management supported and approved, for example, the education and career programs, training programs, the safety programs that ensured workforce had all the safety equipment they needed, and the mentorship programs. For instance, one informant indicated the engagement of the top management by saying, *"top management have supported the safety which has helped to facilitate the safety culture."*

#### 4.1.5. Focus on education and career growth

At the case organization, the workforce is provided with support in the form of sponsoring and study leave to further their education (i.e., to pursue undergraduate, postgraduate, and doctoral programs). Study leave is important to the workforce because their job is guaranteed when they graduate. The opportunity is very highly exploited by the workforce, as after improving their level of education, they are in a better position to gain a salary increase and be promoted when an opportunity arises, which in turn enables them to develop their careers. The program has had a positive impact on the workforce by creating a conducive and motivating working environment, which indicates that limiting people from developing in their workplace can influence their work morale and affect their overall performance. As one informant stated,

*"doing one thing for a long time with no room for growth creates a sense of boredom in the long run. If one wishes to grow career-wise, they should be given that opportunity."*

The opportunity for workforce to acquire further education has enabled them to focus, since they know that their career goals are valued.

#### 4.1.6. Focus on safety and security

The management in the organization realized that there was a difference in how each employee understood and

perceived the risks associated with the nature of activity done at the case organization and therefore decided to invest in safety and security programs to educate the workforce, such that they would feel safe and secure when performing their tasks. One supervisor mentioned, *"due to the nature of our plant, safety is the first thing. The environment is very risky, so we make sure people are safe in their work."* This soft factor represents the psychological well-being of the worker: if a worker is certain of their safety and security, their ability to concentrate effectively on their tasks will increase.

#### 4.1.7. Recognition programs

We found that the lack of recognition programs was a pressing issue for the informants. They expressed that not being recognized for being creative in their tasks demoralized them. One informant said, *"if someone shows creativity in their work, they do not get incentives to motivate them to keep being creative."* The interviewed supervisors expressed an understanding that rewarding and recognizing the operators influenced them to perform better, and therefore they (the supervisors) tended to show appreciation to their teams by complimenting them whenever they made a valuable contribution, despite the fact that no programs had been established by the organization to reward workforce. One informant said, *"We do not get any forms of rewards, we have been fighting to have it implemented but currently there is not any form of reward given. We have suggested to be given rewards in terms of certificates of recognitions or bonuses."* Line managers and supervisors had implored the top management to set a budget specifically for recognition programs. There was unanimity among the informants on the need to introduce recognition programs and that its lack thereof had affected worker creativity in their tasks, which in turn had had a negative impact on their performance.

### 4.2. The Determinants of Soft Factors

From the interviews, we discovered that the soft factors had thrived due to the working environment being supportive and sociable. The latter was supported by the organization having a non-rigid organizational structure, similar culture as the workforce comprised of only local content and employees' sense of ownership.

#### 4.2.1. Local content

The plant is operated only by local employees, who speak the same language and are all bound by the same culture. In the case organization, the similarity in the employees' culture had created a sense of familiarity and trust, which in turn had led to the development of strong bonds between them. This finding indicates that workforce thrive better in familiar environments as opposed to unfamiliar ones. One informant said, *"the team is now fully locals, life has become easier as we all speak the same language and we have a similar culture, so we understand each other easily."* Proper communication is critical in order to facilitate collaboration, and can be achieved if people understand each other. Therefore, to ensure the proper flow of communication (i.e., knowledge or instructions), there must be a common language that is understandable to all of the people involved in an organization. An organization can have a good communication strategy internally but if the workers have different nationalities and conflicting cultures, challenges may arise. For

example, communicating with people in a language in which they are not fluent can be frustrating for both parties. This had happened at the case organization when it was under Chinese management prior to being fully managed by locals. All of the informants revealed that the language barrier had been a big challenge during that period. A study by Shachaf (2008) revealed that Americans faced challenges when working with Japanese and Chinese people because of language barriers. The necessity to elaborate in communications was experienced as very frustrating and time consuming. After considering the countries' norms, Shachaf also discovered that, for example, in Portugal and France scheduling meetings tended to be more relaxed than in the USA and the UK, where the schedules were more rigid and stringent.

#### 4.2.2. Sense of ownership

Considering that the organization is the first large corporation to be managed by a local workforce, the workers felt they were contributing to making history. This in turn had caused them to develop a sense of ownership, which meant they were united in solving the challenges together as they all want to prove their capabilities. They are all aware that if one person were to perform poorly, it would affect the reputation of the entire organization, which in turn would create the impression that the local workforce was incapable of thriving on its own.

#### 4.2.3. Non-rigid structure

Interviews have revealed that the personnel understood that they needed each other's support to accomplish their tasks, since in some instances the department teams faced the challenge of work overload because the departments were made up of teams with very few people. The organization structure has been established with sufficient flexibility to enable the workers to participate in tasks outside their departments, and this has stimulated the formation of good relationships across the entire workforce. This flexibility has become possible because the tasks have been made the priority and not the structure itself. However, the small number of personnel within the departments has proved a good opportunity for the supervisors to understand their team members well by having ample time to spend with them when planning tasks, mentoring, and training, which ultimately made it easy to build trust, strong relationships and competence. One supervisor stated, *"my team is very competent and comfortable. In the beginning, supervision was high but as time goes very little supervision is required."*

This finding can be related to Hussein and Hafsel'ds finding that poor performance was influenced by managers exercising too much control over their subordinates (Hussein and Hafsel'd, 2016).

### 5. Discussion

Most of the findings from the case study are consistent with those reported in the selected literature reviewed in this paper. The majority of the publications report studies conducted in the African context and in other developing countries and identify top management commitment, employee involvement, rewards and recognition and customer focus as the important soft factors implemented in the organizations to facilitate performance, followed by training and education, and supplier relationship. There is consistency in the mentions of all of these factors and

those in our study with the exception of collaboration and safety and security, which are not mentioned in reviewed literature but which we uncovered in the interviews. Similarly, supplier relationships and customer focus were not mentioned in the interviews. We assume that this was due to the nature of the industry within which the organization operates, as it does not deal with customers directly and most of the suppliers are the manufacturers of the equipment used, which eliminated the need to deal with multiple suppliers.

It may be argued that the consistency in the soft factors is due to the fact that most African cultures are similar and therefore the people from different African countries could be expected to respond similarly. However, this is not the case, as the selected literature relating to studies conducted in American and European contexts displays the same consistency in soft factors, with only a difference in the degree of emphasis provided by the researchers. In the American and European countries and in other developed countries, training and top management commitment are the most important factors, followed by teamwork, employee involvement, information flow, communication, supplier relationships, and customer focus. The least important soft factors are identified as ergonomics, and education.

However, top management commitment is the most important soft factor in an organization as it is the root of existence of all other factors. Without the commitment of top management, decisions on trainings, design of work place (ergonomics), collaboration, safety and security, recognition programs and education and career growth cannot be effectively implemented.

Safety and security factor is somehow dependent to ergonomics as safety comprises of both proper workplace and task design. Trainings and education and career growth are mutually dependent as both involve adding knowledge to the employee to facilitate their personal and performance improvement. Also, collaboration and recognition programs are dependent in the sense that it is through collaboration between subordinate and supervisor or team mates that they get to identify those workers that need recognition for their work. If everyone works on their own, it becomes difficult to recognize other worker's contribution towards overall performance.

#### 5.1. Similarities in the Two Contexts

Top management commitment appears to be the most important soft factor regardless of context. Researchers in both the African context and other developing countries' context have emphasized the importance of having top management support in the organization. Joo et al. (2010) state that the leaders have an immediate and critical effect on employees' performance. Without top management commitment, even the implementation of other factors cannot be achieved, as they are responsible for making decisions.

Supplier relationship is emphasized equally in both contexts (i.e., the African context and other developing countries' context). However, since this was not relevant to the case study, it is not discussed further.

#### 5.2. Differences in the Two Contexts

In the African and other developing countries' context, employee involvement, rewards and recognition, and



customer focus appear to be the most emphasized soft factors in the selected literature. By contrast, in the American and European contexts and in other developed countries' contexts moderate emphasis is placed on employee involvement and customer focus, and least emphasis is placed on rewards and recognition. This could be because in the developed countries factors such as employee involvement and reward programs are practiced as part of the organizational culture, such that researchers do not feel the need to emphasize them.

Furthermore, we found that moderate emphasis is placed on training, education and ergonomics in the African context, but in the American and European contexts training is the most emphasized factor, and education and ergonomics are the least emphasized factors. In developing countries, education becomes more expensive the higher education system, and since most people cannot afford the costs, they rely on sponsorships programs from their organization or from other organizations. This explains why education and training has been emphasized more in the African context than in the American and European contexts. The same applies to ergonomics, as in developed countries both equipment and tasks are properly designed such that ergonomics is not a challenge, unlike in the African context.

However, three factors in American and European contexts are not emphasized in the reviewed African context literature: teamwork, information flow, and communication. However, we have revealed these factors under the collaboration factor in section 4.1.3 and mentioned their importance in contributing towards overall performance.

## 6. Conclusion

Our study had two objectives: to identify critical soft factors for optimum performance of maintenance operations and to compare soft factors implementation between the African context and the American and European contexts. The results of the semi-structured interviews revealed the following information:

- Critical soft factors that impact the performance of maintenance operations in the case organization are top management engagement, training, ergonomics, collaboration, safety and security, recognition programs, and education and career growth.
- Soft factors that are considered important in the African context correspond to those considered important in American and European contexts, and differ only in the degree of emphasis on each context, with the exception of top management commitment, which is highly emphasized in both contexts.
- The national influence (i.e., level of economic development, technological and social development) plays a role in determining which soft factors, if implemented, would have more significance than other soft factors.

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Bertha Joseph Ngereja is a PhD candidate in the field of Project Management at the Norwegian University of Science and Technology (NTNU). Her research interests are about soft factors and the creating of better worker conditions especially in high risk projects like the oil and gas industry and how these conditions impact organizational performance. She has written one paper on soft factors, which was accepted at the Dortmund International conference in July 2018. She has previous experience working in oil and gas drilling projects as a field engineer in various African counties such as Tanzania, Ghana, Mozambique, Nigeria and South Africa. She is a member of the Project Management Institute and engages in various PMI Tanzania local chapter programs.



Bassam Hussein is an Associate Professor in the Department of Mechanical and Industrial Engineering, Norwegian of Science and Technology (NTNU), Trondheim, Norway. He is the author or the co-author of more than 60 publications in project management. His research interests include project success, project complexity, blended learning, agile development, and organizational learning. Hussein has more than 20 years of experience as educator, advisor, lecturer, and speaker in the field of project management. During his career, he has participated in the design, development, and implementation of a wide range of customized educational programs in project management for the public as well as for the private sector. In 2016, he was selected as among the top ten lecturers in Norway by the newspaper *Morgenbladet*.