

Improving Team Collaboration in Patient Transfer Processes by Co-Workers' Perceptions and Suggestions

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ABSTRACT

Purpose: The purpose was twofold: first to describe how co-workers within a team perceived team collaboration in patient transfers from an intensive care unit (ICU) to general wards and, second, to describe co-workers' suggestions for an improved future state of team collaboration.

Methodology/Approach: Focus group discussions (FGDs) were conducted at two medium-sized hospitals located in Sweden. Participants were multidisciplinary and from both ICUs and general wards. Data were analysed using qualitative deductive content analysis.

Findings: An expressed need for improving team collaboration was a defined and well-designed ICU transitional care process with a holistic view of how to create quality of care, and a standardised process for continuous improvements. This should involve co-workers from different professions and hospital units, as well as patients and relatives. Other views raised by the co-workers were clearer definitions of roles, responsibilities and deeper insights on how team members depend on each other's work efforts to succeed.

Research Limitation/Implication: This study was conducted at two hospitals, hence no generalizable conclusions can be made.

Originality/Value of paper: Co-workers collaborating in a ICU transitional care process can have important insights in how to improve team collaboration. This can be of great importance in increasing quality of care where multiprofessional teams from different organisational cultures are collaborating.

Category: Research paper

Keywords: ICU transitional care; patient transfer process; quality improvement; quality of care; team collaboration

1 INTRODUCTION

Health care organisations face multiple challenges when providing safe care with quality, while at the same time reducing waiting times and increasing efficiency (Fine et al., 2009). Applying Quality Management (QM) can be one way to address these challenges. An important part of QM is working in teams, both within and across organisational boundaries. Collaborating in teams across organisational boundaries can create a learning organisation (Ljungberg and Larsson, 2018). Team collaboration can also contribute to maximising performances of individuals with good teamwork and even duplicating effort, and interdependent work tasks can be performed more efficient (Murphy and Heberling, 1996).

The quality of team collaboration has a direct impact on the quality of an organisation's outcomes and performance (Boughzala and de Vreede, 2015), and effective teamwork has been shown to be crucial for providing optimal patient care when handling critically ill (Reader and Cuthbertson, 2011). Coordination and delivery of safe, high-quality care demands reliable teamwork and collaboration within, as well as across, organisational, disciplinary, technical and cultural boundaries (Rosen et al., 2018). The transfer of patients from an intensive care unit (ICU) to general wards is an activity that is difficult to plan and perform due to the patient's health condition. This transfer process is called ICU transitional care (Chaboyer, James and Kendall, 2005). To provide safe care with quality within ICU transitional care, it is crucial to combine different unique skills and knowledge of co-workers in order to improve patient safety (Manser, 2009; Häggström and Bäckström, 2014), reduce medical errors, preventable deaths (Manser, 2009; Lyubovnikova et al., 2015) and cut health care costs (Vyt, 2008).

In summary, the way members of teams within ICU transitional care are collaborating in teams and how they improve team collaboration can be important in how to increase quality of care within ICU transitional care. The purpose of this study was therefore twofold: first to describe how co-workers within a team perceived team collaboration in patient transfers from an ICU to general wards and, second, to describe co-workers' suggestions for an improved future state of team collaboration.

2 TEAM COLLABORATION

According to previous research, there are some common characteristics for team collaboration, which have been discussed by several authors (i.e. Manser, 2009; Reader and Cuthbertson, 2011; West and Lyubovnikova, 2012; 2013; Salas et al., 2015; Lyubovnikova et al., 2015). These characteristics can be summarized as: Team structure and team members; Team tasks, roles and responsibilities; Team planning, reflexivity and continuous improvements; Team leadership and team decision-making; Team communication, competence and learning and Team organisational culture.

A requirement of good teamwork is that teams are clear about who their members are (West and Lyubovnikova, 2012) and that members are aware of the importance of team composition (Salas et al., 2015). Teams also need to be clear about teams' tasks, roles and responsibilities. Task interdependence is the degree to which team members depend on one another for both individual and team task completion (West and Lyubovnikova, 2013). Richardson, West and Cuthbertson (2010) consider team reflexivity to be the extent to which team members collectively reflect on their shared objectives and processes, and adapt them according to current or expected conditions. Reflexivity is associated with continuous improvements. According to Manser (2009), leadership is an aspect of teamwork that is relevant to the quality and safety of patient care in dynamical domains of health care. Positive teamwork can be influenced by leadership and team dynamics (Walton et al., 2020). Ingelsson, Bäckström and Snyder (2018) conclude that managers having been able to work with teams and co-workers' perceptions of the whole organisation, enhanced involvement and ownership as a collective. Management can stimulate teams to become 'self-organisations' by enabling learning and knowledge sharing, promoting communication, and creating opportunities for collaboration and interactions between people (Poksinska and Swartling, 2018). Team communication is essential in team work (i.e. Manser, 2009; Richardson, West and Cuthbertson, 2010). This also involves competence and learning. Teams working on highly interdependent and complex tasks must constantly share information, discuss different perspectives, reflect on their performance and agree upon shared goals (Richardson, West and Cuthbertson, 2010). According to Salas et al. (2012), organisational culture is a critical consideration of team work and collaboration. Research shows that there seems to be a difference between the care cultures of ICUs and those of general wards, which can affect both the staff's cooperation and the perception of the transfer for patients and relatives (Häggström, Asplund and Kristiansen, 2009; Häggström and Bäckström, 2014). In ICU, teams continually alter due to large staff numbers, shift work and staff rotations. The ideal 'unified' team working together to provide better care and improve patient outcomes may therefore be difficult to sustain (Rose, 2011).

3 METHODOLOGY

3.1 Project

The research presented is conducted as part of a research project called 'Increased Quality and Efficiency in Patient Transfers'. The project group consists of researchers from two research subjects: Quality Management and Nursing Science and was initiated in January 2018. The overall purpose of the project is to gain new knowledge about how quality and efficiency in patient transfers within ICU transitional care can be improved, focusing on leadership, continuity of care, safety culture and learning.

3.2 Settings

This study involved two medium-sized hospitals located in Sweden. One hospital has 2,500 employees and approximately 400 beds, and the other hospital has about 3,000 employees and approximately 440 beds.

3.3 Data Collection

Multiprofessional focus group discussions (FGD) were conducted between November 2018 and January 2020. This data collection method was chosen as the researchers wanted to gain a broader and deeper understanding of team collaboration within ICU transitional care. Leaders at two ICUs and two general wards recruited participants working as physicians, ICU nurses, ward nurses, assistant nurses and physiotherapists. This can be seen as a convenience sampling, as the leaders and not the researchers chose the respondents. Totally 9 FGDs with 47 co-workers were conducted; 28 (60%) of the participants were from ICUs and 19 (40%) from general wards. Each FGD had 4-6 participants.

There were two researchers in each FGD, one acted as a moderator and one as an assistant moderator. The moderator guided the participants with open-ended questions from a semi-structured interview guide, used to ensure that all FGDs had the same basic lines of inquiry (cf. Patton, 2015). The guide embraced four overarching areas; quality of care, team collaboration, success factors and strengths and continuous improvements, developed from previous research. The FGDs lasted until all questions had been discussed and there was no new information from the participants. Upon the conclusion by each FGD, the moderator and the assistant moderator briefly reviewed the discussions. The duration of each FGD was 45-60 minutes, all were digitally recorded and transcribed verbatim.

3.4 Content Analysis

A qualitative deductive content analysis containing of three phases and inspired by Elo and Kyngäs (2008) was performed to further analyse the manifest content of the texts. During the first phase, the preparation phase, the unit of analysis was selected i.e a word or a theme (Polit and Beck, 2004). In this study the unit of analysis was described as: Team collaboration within and between hospital units. Transcriptions from the FGDs were read and listened to several times by the project members to gain a sense of the whole. In the second phase, the organising phase, a deductive structured analysis matrix was developed. Characteristics for teams and team collaboration constituted generic categories and a deductive analytical framework. These characteristics, were identified in QM and health care literature about team collaboration (described earlier in section 2 Team Collaboration). The matrix also included subheadings for each subcategory. These subheadings were 'Perceived current state' and 'Suggestions for improvements'. Data were coded in the matrix according to the generic categories and to perceived current state and suggestions for improvements

(see Table 2), and in relation to the aim of the study. Aspects from the data that fit into the categories were sorted into the matrix. Data that did not reflect team collaboration were not sorted into the matrix and not analysed. This was followed by the last resulting phase, an interpretative process that included sorting similar codes together within each generic category and subheading. Subcategories were developed by notes and headings were written down using many headings in order to describe all the aspects of the content. Subcategories were given content-characteristic names that were all relevant for the generic categories, subheadings and the purpose. Table 1 shows an example of how the analysis was performed.

Table 1 – Example of the Content Analysis – Unit of Analysis, Generic Categories, Subheadings, Subcategories and Codes

<i>Unit of analysis</i>	<i>Generic categories</i>	<i>Subcategories</i>	<i>Codes</i>
Team collaboration within and between hospital units	Team structure and team members	Perceived current state A lack of cross-organisational teams	'Today there are no teams that are working cross-organisational'.
Team collaboration within and between hospital units	Team tasks, roles and responsibility	Suggestions for improvements A new role for analysing accidents and risks	'A proposal for a new role as an analysis manager, who leads the work around conducting analyses and follow-ups of accidents and risks in ICU transitional care'.

3.5 Ethical Considerations

This study was conducted in full accordance with ethical principles and the project has been ethically evaluated by the Swedish Ethical Review Authority (Dnr. 2018-159-31M). Participants in the FGDs were given both written and oral information by the moderator, on the purpose of the study, that data would be handled confidentially and anonymously, and that the participants had the right to withdraw at any time. They were also informed that the participation was voluntary.

4 RESULTS

Results from the content analysis are described in accordance with the purpose of this study: how co-workers within a team perceived team collaboration in patient transfers from an ICU to general wards and how co-workers described suggestions for an improved future state of team collaboration. The structure of the unit of analysis, generic categories, subheadings and subcategories are presented in Table 2.

Table 2 – The Structure of the Unit of Analysis, Generic Categories, Subheadings and Subcategories

<i>Unit of Analysis: Team collaboration within and between hospital units</i>		
<i>Generic category</i>	<i>Subcategories</i>	
	<i>Perceived current state</i>	<i>Suggestions for improvements</i>
Team structure and team members	<ul style="list-style-type: none"> • Construction of teams varies • A lack of cross-organisational teams 	<ul style="list-style-type: none"> • Sharing resources between ICU and general wards
Team tasks, roles and responsibilities	<ul style="list-style-type: none"> • Ambiguity about who are responsible for what • The same staff not at the same meetings • Easier to collaborate if you know each other 	<ul style="list-style-type: none"> • A new role for analysing accidents and risks • Physiotherapists should have a more central role
Team planning, reflexivity and continuous improvements	<ul style="list-style-type: none"> • Working with improvements across professional and functional boundaries can be improved • A forum for continuous improvements can be developed • No standardised process for continuous improvements • Following-up implemented improvements can be better 	<ul style="list-style-type: none"> • Multi-professional and multidisciplinary care conferences • Reflection after patient transfers and accidents • Involve patients and relatives in improving team collaboration • A group working on continuous improvements of team collaboration
Team leadership and team decision making	<ul style="list-style-type: none"> • Ambiguous who decides and what • Decisions are often made within professions • Parallel systems between professions and hospital units 	<ul style="list-style-type: none"> • Decisions on team improvements applying to several hospital units are being moved up to managerial level
Team communication, competence and learning	<ul style="list-style-type: none"> • Structure for reporting information is not clear • Reporting is not always multi-professional • Uncertain about whether information reaches the right receiver • Showing interest in visiting each other's units • Different competences at different hospital units 	<ul style="list-style-type: none"> • A joint multidisciplinary report • Involving assistant nurses more in communication and information transfer • Communicating in an easier way • Creating a learning environment
Team organisational culture	<ul style="list-style-type: none"> • Feeling safety and ease when helping each other • Different cultures at different hospital units • A lack of team collaboration between ICU and ward • The process for ICU transitional care is undefined • Different views of existing hierarchy in the organisation and teams 	<ul style="list-style-type: none"> • Time for team collaboration • Develop team collaboration • No hierarchy in team collaboration

4.1 Team Structure and Team Members

4.1.1 Perceived current state

Co-workers collaborating in teams within ICU transitional care described that there were different organisational memberships in different teams and that the *construction of teams varied*. For example, had physiotherapists their organisational membership at another ward unit than the ward nurses and assistant nurses. Ward nurses and assistant nurses often collaborated within the hospital unit, and physicians joined at rounds and physiotherapists sometimes at reconciliations. The construction of the teams was also dependent on, whether the hospital context was an ICU or a ward unit. ICU teams were often multi-professional, and the most common members in ICU teams were physicians, ICU nurses, assistant nurses, physiotherapists and other specialists.

Co-workers perceived there was *a lack of cross-organisational teams* collaborating along the whole ICU transitional care process. Sometimes teams would visit a ward after transferring a patient to that ward, but this was not in essence perceived as team collaboration.

4.1.2 Suggestions for improvements

In order to achieve more appropriate team collaboration and a process with higher quality of care, one suggestion for improvements of team collaboration was *sharing resources* between ICU and general wards. Sharing resources could make it possible for additional co-workers to help patients with, for example mobilisation or other care:

...before, there were those who were physiotherapists' assistants, or whatever it was called, who were around and helped.... maybe you could share that resource. One instructs how the other should work, together then with the hospital unit staff. In any case, there would be one more that could help in the mobilisation phase.

4.2 Team Tasks, Roles and Responsibilities

4.2.1 Perceived current state

Co-workers perceived there was *ambiguity about who was responsible for what* when handing over patients from ICU to general ward. Sometimes, ward staff would wait for the physiotherapist to make an assessment before they could start mobilisation.

Different professions attended different reconciliations and team rounds: *the same staff were not at the same meetings*. For example, physicians and nurses attended care conferences and physiotherapists and assistant nurses did not. Another example was, physicians attending rounds but not always reconciliations.

Co-workers perceived it was *easier to collaborate if they knew each other* and each other's competences. Co-workers worked in three different shifts and as a result, co-workers collaborated with different people. Continuity in staffing was perceived as important by the co-workers.

4.2.2 Suggestions for improvements

Co-workers suggested *a new role for analysing accidents and risks*. An analysis manager could be responsible for conducting analyses and follow-ups of accidents and risks in ICU transitional care. This could be part of improving team collaboration between departments and thereby increasing the quality of care and patient safety.

Another suggestion was that *physiotherapists should have a more central role* and attend rounds and reconciliations. Sometimes the physiotherapist was viewed as being like a consultant and just attending on a few occasions.

4.3 Team Planning, Reflexivity and Continuous Improvements

4.3.1 Perceived current state

According to continuous improvements, co-workers *perceived that working with improvements across professional and functional boundaries* could be improved. Nurses and assistant nurses often worked together or separately on improvements, and physiotherapists often worked with other physiotherapists. When it came to improvements that did not only involve their own hospital unit, it became even more complex:

It is easier for us in the group to make changes. But there are many hospital units that have to be involved, if we are to do the same things everywhere. It is not easy to get that cooperation....

Suggestions for improvements from co-workers could be raised once a month at staff meetings. Those meetings were mostly attended by nurses and assistant nurses. Physiotherapists did not often attend staff meetings and did not have a forum for discussing continuous improvements. Co-workers believed that *a forum for continuous improvements could be developed* including both within and between ICU and general wards.

It was not always clear how suggestions for improvements should be handled. Co-workers thought that there was *no standardised process for continuous improvements* and routines for how improvements could be notified, implemented and followed up.

Co-workers thought that the *following-up of implemented improvements could be better*. New routines were not always easy to keep to and make part of everyday work. In stressful situations it was easy to fall back into old habits. Often there was no follow-up at all and the changes did not last.

4.3.2 Suggestions for improvements

Co-workers described that there was a need for *multi-professional and multidisciplinary care conferences*. Today, not all professions attended care conferences. If assistant nurses and physiotherapists also attended, this was seen by the co-workers to improve team collaboration and increase quality of care. There was a desire by the co-workers for a multidisciplinary gathering of the ICU and ward before patient transfers and to draw up care plans together, planning for a seamless process and continuity of throughout the whole process transferring the right patient to the right hospital unit at the right time:

High quality of care is when you... the right patient in the right hospital unit, then it will automatically be higher quality of care, I would say.

...time of course. What time of day too. But it has to do with planning.

One suggestion from the co-workers was to have a permanent item for patient transfers on the agenda for the rounds. This would provide an opportunity to discuss up-coming patient transfers multi-professionally.

In several of the FGDs co-workers perceived a need for *reflection after patient transfers and accidents*: objective analysis of a patient transfer or an accident, conducted together with all the parts involved and with a no-blame culture, raising what was good and where it went wrong.

It was also important to *involve patients and relatives in team collaboration* in order to improve team collaboration and thus quality of care and patient transfers. Co-workers assumed that if care teams knew the needs of patients and relatives before the patient transfer, for example according to information being transferred between care teams from different hospital units, it would increase the value of the transfer.

Co-workers saw a need for *a group that worked on continuous improvements of team collaboration*. This group should be multi-professional and cross organisational boundaries.

4.4 Team Leadership and Team Decision-Making

4.4.1 Perceived current state

Co-workers felt it was ambiguous *who decided and what*. Notes about patient transfers often included a name of a clinic, but not the name of who actually decided. For example, who decided the time for the patient transfer or the patient's medicine after the transfer:

Clarity, these things often fall between the cracks. You don't know who will really decide. Do we decide how long they should have antibiotics or is it another ward? Or they themselves? who is it?

Decisions were often made within professions, for example between assistant nurses or physicians.

Co-workers thought there were *parallel systems between professions and ICU and general wards* and that they had little power to influence other professions or hospital units:

Yes, but we have rounds at the ICU, and there we have talked about... But then you make contact..., so it is like parallel systems that are not interconnected. I do not think it is so successful.

4.4.2 Suggestions for improvements

Co-workers suggested that *decisions on team improvements that applied to several hospital units should be moved up to managerial level*. Otherwise, there would be too many opinions and difficult to reach consensus. Management at a higher level has to decide and tell them ‘this is where we want to go’.

4.5 Team Communication, Competence and Learning

4.5.1 Perceived current state

Handovers including information transfers between teams were made in different forum. Not all co-workers in the team received the same information and at the same times. The *structure for reporting information was not perceived as clear and reporting was not always multi-professional*, for example physiotherapists reported to each other.

Nurses and assistant nurses communicated with each other but not with physicians and physiotherapists. Assistant nurses did not report on rounds, even though they had much information about the patient: ‘*...but we never report anything, although we might have had a lot to add*’.

Co-workers *felt uncertain about whether information reached the right receiver*. Co-workers were unsure if information was passed on to the right co-workers at other hospital units. There were many new hired nurses with no previous experience of ICU transitional care and critically ill patients, and it could be difficult for them to understand the information, compared with more experienced co-workers:

They are so busy understanding what I am really saying, compared with how it was before, when many had worked for a long time and been in similar situations many times.

Co-workers from receiving and sending units described *showing interest in visiting each other’s units* before and after patient transfer as positive. Co-workers from a receiving unit could then create a picture of the patient and his or her needs and the sending unit could follow up the patient’s health conditions. In some of the FGDs, co-workers also talked about a lack of interest and that they did not feel engagement from the receiving part in getting to know the patient. On the other hand, they also felt that the ward staff were stressed and that the sending part tried to help by transferring the patient to the ward.

There was a perceived gap between the ICU and the ward with regard to nurses' competence and understanding. Co-workers described that there were *different competences at different hospital units*. This was seen as a threat and a big obstacle to continuity of care, quality of care and patient safety. However, it was not just about competence, co-workers at ICUs also thought there was a lack of understanding of why it was important to do the things that the ICU staff did:

It's not really a lack of knowledge; I don't think so. It's pretty much basic stuff. But perhaps more of an awareness of why it is important. Otherwise it will just be something they have to do, that they find difficult.

4.5.2 Suggestions for improvements

Co-workers suggested that *a joint multidisciplinary report*, from the ward team and the ICU team, could prevent information from being lost.

They expressed a desire for assistant nurses to be more involved in *communication and information transfer*. Assistant nurses often have deep and personal information about the patients, which can be very valuable for them and their relatives, as well as for the co-workers within the process.

Co-workers, especially at the ICU, believed they could think more about how to *communicate in an easier way* and not use ICU terms all the time. This could facilitate understanding for co-workers at ward units.

In the FGDs, co-workers suggested that learning was created when analysing transfers and accidents and that this analysis should be conducted together with participants from both sending and receiving units. This would *create a learning environment*.

4.6 Team Organisational Culture

4.6.1 Perceived current state

The co-workers *felt safety and ease when they helped each other*, for example when physicians called a ward regarding patients' health conditions before a night shift. This routine made the co-worker on the ward feel safer. Co-workers also described that it was easy to stop someone in the corridor to ask for help.

Co-workers felt that there were *different cultures at different hospital units*. This sometimes led to misunderstandings. For example, there were different assumptions at hospital units on how information about test results should be provided. One co-worker described it as: *'These are preconceived notions that are then built into the culture'*.

In the FGDs, co-workers described that there was a difference between ICUs and wards in the way they worked and described patients' health conditions. Ward staff sometimes thought that co-workers at the ICU had so much knowledge and that ward staff did not understand their information. They were sometimes afraid of asking co-workers from the ICU.

Some co-workers thought there was *a lack of team collaboration between ICU and ward*. They sometimes had meetings, but they did not really see them as team collaboration. In contrast, other co-workers thought that team collaboration was good between hospital units and within their unit.

Co-workers felt that the *process for ICU transitional care was undefined* and not described in sufficient detail, as well as understaffed. Co-workers described all links as essential for the whole to work. Co-workers expressed a need for a more holistic perspective of the process from a customer perspective based on the needs of the patients and relatives and on the needs of the co-workers.

There were *different views of existing hierarchy in the organisation and teams*. Some co-workers did not perceive that there was a hierarchy at their unit, while others experienced a hierarchy as there being differences between the professions for those who were going to participate in, for example, care conferences and rounds:

I think we have a rather non-hierarchical approach at our clinic compared with some others. And that is probably what most of us mean by teamwork. I think, that is because we work with each other and are close to each other as well, I think.

4.6.2 Suggestions for improvements

Co-workers thought that *time for team collaboration* was a primary resource that was often missing. Staff were mostly stressed and did not have time for communication or visiting each other's units, receiving information and learning.

They believed there was a need to *develop team collaboration*, mostly between ICU and general wards and a suggestion from the wards was also to involve the ICU in improving team collaboration.

Co-workers thought it was *important that there was no hierarchy in team collaboration*. Co-workers believed that team collaboration prevented hierarchy and some people using power over others. All team members have different roles and tasks and the team need to collaborate interdependently in order to achieve high quality of care.

5 ANALYSIS AND DISCUSSION

The purpose for this study has been twofold: first to describe how co-workers within a team perceived team collaboration in patient transfers from an ICU to general wards and, second, to describe co-workers' suggestions for an improved future state of team collaboration.

From the analysis it can be seen that there was a perceived lack of cross-organisational teams working along the process, which also often made a gap and discontinuity in care. The importance of team collaboration between ICU and general wards is also discovered in previous health care research (i.e. Vyt, 2008;

Häggström, Asplund and Kristiansen, 2009; Rosen et al., 2018) and seen as an important element within ICU transitional care and when reaching quality of care and patient safety (Häggström, Asplund and Kristiansen, 2009; Häggström and Bäckström, 2014). Similar conclusions were drawn in a previous study measuring team collaboration with a questionnaire (Sten et al., 2021). The results from the tested questionnaire indicated to some extent that teams collaborating over hospital units within ICU transitional care needed to focus more on how to increase person-centered care and continuous learning and how to create prerequisites for successful patient transfers between hospital units. Thus, working across organisational boundaries in multiprofessional teams can be associated with several challenges as ineffective communication, individual personalities, lack of understanding roles and responsibilities, and organisational structure (Walton et al., 2020). Also, time, uncoordinated treatment planning and leadership were seen as additional challenges connected to interdisciplinary team collaboration at ward rounds (*ibid.*).

A desire raised by the co-workers in how to improve quality of care, was to involve patients and relatives in improving team collaboration in patient transfers. This is similar with results from Häggström, Asplund and Kristiansen (2014) indicating that relatives wanted to be part in the transfer and also be prepared in advance for the change.

The analysis from this study described perceived ‘parallel systems’, which thought to be avoided involving and communicating decisions to the whole team and across organisational boundaries. Thus, there was an expressed need among the co-workers for a clearer decision process, both in daily work and when working on improvements. In a study by Poksinska and Swartling (2018), the authors concluded that to keep the improvement programme alive, there is a need for teams to take responsibility for managing and improving daily operations.

Co-workers described that there was variation in the structure of the care teams and some professions had their memberships at other hospital units than those they were working at. In a well-performing process and in efficient teams, tasks, roles and responsibilities need to be clear (*i.e.* Richardson, 2011; West and Lyubovnikova, 2012; 2013). In this study, co-workers in the process perceived, in a similar way as decision-making, that there was ambiguity about who did what. Due to large staff turnovers and three shifts, co-workers met new team members almost every day. That team members understand daily goals of care including the required tasks, care plans with clear responsibilities and plans for interdisciplinary communication seems like a groundwork of ICU management (Rose, 2011).

From the analysis it can be seen that handovers were not always multi-professional and this could sometimes lead to deficiencies in information and uncertainty on whether the information really reached the receiver and the receiver understood. Co-workers also perceived a gap in competence and deficiencies in understanding why it was important to deal with different unit

specific issues. Häggström, Asplund and Kristiansen (2009) stated in their study that one cause of the gap within ICU transitional care is differences in nurses' competences. Suggestions from the co-workers to help solve this problem were a multidisciplinary report with co-workers from both ICU and general ward, involving assistant nurses more and analysing patient transfers together, both ICU and general ward. Reflecting together was described by the co-workers as a way of creating a learning environment. Reflexivity and continuous improvements are important activities for 'real teams' (i.e. West, 2013; West and Lyubovnikova, 2013). Co-workers expressed a need for a standardised process for quality improvements. Having a structured and systematic way of handling suggestions for quality improvements and involving co-workers from different professions and hospital units, as well as patients and relatives, could help improve team collaboration and increase quality of care. When co-workers described their future state of team collaboration they proposed a special group including different professionals working across organisational boundaries with suggestions for quality improvements.

6 CONCLUSIONS

From the results of this study, some overarching conclusions can be drawn. Firstly, results indicated that an expressed need when improving team collaboration, is a defined and well-designed ICU transitional care process with a holistic view of how to create quality of care, continuity in care and a learning environment. Secondly, findings according to team collaboration, could be interpreted as a need for a standardised process for working with continuous improvements, mainly when it came to quality improvements that affected multiple hospital units, and that involved co-workers from different professions and hospital units, as well as patients and relatives. Also, a standardised and structured process for communication, competence exchange, decision-making and leadership for teams in ICU transitional care could be seen as important in order to improve team collaboration and to increase quality of care and patient safety. Thirdly, findings indicated a need for clearer definitions of team memberships, roles and responsibilities and deeper insights on how team members depend on each other's work efforts to succeed. Embedded in this is a need for a welcoming and positive organisational culture within and between teams.

Several of the conclusions from this study can be confirmed in previous research about teams and team collaboration, i.e. the importance of clear roles, responsibilities and structures for communication, competence exchange, planning and decision making. And also, the importance of teams working within and between ICU and general wards with continuous improvements and organisational culture.

7 RESEARCH LIMITATION AND FUTURE RESEARCH

Future research could focus on implementing suggestions for improvements, evaluating these implementations, and measuring team collaboration and quality of care within ICU transitional care. This future research may also be applicable in other health care contexts as well.

More research is needed on how teams can collaborate more successfully across organisational boundaries and become teams that collaborate from a holistic perspective and with patient focus in a well-designed ICU transitional care process where patients and relatives are involved in the design.

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CONFLICTS OF INTEREST

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Improve Ramp-Up Performance on the Sewing Process in a Sports Shoe Factory Using 8-Disciplines and Lean Manufacturing

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ABSTRACT

Purpose: The research aims to design a performance improvement framework for a new model of sports shoes to increase the ramp-up process time.

Methodology/Approach: The approach used the problem-solving system of 8 disciplines, Single Minute Exchange Dies, Visual Management, and the Just In Time principle.

Findings: By using the methods described above, the research findings will have a positive impact on the company. Model changeover time was reduced from 600 minutes to 102 minutes, and ramp-up time was reduced from 20 days to 2 days.

Research Limitation/Implication: The limitation of this study was that only the CK2946 model was still done as a case study. The cost and other inhibiting factors were also not included in the discussion of this ramp-up process.

Originality/Value of paper: By integrating SMED, Just In Time, visual management, and using 8-Dicipline, the researcher developed a framework for improved performance for ramping up a new model of sports shoes.

Category: Case study

Keywords: ramp-up; changeover; SMED; just in time; visual management

1 INTRODUCTION

The global development trend of the footwear industry showed an increase with average production growth of 3.05% in the period from 2015 to 2019, but the global consumption rate was downward in 2019 (Black and Létis, 2018; APICCAPS, 2020b; APICCAPS, 2020a). Indonesia ranks fourth in the world as a footwear manufacturer after China, India, and Vietnam (Kemenperin, 2019), where Indonesia produced 1.2 billion pairs of shoes in 2018, contributing about 6.4% to the global total production of shoes. However, there had been a decrease in national consumption in 2019 due to the impact of the pandemic outbreak of Covid19 (APRISINDO, 2018; Kemenperin, 2019; Huda, 2020; Krishna, 2020). If the average growth in shoe consumption worldwide for the period 2015 to 2018 was only 2.6%, then the average consumption growth in the same period will reach 6% at the national level. During the last five years, the average growth in Indonesia's shoe production was 5.7%, higher than the 3.05% global average growth. In addition to being promoted to the local market, Indonesian shoe products were also exported to the global market, which accounts for 46% of the shoes produced.

The footwear industry is a group of the fashion industry that is required to develop innovative products to boost market competitiveness. In Indonesia, the footwear industry is classified as a labour-intensive industry, relying on its production processes on the use of large-scale human labour (Pujiastuti, 2015; APRISINDO, 2018). In addition to expanding to different regions to improve efficiency and decrease labour costs (International Labour Organization, 2016), this industry is also constantly increasing the range of its products.

The increasing variety of new models, particularly in sewing process lines, can have an impact on machine setup time and operator skills in production lines. The ability of the operator to perform the process can decrease as the model changes from one model to another, which has a different process that can result in decreased production process efficiency (Kentli, Dal and Alkaya, 2013) and also increase the sewing process ramp-up time is a long time. Ramp-up time is the time it takes until the line reaches its daily production target for the first material to enter the line. Ramp-up is a phase in mass production from the development of product samples, processes, and production systems until the first product output that suits the customer is achieved. The production quantity increases with the instability of machines, processes, and people are working until the conditions are stable and the production quantity desired is reached during the ramp-up stage (Dombrowski, Wullbrandt and Krenkel, 2018).

As one of the multi-national companies producing sports shoes in Indonesia, with an average of 18 new shoe models each year, PT PAI always produces new shoe models. This causes the ramp-up time performance to be longer in the sewing process, resulting in decreased sewing line productivity. Based on the last 6 models, the average ramp-up time in the sewing process at PT PAI was around 20 days, with the best time was 13 days, while competitor benchmarks can reach

10 days (interviewed result on March 23, 2020). PT PAI needs to make improvements to compete in national and global markets, because the main processes in a shoe company are basically the same, namely cutting, sewing, and assembly (Briciu and Ofileanu, 2015).

2 LITERATURE REVIEW

Researchers have widely adopted the concept of lean manufacturing to increase productivity and minimize costs in the manufacturing process (Uzun Kocamiş, 2015; Karam et al., 2018). The concept used in time-related lean production is just in time and SMED (Single Minute Exchange Dies) is associated with model change. In various industries, such as the iron industry, the apparel industry, and the telecommunications panel industry (Gavali, Chavan and Dongre, 2016; Mulyana and Hasibuan, 2017; Singla and Pal, 2017; Zerín, Hossain and Zannat, 2019), SMED is widely used to solve rapid transition problems in the production process (Esa, Rahman and Jamaludin, 2015; Jagtap et al., 2015; Filla, 2016; Gavali, Chavan and Dongre, 2016; Arief and Ikatrinasari, 2018; Syafei and Lokadipati, 2018; Agung and Hasbullah, 2019; Talekar et al., 2019). The application of SMED in the clothing industry had been a success in reducing the replacement time of the model between 0.45-12.6 hours (Singla and Pal, 2017), while the replacement time in the apparel industry had reduced by 283.81 minutes (Zerín, Hossain and Zannat, 2019). It can reduce the retooling time by up to 6 minutes in the food industry (Maalouf and Zaduminska, 2019), it can save setup time by up to 12 minutes in the pharmaceutical industry (Arief and Ikatrinasari, 2018), it can reduce setup time by up to 9 minutes in the copper cable industry (Setyawan, 2019).

Several problem-solving tools, such as PDCA (Plan, Do, Check, Action) and DMAIC (Define-Measure-Analyze-Improve-Control), are widely used today. PDCA is a traditional approach used to solve medium-scale problems and implies that the PDCA cycle must be restarted in the Act phase to ensure continuous improvement, as in (Sunadi, Purba and Hasibuan, 2020) which uses the PDCA method to increase the process capability. In concept, however, the PDCA can still be enhanced again, so that the process's ability can even be better. In conjunction with the six sigma methods, the DMAIC method is generally used. The DMAIC approach is essentially similar to the PDCA approach, which is carried out in 5 stages and is often associated with statistical tools that address product quality in the control of the process of product defects (Trimarjoko et al., 2019). Compared to the PDCA and DMAIC methods, the *8-Discipline method* has a more detailed phase: D0 (planning), D1 (team building), D2 (defining and explaining the problem), D3 (implementing temporary corrective actions), D4 (root cause analysis), D5 (permanent fix action), D6 (implementing permanent corrective action), D7 (preventing the same problem) and D8 (Team recognition) follow the following steps in the 8-Discipline method (Zarghami and Benbow, 2017). In phases D0 to D4,

the phase plan in 8-Disciplines is discussed in more detail to make it easier to plan improvements. Phases D0, D1, and D8 have complete methods that do not have the two previous methods for starting and ending a project.

The SMED concept was applied by several previous studies with a focus on improving the fast changeover time on the internal setup of the process and the machine itself. Meanwhile, in preparing to replace the new model at this time, the performance of the sewing process for the new model of sports shoes cannot be separated from communication with other departments. To support problem-solving related to delays from other departments, the concept of just in time and visual management is required. As a reference for a framework for the development of new shoes, particularly sports shoes, the results of the integration of the SMED, just in time, and visual management methods with the 8-Discipline method can be used.

3 METHODOLOGY

This study is a case study carried out by a multinational sports shoe company in Indonesia and was conducted from November 2019 to February 2020. The steps taken to solve the problem in this case are:

- *Steps 1: Problem Identification*
 - Ramp-up data achievement
 - Interviewed (Production leader, production manager, etc.)
 - Determine research objectives
 - Determine research framework (Figure 1)
- *Steps 2: Literature study*
 - Eight Disciplines theory, Lean Concept, Pull system, SIPOC, SMED
 - Literature review
- *Steps 3: Data collection*
 - Collect ramp-up time
 - Breakdown setup activities
 - New model schedule plan
- *Steps 4: Data Analysis*
 - Internal Factors (calculate sewing process setup and Compared cycle time in each process with line balancing (Takt time)
 - External Factors (list Item are used to the framework of the sewing process)

- *Steps 5: Improvement*
 - Improvement is made by the 8-Discipline steps (Table 1)
- *Steps 6: Evaluation*
 - Tracking project result based on the next new model
 - Evaluate the achievement of the framework timeline

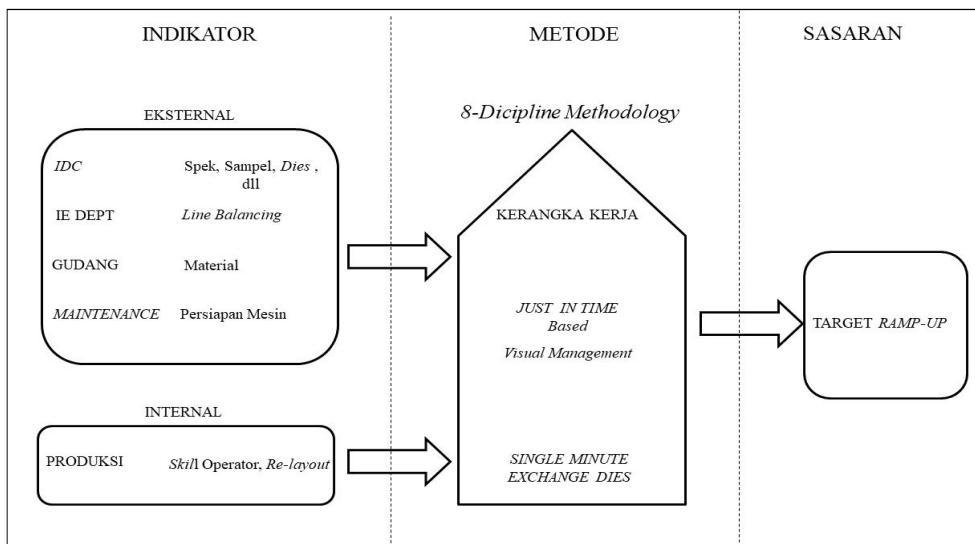


Figure 1 – Research Framework

Figure 1 depicts a system for explaining the issues caused by external and internal causes that are the target of problem indicators. The 8-Discipline approach is supposed to be able to identify and solve problems as a result of improvement measures. The SMED, JIT, and Visual Management approach offers tools for making changes such that issues can be solved and not recur. These three approaches would result in the development of a framework operation as a means of achieving management's planned ramp-up goals, as well as joint-supervision.

In this study, the data used consisted of primary and secondary data. The primary data was collected through direct observation, interviews, and brainstorming. The 8-Disciplines process was the step used in this case study. The initial stage was presented in Table 1. Through the planning of the project schedule (D0). The next step was to create a project team to enhance the success of the new model ramp-up process involving the Department of Production, the Department of Innovation Development Center, the Department of Industrial Engineering, the Lean Department, the Department of Warehouse, the Department of Engineering, and the Sister Company (D1). The industrial engineering department collected secondary data at the ramp-up performance of each new model.

Table 1 – 8-Discipline Corrective Steps for Improved Performance of the Sewing Process (Gemba Academy, 1998)

Kaizen Event Description Preparation / Kaizen / Follow Up	Kaizen Timeline										
	15	22	29	05	12	19	26	02	09	16	Ramp-up
	December 2019			January 2020			February 2020				
D0: Project planning	X										
D1: Forming a Team	X										
D2: Define the problem	X	X									
D3: Temporary prevention	Previous model										
D4: Root caused analysis			X	X	X	X					
D5: Plan for Improvements			X	X	X	X					
D6: Corrective action								X	X	X	
D7: Prevent the problem								X	X	X	X
D8: Recognition Team	When monthly Meeting										

4 RESULT AND DISCUSSION

The main problem defined (D2) was the unachievable ramp-up time in the sewing process which causes low productivity and late delivery of the six new models. With the coordination of the Project Team, each department made temporary improvements (D3) including The IDC Department compared the specs and the job of production operators to ensure quality, the Industrial Engineering Department and the Trial Team helped to improved operator skills so that the process cycle time was achieved according to the line balancing sheets, and the Maintenance Department and production leaders speed up the completion of the layout process.

Using the brainstorming method, analysis of the root cause of the problem (D4) was carried out and the results were presented in a fishbone diagram. 4 variables, namely humans, materials, techniques, and machines, were the problem of delays in the ramp-up time. Bottleneck issues were identified from the human factor in critical processes (internal sewing). The causes were not only due to internal activities (the layout process and machine settings were carried out on the D-day) but also due to external factors from the machine, material, and method factors, as could be seen in Figure 2.

Problems could be classified into two groups, namely the internal sewing process and the external sewing process (including the cutting process). The internal sewing process was improved by the use of the SMED method due to the long changeover time activity. Meanwhile, for external factors due to delays in the

equipment preparation activities that preceded the sewing process, but the team did not identify which department the team was repairing by creating a new model performance improvement framework to anticipate delays with a just-in-time approach and visual management.

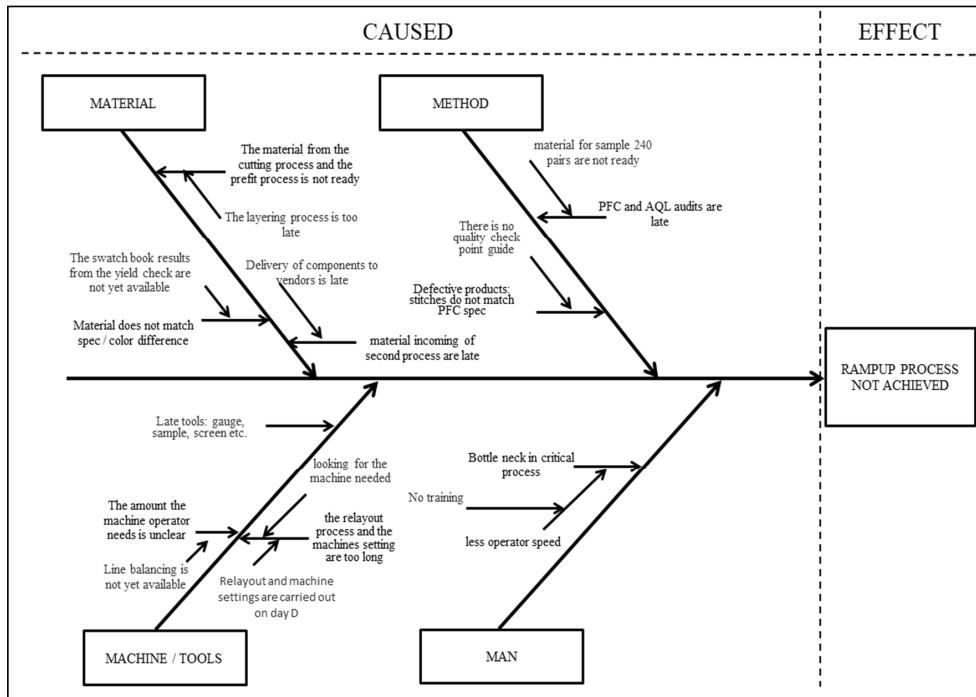


Figure 2 – Fishbone Diagram of Ramp-up Process Is Not Achieve (Cotton, 2016)

Due to the change over time, which was too long, the improvement carried out (D5) on the internal sewing process reach 10 hours (600 minutes), as described in Table 2.

Table 2 – Current Situation Changeover Activity

Task	Activities	Internal/ External	Code Activity	Time (minute)
Sewing Team Leader (assisted by operator)	1. Prepare the machine needed, tooling and compile the layout of the machine	Internal	A	300
	2. Allocation the operator's task	Internal		
	3. Attached quality check point	Internal		
	4. Training of critical processes	Internal	B	600
Maintenance	1. Change needle type and stitch step setting (stitch per inch)	Internal	C	450
	2. Computer sewing machine program settings	Internal		

Following the brainstorming of the team between the production and maintenance teams, an improvement plan was proposed by changing some of the internal activities to the external ones presented in Table 3. The results of this brainstorming have been used as targets for the activities of the proposed new model framework.

Table 3 – Plan to Change Activities from Internal to External

<i>Task</i>	<i>Activities</i>	<i>Internal/ external</i>	<i>Note</i>
Team Leader sewing & Auditor	1. Prepare the machine and tooling	External	Machine preparation with H-10 dead line and numbering to be affixed to the sewing machine.
Maintenance	2. Change the needle type	External	The needle change is done after the machine has been numbered by the Team Leader.
Maintenance	3. Computer sewing machine program settings	External	Computer sewing machine settings can be done on H-10.
Team Leader sewing	4. Allocation the operator's task	External	The allocation of tasks can be done on the D-10.
Team Leader sewing & Team Trial	5. Training critical Process	External	Training for critical process operators will be on D-7 and regular processes on D-6.
Team Leader sewing , operator sewing & Maintenance	6. Compiling Machine Layout	Internal	The process of compiling the layout is set to a target of 90 minutes and will be carried out on D-6.
Team Leader sewing	7. Attached quality check point	Internal	The quality check point can be attached together with the process number on the table.
Maintenance	8. Setting stitch steps (stitch per inch)	Internal	Stitching step setting is done with a target time of 60 minutes on D-6.

Apart from internal problems, delays in the ramp-up process were also often caused by the late receipt by the production department of support items from other departments by the sequence of activities. For example, the Industrial Engineering Department was often late in delivering line balancing sheets, as a result of which the production department was late in determining the number and type of sewing machines to be assigned to operators. Delays in the sewing process resulted in the sequential activity being disrupted in such a way that the management ramp-up target was not achieved. Delays in the sewing process may also cause the assembly process to be delayed, resulting in late delivery to customers. It is on this basis that the team proposes a framework for a new shoe model to improve ramp times. Table 4 illustrates the framework of the sewing process. This framework sets a timeline for each activity so that the target ramp-up time can be reached. It is clear from Table 4 that there are 4 preparations

tooling activities on D-15. Green Visual is given if the target is reached, otherwise, Red Visual is given when it is too late.

Table 4 – Proposed Activity Framework for New Model Shoes Sewing Section

Area	SEWING					
Part	Activity		Deadline	Target	Status/ Date	Note
Sewing Preparation	1. Tooling Preparation	1. PFC/SPEC	H - 15	28-Jan		
		2. Component Gauge	H - 15	28-Jan		
		3. Sewing Jig	H - 15	28-Jan		
		4. Original Sample	H - 15	28-Jan		
	2. Line Balancing	1. Accept the LB for the FSR Trial stage	H - 15	28-Jan		
		2. Line Balancing Adjustments & Initial Production Layout Arrangements	H - 11	3-Feb		
	3. Transfer The sewing process on TL & GL production	1. Supply of sewing components	H - 15	28-Jan		
		2. Making Job break down sheets for critical processes	H - 11	3-Feb		
		3. Transfer stitching process	H - 12	31-Jan		
	4. Transfer of stitching process to operators process critical	1. Allocation of operators task	H - 10	4-Feb		
		2. Material preparation for training of operator process critical	H - 8	6-Feb		
		3. Teaching operators of critical processes	H - 7	7-Feb		

The next stage is the corrective action (D6) that had been planned by the production and maintenance team to work together on the improvement plan. The Team Leader prepared line sewing for the new model on the D-10, while the Internal Auditor checked the completeness of the tooling on the temporary sewing machine area. The team leader assigned machine numbers to the line balancing sheet and the quality checkpoints on the table for critical processes. Figure 3 showed the sewing machine for the CK2946 model in the mainline area for process 6, namely, stitch tongue to tongue lining. Furthermore, Maintenance performs machine settings in a temporary area to reduced workload when relaying was carried out on D-6 days. The Maintenance team changes the needle typesetting for the manual machine or computerized sewing machine which was still being carried out on the same day as the D-10 target and simultaneously the

team leader had chosen an operator for each process so that on the D day the ramp-up was ready to run the new model process.

The determination of the operator that had already been carried out will determine the critical training phase of the process that would be carried out on D-7 and, in general, the process will be carried out on D-6. The training of critical process was carried out in the line-testing area at the end of the regular working hours (overtime) and will end when the head-line test section decides that the operator has passed with good quality. While there is regular training in the training room to introduce new model products and processes (PFCs) for operators to understand the new model processes, the team leader will also appoint operators to fill the process as well as quality points in each process.

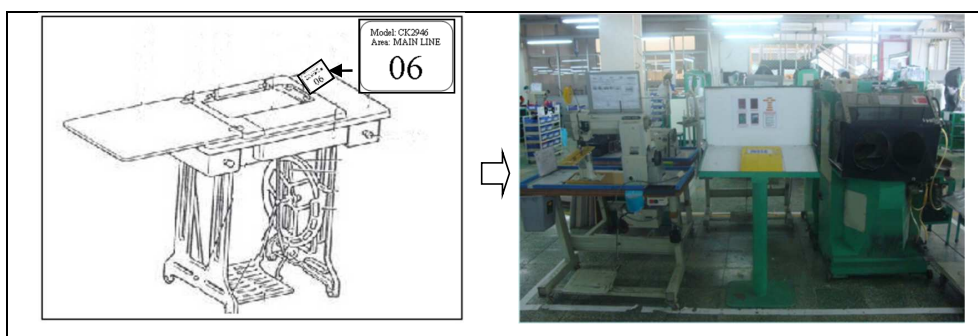


Figure 3 – Numbering on Sewing Machines and Temporary Places for Sewing Machines

The next improvement activity carried out on H-6 is to arrange the layout of the machines according to the line balancing. Machines that had been numbered and set up by the team leader, as well as Maintenance in the temporary area, can be used to compile the layout from the start of process number 1 to process 42 for the mainline area. With the improvements that have already been made, it is hoped that this activity can be completed in no more than 90 minutes. And then Maintenance will set up some of the remaining machines that have not been completed on the D-10, and this activity is expected to take no more than 60 minutes.

The four activities mentioned above are included in the framework activities of the sewing process and are in line with the timeline. The results of the quick changeover with the SMED method provide significant improvements as described in Table 5.

Table 5 – Process Performance Before and After Changeover Improvements in Sewing Process

<i>Activity</i>	<i>Before improvement</i>	<i>After improvement</i>	<i>Percentage</i>	<i>Note</i>
Ramp-up Achievement	20 days	2 days	The ramp-up time would increase by up to 90%.	
Re-layout	300 minute	68 minute	The change in sewing layout increased to 77.33 %	
Machines setup	450 minute	45 minute	Machine setup time increased by up to 90%.	Not all machine setting activities are done
Total changeover	600 minute	102 minute	The average turnover time jumps to 83%.	Calculated from the start of the layout until the first upper comes out

Inline sewing, improvements in internal to external operations resulted in time savings in the re-layout process from 600 minutes to 102 minutes, the set-up time of the engine was also reduced from 450 minutes to 45 minutes, and the layout time was reduced from 300 minutes to 68 minutes. The reduced time setting of the machine helps to develop operator skills across vital processes. Internal changes had made it possible to reduce the ramp-up time from an average of 20 days to just 2 days. Improvement of external factors in the planning of ramp-up products was made possible by monitoring framework activities as summarized in Table 6.

Table 6 – Sewing Areas Framework for the CK2946 Model

<i>Style</i>	<i>CK2946</i>					
<i>Area</i>	<i>SEWING</i>					
<i>Part</i>	<i>Activity</i>		<i>Deadline</i>	<i>Target</i>	<i>Status/Date</i>	<i>Note</i>
Sewing Preparation	1. Tooling preparation	1. PFC/SPEC	H-15	28-Jan	26-Jan	
		2. Component Gauge	H-15	28-Jan	26-Jan	
		3. Sewing Jig	H-15	28-Jan	26-Jan	
		4. Original Sample	H-15	28-Jan	26-Jan	
	2. Line Balancing	1. Accept the LB for the FSR Trial stage	H-15	28-Jan	28-Jan	
		2. Line Balancing Adjustments & Initial Production Layout Arrangements	H-11	3-Feb	3-Feb	

<i>Style</i>	<i>CK2946</i>					
<i>Area</i>	<i>SEWING</i>					
<i>Part</i>	<i>Activity</i>		<i>Deadline</i>	<i>Target</i>	<i>Status/Date</i>	<i>Note</i>
	3. Transfer The sewing process on TL & GL production	1. Supply of sewing components	H-15	28-Jan	27-Jan	
		2. Making Job break down sheets for critical processes	H-11	3-Feb	3-Feb	Job break down with TL and GL
		3. Transfer stitching process	H-12	31-Jan	31-Jan	
	4. Transfer of stitching process to operators process critical	1. Allocation of operators task	H-10	4-Feb	2-Feb	
		2. Material preparation for training of operator	H-8	6-Feb	3-Feb	Using excess material
		3. Teaching operators critical processes	H-7	7-Feb	4-Feb	Stitch Backtab Binding, Stitch Foxing through to Collar Lining, Stitch Eyestay to Upper
Sewing preparation	5. Quality check point training	1. Training quality check point, key manufacturing process	H-6	10-Feb	5-Feb	
		2. Understanding PFC for TL and operators	H-6	10-Feb	5-Feb	
	6. Machine preparation, layout & sewing process	1. Provide the machines / tools needed	H-10	4-Feb	1-Feb	
		2. Provide serial number stickers for process identification	H-10	4-Feb	1-Feb	
		3. Provides quality check points and key manufacturing processes		4-Feb	1-Feb	
		4. Pasting the serial number according to the sequence of processes on the table / machines.	H-10	4-Feb	2-Feb	

<i>Style</i>	CK2946					
<i>Area</i>	SEWING					
<i>Part</i>	<i>Activity</i>		<i>Deadline</i>	<i>Target</i>	<i>Status/Date</i>	<i>Note</i>
	5. Attachment of quality check points and key manufacturing processes to the operator's desk			4-Feb	2-Feb	
	6. Re layout		H-6 (90 min)	10-Feb	7-Feb	Re layout 68 minute
	7. machines and tools setup		H-6 (60 min)	10-Feb	7-Feb	Machines setup 45 minute
	8. First upper time comes out		H-6 (30 min)	10-Feb	7-Feb	Total output 84 pairs realized on February 7 2020 (D-3)
	7. Audit PFC		H-5	11-Feb	7-Feb	
	8. AQL Sewing		H-4	12-Feb	12-Feb	
	9. Achievement of Sewing Production Target (Ramp up sewing target has been reached)		H-2	14-Feb	20-Feb	The ramp up was reached on February 20, 2020, there was a problem with adjusting the ramp up target, the production team followed the old version of the ramp up target, which is 702 pairs for today, while the target for the new version is 756 pairs for today.
	Notes: From January 26 to February 12: Faster / On target; From February 20: Too late for target.					

Table 6 was the follow-up product of the CK2946 sewing model framework, which entered the Sewing line on 18 February 2020, which achieved a 2-day ramp-up. Both activities were in line with the goal, but the achievement of this model's ramp-up goal was D+2 days. This situation was due to different interpretations of the output goals set by PPIC, as different goals influence the number of operator compositions and system requirements. The achievement of the ramp-up was better than the previous average, respectively H+13 and

H+20 days. This improvement was helped by internal factors of production which were able to provide a better rapid change in time.

The dedication of all relevant departments (D7) to maintain the framework consistently is needed so that the same problem does not happen again. Management should be praised for the performance of the project team in achieving a better ramp-up for the new shoe model CK 2946. Rewards in the form of management rewards shall be issued at the end of the monthly meeting (D8).

5 CONCLUSION

The implementation of the SMED approach can have a substantial effect on the efficiency of the ramp-up process by changing the internal layout operations, the separation of the tasks of the operator, the attachment of quality control points, the training of critical processes, and the machine adjustment activities carried out by the mechanical team to external activities. The use of the Just In Time concept helps to ensure the consistency of the delivery of the necessary production items in preparation for ramp-ups between departments. The integration of SMED and JIT approaches into a new model system to provide shared visualization oversight that is easily understood by all departments in the implementation of ramp-up preparations. The 8-Dicipline method makes it simple to carry out any operation, from planning to tracking the results.

The implementation of the framework has increased the performance of the new shoe model type CK2946 to achieve the target H+2 days. This can also be seen by the performance of the entire team in maintaining the punctuality of events within the framework that can be seen with the green colour code (visual management) accomplished in this model, even though certain events are still red. When compared to (Mulyana and Hasibuan, 2017), who improved system downtime by up to 75.59% by separating internal and external operations, splitting the workload of setup activities with two operators, and using geage software. This gauge tool speeds up the setup process by allowing you to connect the changing ring and stripper to the cartridge at the same time. However, the enhancements are limited to a narrower scope and only apply to a few machines. This study has a broad scope and includes a variety of methods (SMED, JIT, and others), making it slightly more complicated. Apart from having a large number of machines and processes, intense coordination between departments is required in order for the framework to running on time.

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Strategic Management from the Perspective of SMEs Operating in Service Sector

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ABSTRACT

Purpose: Providing high quality services is a basis for long-term competitiveness of small and medium-sized enterprises. Recognizing the success factors of transformation and strategic management is an issue that has been frequently addressed in the past two decades. The goal of this article is to evaluate the strategy of small and medium-sized enterprises offering services in tourism and catering.

Methodology/Approach: The qualitative analysis was based on 107 completed interviews. Two hypotheses were formulated and an Independence Test was applied. Chi-square Test and Cross Table Analysis were used which enable to examine the relationship between 2 non-metric variables. The two examined variables related to our Hypothesis 1 were ordinal, and 1 ordinal, 1 nominal in the case of Hypothesis 2. The significance level was $p=0.05$.

Findings: The obtained results show weak relationship between the size of the business and the awareness of the strategy. No relationship can be detected between the size of the business and the evaluation of the key success factor

Research Limitation/Implication: The research activity and obtaining research data from SMEs was obstructed by the pandemic situation caused by COVID-19. The research was limited by external circumstances, so the interviews with company representatives could be conducted on online platforms.

Originality/Value of paper: The paper examines how successful the SMEs involved in the research are in communicating the values and goals of the company to their employees. It brings important findings in the field of strategy management which leads to high quality services in the case of providers.

Category: Research paper

Keywords: strategic management; mission; vision; competitiveness; strategy

1 INTRODUCTION

Strategy, strategic thinking and strategic management are concepts that evoke respect and recognition. The concepts are associated with strong and charismatic personalities acknowledged in the field of small and medium-sized enterprises.

A company's prospects for the future are objectively and timely structured. Every enterprise needs to develop a strategy to help them keep up with the changes taking place in the market. There is no single strategy that would be the best solution for all companies. Each organization needs to find the path that seems most reasonable in the given circumstances, taking into account its own current situation, opportunities, goals, and tools. The idea of the farthest time horizon comes in the form of a vision, which has an inspiring effect and a challenge both inside and outside stakeholders. It is not very important in what order the parts of the future orientation are formulated, the point is that they are ultimately connected to each other logically and in chronological order, from the vision to the goals through the mission.

The strategic management principles and processes should change and adapt to the changing world economic environment. The strategic management of businesses should include several factors and considerations (Joyce and Woods, 1996). The information age, pandemics and globalization made the tactics more complicated, sophisticated and radical. It is important the businesses remain flexible and apply strategies that help the employees to change and modify the strategies that do not work (Genus, 1995; Chandler, 1992). New strategies and methods are introduced to implement paradigm shifts in the organizational environment. Careful analysis of the business environment, including the external, general, industrial, competitive and the internal organizational environment. Richardson and Richardson (1992) made the "total approach" strategic management equivalent with different forms of planning: a) planning aspirations; b) corporate and competitive planning; c) emergency planning; d) administrative planning; e) productivity planning; f) team culture planning; g) innovation planning; h) shock event planning (AlQershi et al., 2020).

2 THEORETICAL BACKGROUND

2.1 Strategic Management

Strategy (strategic approach) is a wide range of opportunities to address certain challenges and objectives. Strategy is made up of decisions, reactions, activities that increase the chance for success and decrease the risk to fail to meet the goals. Each business strategy is therefore a unique masterpiece. These ideas were confirmed by Porter (2004), Souček (2005) and Magretta (2012) – sustainable competitive advantage can be achieved by applying strategy (Szemere, Garai-Fodor and Csiszárik-Kocsir, 2021).

The fundamental question of strategic management is how organizations achieve and maintain their competitiveness (Teece, Pisano and Shuen, 1997; Johnson and Scholes, 2000), and as a result of this how they outperform the industry average. Since both the business environment and the companies are constantly changing, it is a great challenge to achieve equilibrium and gain competitive advantage. The process of strategic management focuses on how companies achieve awareness, how the company can define the goals and objectives, as well as the implementation and evaluation of achievement of these goals. The strategy serves as a reference point for the members of the organization in terms of growth and development of the organization. A strategy is successful when results in competitive advantage of the company, the chosen strategies are viable and create a value both for the players and stakeholders. Thompson (1995), Ward and Peppard (2013), Aaker and Moorman (2017) pointed out that the success of strategy depends on the corporate or organizational culture and values, as well as the strength and style of the leader of the strategy. If the culture and values of the organization had adapted the change, the success would have come easier (Papula, 2004; Galabova, 2021).

Strategic thinking is a combination of convergent, divergent and creative thinking, combined with critical judgement (Ambrosini, Johnson and Scholes, 1998). The perspective of strategic brainstorming means that the new strategic ideas born as a consequence of the mental model of strategy and business processes (Hamel et al., 1999). If the strategist can develop ideas and can see them from different perspectives, the ideas can be diverse and creative. It is important to recognize how to position the organization in order to maximize opportunities, while minimizing the threat of the environment. Implementing the selected strategies requires the synthesis of the alternative strategies, their possible impacts and outcomes. The Gap analysis helps the leaders to understand the dynamics of the competitive environment (Ambrosini, Johnson and Scholes, 1998; Anyakoha, 2019).

Winslow (1996) thought that the “mission statements” count a bit more than the wishlists, unless they fall among the achievable goals the company determined. He encouraged the detailed business analysis before determining the strategic goals. Benchmarking, customer service research and business replanning were the three methods business leaders applied to expand their business analysis or decide their business goals and objectives. “*Strategic management was rather to achieve a balance between the mission and activity of the organization and the wider environment of its resource capacities*” (Genus, 1995, p.8). The linear approach to strategic management is outdated due to the constant and unpredictable changes on the global markets. The development and protection of organizational resilience preserves the resources of the organization and strengthens the abilities during change and chaos.

The crucial need for change within organizations cannot be implemented until the legacy of old, embedded cultures and management is disintegrated and transformed. The attitudes, values and beliefs have to be examined and

redirected. *“New organizational structures, new skills and knowledge, new employees, new information systems and leadership approach is required”* (Bainbridge, 1996, p.11). Outdated processes have to disappear, and new processes based on updated technology and thinking, successful in the 21st century have to prevail. The businesses have to progress in transition. During the transition period, the organizations have to remain on the market, maintain their interest and competitiveness, achieve profit targets, and keep pace with technological development. The traditional company values of the past: stability, adequacy and consistency can be an obstacle to fulfil the new mission and strategies of organizations (Aliperti and Cruz, 2020).

The strategic activities are necessary for the new and efficient strategic management of the new century in terms of the human resources aspect of the business, technological development and the infrastructure of the organization. In a changing global business environment, the effective goals and missions have to be specific, flexible, adaptable and inspiring, but measurable; they should be easy to understand, but not enough easy to be simplified; both for the customer and other stakeholders; they should be real in terms of chronology, yet include quality (Mura and Sleziak, 2014). *“Needless to say, the appropriate balance of these parentres is extremely difficult”* (Hitt, Ricart and Nixon, 1998, p.36). The effectiveness of the mission can be measured by variable indicators: the extent to which the member of organizations are moving in clear direction; how inspiring it is, and generating the passion and commitment in the performance of the company.

In recent years, the most commonly applied methods in the field of corporate performance management are primarily Benchmarking, Strategic Planning, Vision and Mission Statement, CRM (Customer Relationship Management), Outsourcing and the Balanced Scorecard. In addition to these methods and concepts, further tools have been used in recent years such as Change Management Programmes, Strategic M&A, Core Competencies, Strategic Alliances and Customer Segmentation. Most of these tools are an integral part of the coherent concept of strategic performance management of the business. According to Rajnoha and Lorincová (2015), companies operating in the selected sectors of the Slovak economy, while providing outstanding performance, have a strong focus on managing strategic performance by applying several modern methods and concepts. According to Bobenič Hintošová et al. (2020) knowledge of the connections among individual factors, as well as quantification of their effects, both in relation to business performance and among them, can have a significant pragmatic impact, particularly in terms of the business strategy development and its implementation (Bobenič Hintošová, Bruothová and Vasková, 2020). Mura, Žulová and Madleňák (2016, p.83) state *“In the future, additional legislative cooperation with social partners is expected to initiate further steps in strategic management that will lead to building a knowledge-based society and strengthening of the services sector as the future fields in which to create new, modern jobs”*.

2.2 Values, Mission, Vision and Quality

Drafting vision and mission statements are a strategic decision made by the top management or the owners. Mission is a term used to describe our main activities. In business context it refers to customers (what kind of needs I would like to satisfy), the external environment and the market in which the company operates.

Vision is related to the quality objectives of the company, because it describes what the company wants to achieve. According to Mallya (2007, p.29) *“vision can be perceived as a mental model of the future state or as a positive reflection of the future of the organization”*. Košťan and Šuleř (2002, p.11) add that *“vision is a unifying element, which is a challenge, inspiration, support or meaning of effort for the people working in the company”*. According to Kourdi (2011, p.128), *“it is not enough to define vision as a future perspective unifying the employees of the company”*. It should also contain a set of values specific for the company and the employees, which would have a function of decision-making and negotiation. Mathur and Kenyon (1998, p.39) stated: *“A company is often said to have an explicit or implicit system of values, which is part of its culture. What is meant, is that the management team has a collective set of values, so that the company is used as a shorthand expression for the collectivity of the managers. An example might be a dedication to the quality of what is offered to customers”*. According to Forbes Insights (2014) *“It is an easy matter to state quality goals. But actually taking action to achieve those goals requires strong commitment: a compelling vision, companywide shared values and complementary performance metrics and incentives”*. They analyzed responses from more than 2,000 executives and quality professionals. Only half, 51%, said that the quality vision is understood within the organization. Papula, Papulová and Papula (2019) presented that vision is a key idea determining goals, activities and strategy of the company. The vision forecasts how the company should look like in the future. Vision has to express the customer philosophy, internal policy, relationship and commitments to partners and the environment, awareness of company about its position on the market. According to them, the vision presents the future position of the company, pays attention on trends, factors and phenomena currently uncertain. Antořová (2012) claims that the most important while creating a vision is intuition, mental abilities, imagination, receptivity and ability to predict the future. The vision has to initiate people to act in order to succeed, therefore an effective vision inspires, motivates and provides emotional guidance. Its importance has to be highlighted also in the case of small and medium-sized enterprises (Bartkus, Glassman and McAfee, 2004; Bratianu and Balanescu, 2008; Al-Hanakta, Horuz and Corekcioglu, 2020).

According to Zgodavova and Bober (2012, p.59) *“The ISO (International Organization for Standardization) standards positively contribute to the running of the world we live in”*. The newest version of ISO standard (ISO 9001: 2015 Standard) contains strategic management concepts too. It gives us an opportunity to put business school concepts and theories into use. With the help of it,

strategic management and quality management come together as determining the organizations context (Fonseca and Lima, 2015; ISO, 2016).

2.3 Corporate Success Factors

Companies are put under pressure by external environmental factors, while they are trying to maintain their competitiveness on the aggregate markets. They strive to formulate strategies that help them create more value for their customers. Strategic thinking provides a guidance for examining those segments of the market that seem to be relevant in terms of the company's operation. Theories and management models serve as a guide to increase the competitive advantage of the company. Strategic thinking helps the company to define the company goals and objectives, develop key policies and plans to achieve the defined goals, which identify and clarify the activities of the business and have positive impact on the performance. Factors important in terms of competitive advantage can be identified that will explain the relationship between the company's performance and the motivation behind the performance. The corporate success factors refer to activities and solutions that are crucial in "defeating" the competitors (Day and Wensley, 1988; Sousa and Hambrick, 1989). Several authors have addressed the discussed issue. Grunert and Ellegaard (1993, p.264) summarized it as the follows:

- The corporate success factors are relevant in all areas of the business, as they include the necessary resources and the abilities characteristic for the company;
- Market-driven, as their main goal is to ensure the competitive advantage of the company;
- Their number is limited, as only a few components show a significant connection to corporate success;
- A causal relationship exists between the specific skills of the company and the required resources and competitive advantage.

The corporate success factors target the companies with tasks that are necessary to achieve and maintain their position. The last of the listed characteristics includes the dynamic characteristic of success factors. According to D'Aveni (1994), the increased competition results in faster change of success factors. However, this is limiting their identification.

The concept of success factors is focusing on two research fields. It is primarily concerned with defining the resources and skills. Grunert and Ellegaard (1993) differentiate the mentioned concepts. According to them, the basic resources and skills are those the company needs to operate on the market. These tools are of unique importance to each company and also differ in terms of competitive advantage. Varadarajan (1985) argues that specific skills and resources are rather preventing failure than being a key to success. The most important success

factors are those resources, which contribute to maintaining the competitive advantage. Furthermore, it assumes that competitive advantage and the company performance are correlated, because the competitors do not evaluate these skills and tools in a uniform manner.

According to Bharadwaj, Varadarajan and Fahy (1993), the second field is related to the study and analysis of identification of these success factors, so their examination can contribute to defining the general theory of competitive advantage. Based on these, 2 types of viewpoints can emerge. As one point of view, they logically testify the reasons for success, on the other hand they refer to company performance in terms of parallelism between these factors and market attractiveness. As a consequence, the success factors may lose their value due to negative market features.

The research is focusing on those success factors that were also defined by Magyar (2009a) in his study. This can be explained by a simple fact that the SMEs in the researched area are focusing on stabil customer base, modern technology, unique resources and the professional skills of the employees. The second hypothesis is also based on this assumption (Magyar, 2009b; AlQershi et al., 2020).

3 METHODOLOGY

The goal of this article is to assess the strategy of small and medium-sized enterprises providing tourism and catering services. The another purpose is to draw attention to the importance of vision and mission. The theoretical part introduced the concept of strategic management, corporate vision and mission. A short description was provided about the corporate success factors. The research is based on interview survey. Structured interview as a part of the research was designed for the managers of SMEs. Demographic questions were also included that were necessary to identify the size of enterprises (micro, small, medium-sized). We used a database to reach (website containing data of companies) the potential enterprises. The current analysis is based on 107 completed interviews. We targeted only those enterprises that employ further employees beside the company owner. These employees could not be family members.

It is important to highlight that the interviews had to be stopped due to the pandemic situation caused by COVID-19. Most of the tourism and hospitality businesses had to slow down their activities. The interviews were conducted with the managers of the companies (employees were not involved) as they can provide the most relevant information about the situation of the business. We used a limited number of open questions. The interviews were conducted on different online platforms e.g. Skype, Meet, BBB, Microsoft Teams. During the first few interviews we asked the managers of companies to forward the interview questions to potential company managers working in hospitality and

tourism industry. As a result of this, some of the company managers contacted us for the interview.

Two hypotheses were formulated during the research:

H1: There is a relationship between the size of the business and the strategy, vision awareness.

H2: There is a relationship between the size of the business and the evaluation of the key success factors.

The above mentioned hypotheses are examined in details below. We applied an independence test. A Cross-Tabulation Analysis and Chi-Square test were used as statistical methods, which allow us to examine the relationship between 2 non-metric variables. We examined 2 ordinal variables in the case of Hypothesis 1, while 1 ordinal and 1 nominal variable was examined in the case of Hypthesis 2. The significance level of $p=0.05$ was determined.

4 RESULTS AND DISCUSSION

The introduction of obtained results will start with an introduction of demographic data. 34.3% of the respondents were female business leaders, while 65.4% were male respondents. Most of the respondents belonged to the age group 36-50. No responds were obtained from leaders under 20. The last question was interested in the highest achieved qualification of the respondent. Most of the respondents have completed vocational high school and passed final exam. The ratio of respondents with second level of university degree (Msc) was 17.8%, the same ratio was achieved by the respondents with vocational high school degree without final exam. The obtained results are summarized in the table below.

After examining the characteristics of company leaders, we found it necessary to map the characteristics of companies as well. We were interested in types of the companies involved in the research. The companies we examined are mainly limited liability companies, part of them are run by registered entrepreneurs. Regarding the years of existence of the business, the researched companies show a colourful picture. Compared to medium-sized enterprises, the ratio of micro and small enterprises was higher in the sample.

Table 1 – Summarized Data about the Leaders and the Enterprises

<i>Age group</i>	
Under 20	0.0%
20-35	19.6%
36-50	54.2%
51-65	19.6%
65+	6.5%
<i>Gender</i>	
Female	34.3%
Male	65.7%
<i>Age of business</i>	
0-2 years	8.4%
2-5 years	21.5%
5-10 years	22.4%
10-15 years	27.1%
More than 15 years	20.6%
<i>Education</i>	
Vocational high school (Without graduation)	17.8%
Vocational high school (Graduation)	47.7%
Grammar school	10.3%
University (Bsc. diploma)	5.6%
University (Msc. diploma)	17.8%
University (PhD. diploma)	0.9%
<i>Type of business entity</i>	
Limited liability company	49.5%
Self entrepreneur	50.5%
<i>Size of the business</i>	
Micro-enterprise	45.8%
Small business	41.1%
Medium-sized business	13.1%

The first hypothesis was the following: “*There is a relationship between the size of the business and the strategy, vision awareness*”. In order to test the hypothesis, we had to select the collected data. We wanted to examine the relationship between the business size (independent, ordinal), strategy and awareness of business vision (dependent, ordinal). We had to conduct an independence test. We obtained the following values.

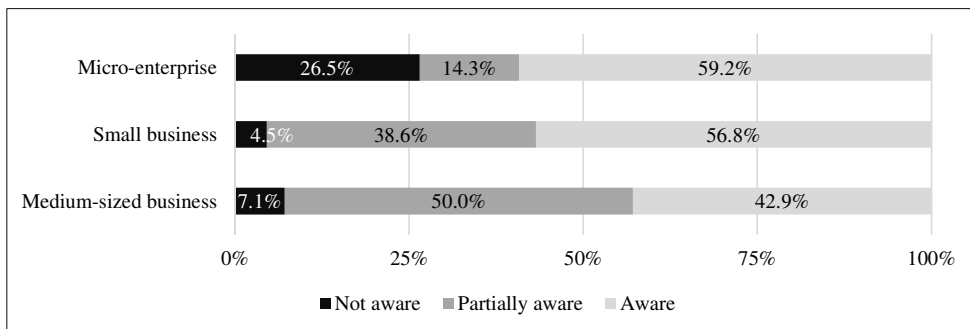


Figure 1 – Business Size and the Awareness of the Strategy

Since both of the variables are ordinal – not metric variables – we applied a crosstab. The statement sounds that there is no relationship between the observed variables. Pearson’s Chi-square (χ^2) test was used to perform the test. We obtained the following values by applying SPSS.

Table 2 – The Result of the Pearson Chi-Square test – Hypothesis 1

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	15.879	4	0.03
Likelihood Ratio	16.757	4	0.02
Linear-by-Linear	0.409	1	0.523
N of Valid Cases	107		

The value of the Chi-square is 15.879; the value of the degree of freedom (df) is 4; the significance (α) value is 0,05. The critical value of the χ^2 (in case that the degree of freedom (df)=2, the level of significance is 0.05) based on the table of quantile values of the Chi square distribution is 9.488. According to this, $15.879 > 9.488$ means that $\chi^2 > \chi^2_{crit}$. The value of P (empirical significance level) is 0.003, which is higher than the significance level ($\alpha=0.05$). Based on these results, there is relationship between the size of the business and the awareness of the strategy, mission. Since there is relationship, it is necessary to examine the relationship between the two ordinal variables (Gamma coefficient). The results were obtained by using SPSS program. The value is 0.019, which shows a weak, positive relationship between the variables. According to these results, the employees of bigger companies aware of company vision more than those of smaller enterprises. The “partially aware” option was also considered.

Table 3 – The Value of Gamma Coefficient – Hypothesis 1

	Value	Asymp. Std. Error	Approx. T	Approx. Sig.
Ordinal by Ordinal - Gamma	0.019	0.151	0.124	0.901
N of Valid Cases	107			

According to the H2 hypothesis: “There is a relationship between the size of the business and the assessment of the key success factors”. We wanted to examine the relationship between differentiation based on the size of the business (independent, ordinal) and the evaluation of the key success factors (dependent/nominal). We performed an independence analysis. First, we got the following value.

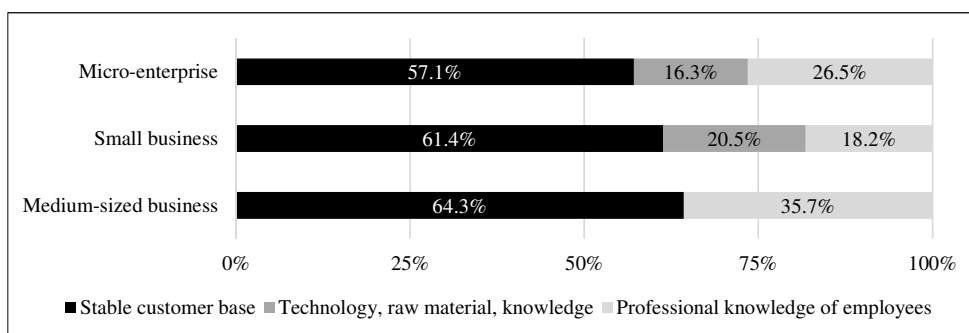


Figure 2 – Evaluation of the Key Success Factors for each Company Type

One of the variables is ordinal and the second is nominal, so a crosstab was used in this case as well. The basic statement was that there is no relationship between the two examined variables (income, expenditure). The rule of the feasibility test was met, so we applied the Pearson’s Chi-square (χ^2) test. Using SPSS, we obtained the following values.

Table 4 – The Result of the Pearson Chi-Square Test – Hypothesis 2

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.459	4	0.347
Likelihood Ratio	6.601	4	0.159
Linear-by-Linear	0.055	1	0.815
N of Valid Cases	107		

The value of the Chi-Square is 4.459. The value of the degree of freedom (df) is 4. The significance value (α) is 0.05. The critical value of χ^2 distribution (degree of freedom (df)=4, the significance level=0.05) based on the table of the quantile values of Chi-Square distribution is 12.592. According to this: $4.459 < 9.488$

means that $\chi^2 < \chi^2_{crit}$. Furthermore, the value of P (empirical significance level) is 0.347, which is higher than the level of significance ($\alpha=0.05$). The obtained results prove that there is no relationship between the size of the business and the evaluation of the key success factors.

5 CONCLUSION

The aim of the research was to examine the strategy of small and medium-sized enterprises providing tourism and hospitality services and to raise the awareness about the researched field. In order to achieve the goal, a structured interview was applied. 107 interviews were made with the managers of those companies, which have at least one employee, who is not a family member.

Two hypotheses were formulated, the first of which was related to strategy and vision of the company. Van der Walt, Kroon and Fourie (2004) emphasized the importance of strategic management in the SME sector. Szabó (2016) argued that employees are more committed if they are familiar with the vision and long-term goals of the company. It is important that the employees understand and accept them and aware how their efforts contribute to success in achieving the goals. Improvement in employee commitment can be detected if they identify themselves with the goals and values of the company. Even though, strategy and vision awareness is not perceived as the most important factor for SMEs in Slovakia. Therefore, the aim of the research was to raise the awareness about the potentials of this field. Based on the research above, we examined how successful the SMEs involved in the research are in communicating the values and goals of the company to their employees. The hypothesis was confirmed, as the employees of small and medium-sized companies are generally aware of company strategy. It was confirmed only in those cases if we consider also those companies where employees are only partially familiar with the strategy and vision of the company. Focusing on companies, where the managers reported that the employees are fully aware of the vision and strategy of the company, the ratio is higher for small enterprises. If we examine the companies where employees are less involved, the worst ratio is shown in the case of small enterprises.

The second hypothesis examined the importance of success factors. According to Magyar (2009a; 2009b), a stable customer base, modern technology, unique resources and the professional knowledge of the employees are the key success factors for SMEs. We were interested what is the most important factor for the researched companies operating in tourism and hospitality sector. Based on the obtained results, there is no relationship between the size of business and the evaluation of the key success factors, as a stable customer base was considered the most important.

The research activity and obtaining research data from SMEs was obstructed by the pandemic situation caused by COVID-19. The study was limited by external circumstances, so the interviews with company representatives could be

conducted on online platforms. The plan is to extend the research to further countries of Central Europe. Most of the companies operating in hospitality and tourism sector spend not adequate time with online presence. The entrepreneurs spend most of their time with activities that are not closely connected with online presence.

It seems to be a good decision to conduct the research with participation of the same enterprises in the future. It would be possible to observe which companies survived the pandemic, and what is the ratio of those companies had to quit their operation or went bankrupt. The interview has to be updated with further questions. The plan is to involve also large companies in order to make a broader comparison on the market. A questionnaire survey can be applied and distributed among the employees of the company as a tool to get information from different perspective as well.

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CONFLICTS OF INTEREST

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Lean Manufacturing Implementation through DMAIC Approach: A Case Study in the Automotive Industry

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ABSTRACT

Purpose: The main objective of this paper is to validate the results of the Lean manufacturing application via the DMAIC concept. This study concerns a case study carried out in an automotive company which aims at improving its flows within the production workshop by pulling the physical flow and minimizing the different wastes.

Methodology/Approach: By conducting a literature review to examine the different frameworks for applying the lean method and to extract case studies related to the DMAIC approach which is missing on the selected articles, only one article that addresses this possibility.

Findings: DMAIC has allowed a better structuring of the entire project, choosing the right improvement solutions with the right choice of Lean tools and several advantages that are not valid for other frameworks. This implementation shows a spectacular improvement in the production planning, the fluidity of the flow as well as an important financial gain for the company.

Research Limitation/Implication: The project duration was not sufficient to apply other beneficial lean tools as the study was limited only to a single production line.

Originality/Value of paper: This article demonstrates the added value of the structured DMAIC approach to lean manufacturing methodology and implementation.

Category: Case study

Keywords: lean manufacturing; DMAIC; lean tools; automotive; case study

1 INTRODUCTION

Lean manufacturing, Lean production, Lean institute, Lean office and other names always refer to the Lean concept which aims to eliminate activities and actions with no added value. The Lean concept is originated from Toyota production system TPS, invented to eliminate all types of waste in the production process of the Toyota company (Shingō and Dillon, 1989; Pech and Vaněček, 2018).

The word Lean appears for the first time in the famous book “the machine that changed the world” of Womack, Jones and Roos (1991), which defines it as: “Lean gives you the ability to produce more by using less – less human effort, equipment, time and space, while at the same time getting closer to the objective, which is to meet the exact need of the customer” (Womack, Jones and Roos, 1991).

This paper has studied the good practices used by Toyota to overcome their crisis. Today, Lean manufacturing is applied in all countries and sectors either alone or by integrating it with other approaches such as six sigma, the agile model or the industry 4.0 (Marodin et al., 2019).

By applying lean manufacturing principles, many manufacturing industries around the world have reduced the cost of their products during the manufacturing phase and increased their profits (Vamsi Krishna Jasti and Sharma, 2014). This effect is witnessed by the literature where hundreds of successful case studies have been uncovered in all industries and especially in growing companies.

This document presents a relevant Lean Manufacturing application, implemented by following the systematic steps of the DMAIC approach to reduce the various waste forms that involve a high inventory of work-in-process for the company with a very complex workflow. In order to successfully implement the Lean concept, the team used a plethora of Lean tools Kaizen, Kanban, value stream mapping, 5S, Kaizen Team, Heijunka, Standardized Work, Takt time and Visual Control as well as many diagnostic tools such as Ishikawa, QOQCCP, 5 whys, 5M and Pareto diagram where these tools were carefully chosen.

For the paper’s organization, we will start with a literature review concerning Lean Manufacturing and its applicability as well as the DMAIC cycle. The second part will be focusing on the host company and its activities as well as the reasons for choosing and implementing Lean Manufacturing as a tool. All the DMAIC phases will be presented in the third part. The fourth part will include the gain generated and the Lean application’s efficiency in this company. A conclusion and some perspectives will be discussed in the last part.

2 LITERATURE REVIEW

2.1 Lean Concept

The Lean philosophy is the art of reduction and elimination of all non-value added activities, those activities that are known by *Mudas* in lean's jargon. The implementation of Lean production allows production with less human effort in the factory, less financial resources, less space and less equipment to manufacture the same product (Salonitis and Tsinopoulos, 2016). Toyota, the creator of Lean, depicted its philosophy as a temple to define the bases of Lean project construction and the pillars that reinforce its rigidity (see Figure 1). Each part of the temple enables to define the methodology's objectives with the elements on which it is necessary to act and the tools to be deployed.

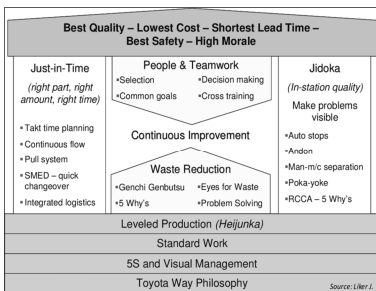


Figure 1 – Toyota Production System TPS (Rüttimann in Stöckli, 2016)

In order to successfully implement Lean, companies must follow the principles of Lean implementation, five generic principles are described in several books and articles (Jerry, 2003; Liker, 2004; Andersson, Eriksson and Torstensson, 2006; Su, Chiang and Chang, 2006; Rifqi, Ben Souda and Zamma, 2020, p.4) (see Table 1).

2.2 Lean Manufacturing Implementation

The Lean concept was first implemented in the automotive sector, its effective and successful application made a group of companies adopt it and take advantage of its benefits concerning waste reduction and flow optimization.

The applicability of lean thinking has been proven in the literature by hundreds of successful case studies, such as in banking sector (Hidayati, Tarigan and Tarigan, 2019), construction (Li, Fang and Wu, 2020), pharmaceuticals

(Sieckmann et al., 2018), electronics (Nguyen and Do, 2016), services (Piercy and Rich, 2009), metallurgy (Ching, Hoe, Hong, Ghobakhloo, in Pin, 2015), shipbuilding (Sharma and Gandhi, 2017), health (Régis, Santos and Gohr, 2019), as well as its implementation in universities (Balzer et al., 2016) where all these sectors have demonstrated the applicability and adaptability of the Lean concept.

Table 1 – Lean Manufacturing Principles

Principle No. 1	Value Stream	Identify the value from the customer perspective
Principle No. 2	value stream mapping	Identify value-added and non-value-added activities.
Principle No. 3	Continuous Flow	Create a continuous flow without waste
Principle No. 4	Pull system	Produce only what is needed and when it is needed.
Principle No. 5	Perfection / continuous improvement	Striving for perfection

Its implementation has also been linked and integrated with other concepts, services or paradigms. The Lean Sigma (Mostafa, Chileshe and Abdelhamid, 2016) is an example of an integrated concept where Lean focuses on efficiency and speed, it ensures that resources are well used and create value and on the other side the concept Six Sigma which seeks accuracy and precision by doing things right the first time. Also Lean logistics (Wronka, 2017) where Lean is applied in logistics service, it supports internal and external logistical processes to ensure a continuous flow of production materials and deliveries on time, in the right place, at the right quality and at the right cost. Several more concepts are created with the aim of strengthening Lean or to improve other concepts and approaches through the Lean benefits

Generally, to implement Lean, companies apply the five principles of Lean. Table 2 contains a set of Lean applications where the steps followed by its authors have been described separately for each one. Generally, they follow these 5 lean principles or they try to adapt them to their situations, requirements and needs.

The literature also includes several models and frameworks that can be adopted in order to implement Lean thinking, Manotas Duque and Riviera Cadavid (Diego Fernando and Rivera Cadavid, 2007) as examples have proposed these steps:

- Change planning (defining the need for change, senior management commitment and support, identifying target areas, model lines and outreach strategy)
- Implementation (eliminating waste, continuous improvement, continuous and pull systems, multi-functional teams, information systems)
- Measurement of progress
- Measures objective (monitoring the Lean implementation progress, continuous monitoring, benchmarking)

Table 2 – Lean Implementation in the Literature

<i>Types of industries</i>	<i>Authors</i>	<i>Steps followed for the Lean implementation</i>
CNC Manufacturing	Verma and Sharma (2017)	<ul style="list-style-type: none"> • Mapping the current state and its analysis • Creating the Future State Map • Data analysis for each process and analysis of the future flow map • Identifying bottlenecks
Furniture industry	Guner Goren (2017)	<ul style="list-style-type: none"> • Mapping the current cartography • Mapping the future mapping based on the detected Mudassas • Use continuous flow where possible • Use supermarkets where continuous flow is impossible • Build a FIFO line where there are varieties of products
Auto parts manufacturing	Dhiravidamani et al. (2018)	<p>The authors implemented the techniques of Kobetsu-Kaizen and the VSM. They were based on kaizen events according to these steps:</p> <ul style="list-style-type: none"> • Team training • Ensures management commitment and support • Consider environmental measures as well as Lean measures • Identify environmental waste in Lean training • Visualize environmental wastes and eliminate them • Pursue and maintain efforts
Gearbox Manufacturing	Saravanan, Nallusamy and George (2018)	<p>The implementation is carried out by following a set of steps in a flowchart prepared by the authors which includes these steps:</p> <ul style="list-style-type: none"> • Existing study and problem identification • Process study and observation • Data collection, VSM and VA, NVA, and NNVA identification • Future state VSM • Work standardization • Results
Cable manufacturing	Chanarungruengkij in Kaitwanidvilai (2018)	<p>Based on the steps introduced in the “Lean way” book for process improvement, which are:</p> <ul style="list-style-type: none"> • Visit the production site to check the current state of the production line, identify and implement the process for each stage, identify production wastage and map value flows • Improve the process by reducing waste • Establish the future value stream mapping • Summarize the results
Automotive plant	Pérez-Pucheta et al. (2019)	<ul style="list-style-type: none"> • Problem Statement • Evolution of the current state • Waste identification • Development of future mapping • Report on Proposal A3

<i>Types of industries</i>	<i>Authors</i>	<i>Steps followed for the Lean implementation</i>
Water heater manufacturing	Ur Rehman et al. (2020)	<p>The steps of the adopted approach are as follows:</p> <ul style="list-style-type: none"> • Start • Data collection (time study, performance history, demand and production, shutdown history) • Current state analysis (bottleneck study, flow and distance map, availability and utilization, productivity measurement, value stream map) • Suggested improvements to remove detected problems • Future state analysis (productivity analysis, value stream map) • Analysis of States (current and future) • End
Agricultural equipment manufacturing	Ramakrishnan et al. (2019)	<p>The implementation of Lean practices was carried out in nine units using the following steps:</p> <ul style="list-style-type: none"> • Diagnose the current level of these units - capture current conditions and levels of Lean adherence using Lean assessment tools • Set objectives/steps include unit-specific projects and joint projects to be undertaken • Detailed list of projects and milestone-based objectives for all units for activities in each phase • General action plan for subsequent phases • Formulation of a review mechanism to monitor progress and targeted milestones

As the above table shows, the authors try to find the best practices to implement Lean Manufacturing somehow, But the aim of maximizing value and reducing waste is still unchanged.

2.3 DMAIC Concept

DMAIC is inspired by Deming practices and the Plan, Do, Check, and Act (PDCA) Cycle (Gupta, 2013), a systematic approach used to guide the scheduling and execution of Six Sigma projects. It is considered one of the essential and distinctive approaches for leading Six Sigma projects in process improvement and quality (Jirasukprasert et al., 2014). DMAIC is the acronym for the 5 steps that are Define, Measure, Analyze, Improve and Control (see Figure 2).

However, DMAIC can be operated without making reference to the six sigma approach. Reference (Dossou and Dedeban, 2017) the DMAIC cycle was exploited to improve the supply chain and in another reference (Popov et al., 2018) to analyze the root causes of circuit breaker failure in a distribution system.

The literature also reveals the integration of DMAIC with other approaches, such as with the VIKOR method (Zhou et al., 2018) or with the VSM tool (Guo et al., 2019). Furthermore, we can also find when DMAIC combines several approaches and methodologies, such as the DMAIC + approach (Sahay, Ghosh

and Bheemarthi, 2011) which combine Lean manufacturing, six sigma and constraint theory.

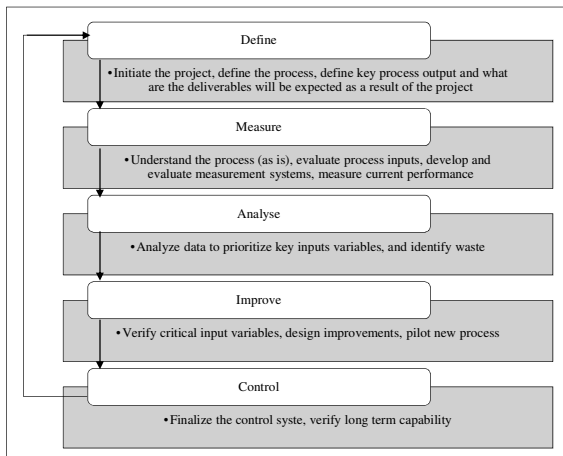


Figure 2 – The 5 Steps Of The DMAIC Cycle (Improta et al., 2017)

In this context where Lean can also be implemented through the deployment of the DMAIC approach, reference (Ferreira et al., 2019) where the authors presented a framework called “iLeanDMAIC” based on Lean tools and following the steps of the DMAIC approach, this iLeanDMAIC framework was validated by a case study in industry.

Our case study will also provide evidence of the successful implementation of Lean via DMAIC, especially since this approach ensures rigorous problem resolution and effectively manages process improvement actions.

3 COMPANY BACKGROUND – REASONS FOR IMPLEMENTING LEAN MANUFACTURING

In a context of hard competitiveness and quasi-permanent innovation, the host group has succeeded to become a leader in manufacturing metal components for the automotive industry in Europe. This group has 26 factories in eight countries (France, Spain, Czech Republic, Germany, Great Britain, Italy, Turkey, Morocco

and China). The Moroccan site on which this case study was conducted is employing a staff of 431 people and deals with large companies such as Renault, Toyota, Audi, Valeo, Nissan, Seat, Volvo, Faurecia, Infinity, Volkswagen and others. This site supplies these companies with products made through several processes of cutting and stamping of metal parts, assembly parts, and profiling to manufacture structural parts, substructures, openings, and mechanical parts (engine components).

The Lean was implemented with the aim of improving the physical flow between a site press and the assembly stations (Figure 3). The project team realized that Lean Manufacturing is the best solution for identifying non-value-added activities and improving flows, as long as the company seeks to eliminate the different waste forms within the workshop. In order to succeed in this project our multi-skilled team was accompanied by consultants from Kaizen Institute who participated in the different stages of the application and solutions validation.

4 LEAN IMPLEMENTATION FRAMEWORK: CASE STUDY

In this case study, the DMAIC problem solving methodology was chosen to implement Lean Manufacturing, where its tools will be deployed in each DMAIC approach phase. This choice is supported by the project team due to the structured steps that DMAIC provides, which will facilitate the waste source extraction in the shop floor which is the main objective of the project.

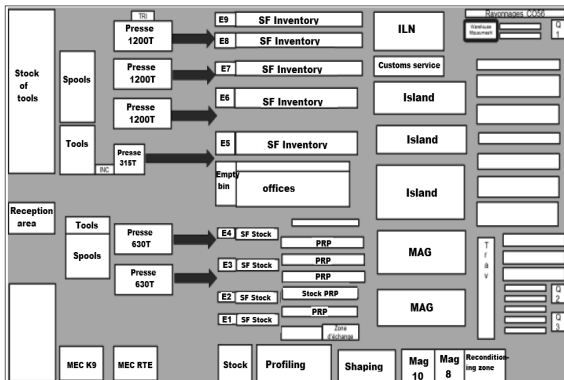


Figure 3 – Factory Plan

The materials that flow in the plant are a cellular flow. That means that each press produces according to its proper production program developed following MRP planning, which is independent of the other machines. The items or references produced are either shipped directly or placed in semi-finished SF inventory for a long time period, which can vary from 6 to 26 days or more, before proceeding to other operations

4.1 Define Phase

The definition phase consists of defining the Lean project objectives and selecting high-impact improvement opportunities. But before visiting the site and defining the processes and their elements, project team need to validate the following:

- The commitment of top management
- The impact assessment of the implementation
- The training of all team members
- The definition of the team/project charter

During the team formation, the resource availability constraint imposed the creation of the RACI matrix to assign responsibilities to the different work team members. Furthermore, in order to successfully implement Lean in this production site, some objectives were set as follows:

- Fluidity and computerize the physical flow
- Reconfigure production lines for linear flow via Kanban-pulled flow instead of cellular and MRP-pulled flow
- Eliminate non-value added activities
- Deploying Lean and Mizusumashi tools for flow improvement
- Eliminate the root causes of waste generation
- Transformation of the SF stock from flat stock to shelf stock (less stock space)

4.2 Measure Phase

In our case, the majority of the products that encountered more waste are the semi-finished products performed on the 315T press, these SF products are either to be reconditioned in the workstations, or sent to a re-conditioning area to be delivered to the workstations.

In order to better visualize the current situation and determine the problems and waste sources, we developed a physical flow mapping of a model reference (see Figure 4), where the different qualitative and quantitative characteristics of the physical flow collected from the site were introduced.

The reference choice was carried out through a meeting with the Lean team which selected the reference 106,234PC (Secondary Flask D Traverse X52), regarding the problems it presents to the production operators and the complexity of its flow. The same goes for the 315T press, limited to operations with very low added value and a significant WIP level, and other problems that will be dealt with in the remaining DMAIC phases.

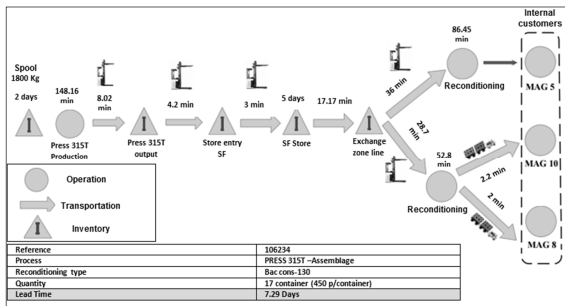


Figure 4 – Current Situation Mapping

The realization of a flowchart which describes the process under a time notation and the process steps in a simple way while classifying them by categories (operation, control, delay, storage) showed that the majority of the time is a storage time resulting in an increased lead time of 7.29 days. This lead time led the team to calculate the speed of the 315T press in order to compare it with the takt time for each article where the result showed a huge gap between the two (see Figure 5). For example, for part number 82275 EQUERPC, the customer requests one part every 656s, and the factory supplies one part every 14.81s. The customer request is respected but the storage time and the quantity stored is very important, which generates additional costs for the company as it adopts the MRP push-flow production management.

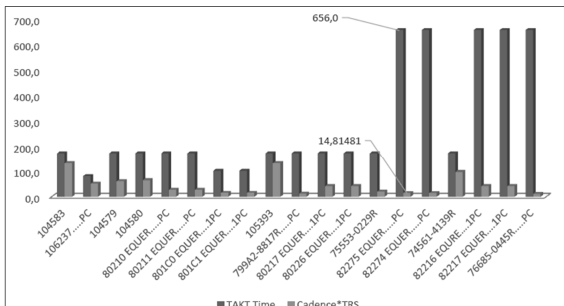


Figure 5 – Comparison of Rate and Customer Takt Time

To better visualize all the movements and displacements within the workshop, the realization of a spaghetti diagram appeared an essential step to avoid this type of waste. Figure 6 presents the spaghetti diagram of the workshop showing the physical flow that links the 315T press, the inventory and the assembly stations.

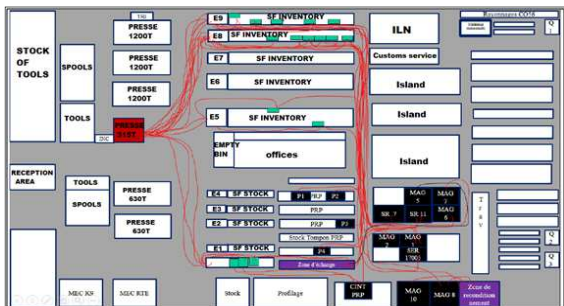


Figure 6 – Spaghetti Diagrams

This diagram will contribute to the efficiency improvement and the reduction of employee fatigue due to unnecessary movements as well as the minimization of energy consumption for forklift operators travelling longer distances.

4.3 Analyze Phase

The main objective of this phase is to analyze the results found in the previous phase in order to treat and highlight the root causes which will allow the optimal solutions to be generated. For the 315T press, it encounters several types of wastage where Table 3 shows the most dominant wastes.

Table 3 – 315T Press Waste

Waste type	Description
Movement Muda	The spaghetti diagram shows the complexity of the flow between the 315T press, the stock and the assembly stations. The diversity of SF parts forces the forklift drivers to circulate too much to supply each station with the necessary quantity. However, these movements follow no standard, which generates unnecessary movements that can lead to production stoppages and require a significant loading time for the drivers.
Over-processing muda	According to Figure 4, there are some operations that take a considerable time and do not bring any added value for the customer. As an example, the reconditioning of SF parts in large plastic or metal bins, for which a non-value added time of 41.18 hours has been calculated which must be minimized (This time is the sum of the reconditioning times per month for all references) Adding that the reconditioning conditions do not respect the rules of ergonomics at work.
Storage Muda	SF parts remain in stock for 5 days on average, for this reason the delivery time takes more than 7 days. Although the tools in the workshop have been organized according to the duration and the occupied storage area, it is necessary to minimize the size of these tools and taking into account the safety factor during use. Another study of calculation of occupied surface showed that the storage surface dedicated by the 19 references is 28.43 m ² , which is equivalent to 32 locations that must be minimized.
Other Muda	The 315T press meets many problems with forklift trucks in terms of efficiency, loss of time and cost for maintenance operations and production stoppages. In addition, as the company wants to re-experience the Mizusumashi train and try to create a PULL system to achieve the Just in Time.

4.4 Improve Phase

Figure 7 shows the new workshop configuration containing the Lean Manufacturing guidelines. The modifications illustrated in this improved model are:

- The implementation of the Kanban method for a pull flow
- The creation of a supermarket at the 315T press output for semi-finished parts (SF)
- The reduction of batch size transfer through the implementation of sustainable packaging
- The implementation of the Mizusumashi solution

- The use of the A3 to provide a global and complete vision of the problem and the solutions implemented step by step, including the final results obtained as well as the resources required to achieve these results

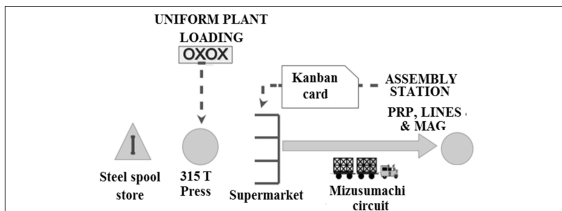


Figure 7 – The New Configuration of the 315T Press

Supermarket implantation: Before implanting the supermarket, the team carried out several calculations and examined the existing constraints, for example calculating the maximum launch sizes of each reference by considering the following parameters:

- Annual customer requirement (Sales and Operations Planning SOP) for each project
- Reference assignment within the projects
- Nomenclature coefficient
- Tool categories

It was necessary to calculate the maximum space that can be exploited with an adequate design. Figure 8 shows the market design in 3D on CatiaV5, it is a dynamic supermarket with two levels, one for full bins in front of the picking zone which is the loading area via the Mizusumashi, and another level for empty bins in the opposite direction of the 315T press.

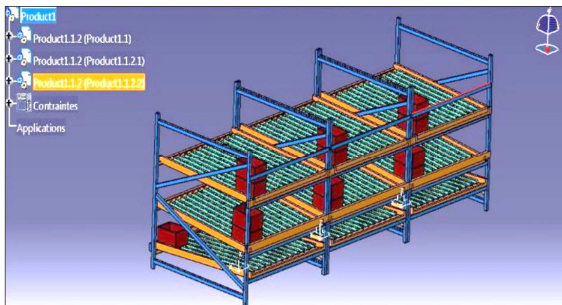


Figure 8 –The 3D Supermarket by CATIA V5

Production leveling – Heijunka: In this case, the team decided to apply the load levelling for the following reasons:

- Insufficient space to install the supermarket on the edge of the 315T press line, due to the batch size, which may require a storage time exceeding three weeks
- Takt time of the company is smaller than that of the customer
- Heijunka is one of the pillars of the Lean Temple

For this reason, it was necessary to validate the internal constraints such as the tool maintenance constraint, the average maintenance constraint, the serial method constraint and finally the logistic constraint. This validation allows suggesting a scenario that acts on all the tool classes in order to reduce the launch sizes. Table 4 shows a comparison between the old and new production schedule following the levelling of the production. This new program will maintain a high efficiency of the pull system.

The available capacity of the supermarket is only 720 bins, due to the Heijunka, the need for Odette boxes has decreased from 1,952 to 696 bins, which is very opportune.

Table 4 – Old Vs. New Production Planning

Items reference	Net requirement / production launch	Planning without Production Leveling (Heijunka)						
		Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Total
104583	18159							
106237	37122							
105393	19980							
		Planning with Production Leveling (Heijunka)						
		Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Total
104583	4540							18159
106237	99281							37122
105393	9990							19980

Mizusumashi train (water spider): The Mizusumashi train has already been adopted in another site of the group, which has shown its effectiveness and still encouraged to implement it in this project, among the advantages it will lead, we can find:

- An improved flow by eliminating stoppages due to lack of production parts
- Avoiding the creation of work-in-process inventory
- Elimination of non-value added activities
- Delivery of lines with a 100% service rate (0 production stoppages due to missing parts)
- Reduction of waste due to unnecessary movement and transportation

Before starting to use the train, a set of standards have been established to improve performance and take into consideration internal safety rules, battery change rate and circuit control. These elements were addressed in work instructions in addition to audits in order to validate the solution. Figure 9 shows the new spaghetti diagram with the optimized train route and the supermarket positioning.

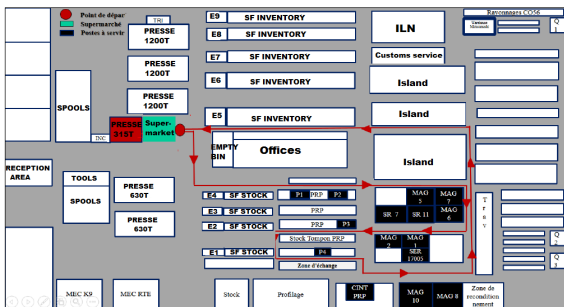


Figure 9 – The Mizumashi Train Route

Kanban: The first improvement actions facilitated the Kanban implementation, before its implementation the team worked on the Kanban card design and the card needs for all the references. For the operating principle in the workshop, when the operator starts consuming the bins, he takes the Kanban cards from the bins and places them on the support of the SPS table, the driver of the Mizumashi train collects the cards and empty bins and then returns to the supermarket to put the empty bins in their place. As a second action he takes the bins filled with the references of each Kanban card to deliver them to the stations during the next cycle (see Figure 10).

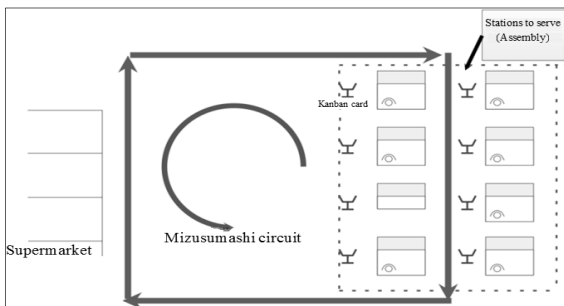


Figure 10 – The New Workshop Configuration for the 315T Press

Visual Management: several actions have been carried out within the visual management context in order to improve flow control and minimize waste related to movements and transportation. The team also proposed the realization of A3 thinking for a better project presentation for other departments and maintaining actions to avoid the occurrence of other types of waste (see Figure 11).

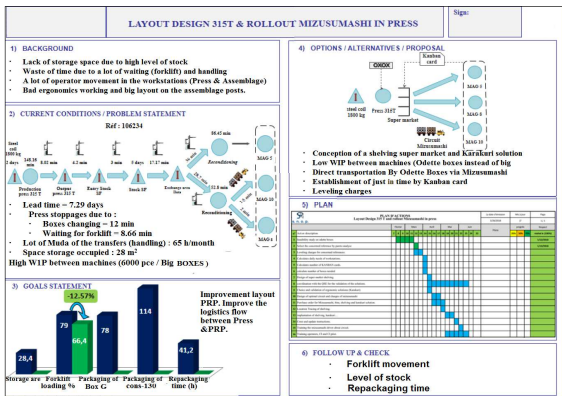


Figure 11 – A3 Thinking

4.5 Control Phase

In order to control and monitor the different implementation stages of the project, the relevance of the solutions and to ensure the expected results, several audits and actions have been planned and carried out:

- An audit of all the actions performed;
- A Kanban start-up audit: This audit is performed as a flash audit where a set of anomalies are provided after an in-depth brainstorming. These anomalies include: lack of Kanban ticket, Component rupture, incorrect location of Bac Odette, etc. This flash audit will evaluate the conformity of the different requirements fixed to achieve a pulled and continuous flow, at the same time through this audit the company can detect other improvement opportunities;
- A verification and control of the new press load has been achieved to be sure that the load is adapted to the new modifications (the calculated rate is 92%, which implies that there is no problem during production);

- An audit on the respect of the Mizusumashi train rules: a set of instructions, rules and penalties have been prescribed to maintain the proper functioning of the train and to guarantee the safety of the operators, especially since this train circulates permanently in the workshop to supply the necessary components to the stations and to recuperate the finished or semi-finished parts. Among the rules that have been established in the instructions and audit sheet we find: the respect of the circuit traced for the train, the respect of the highest speed which must not exceed (15km) by the train, the decrease of the speed to the minimal (5km/h) in the intersections and the corridors accesses, the stationing of Mizusumashi at the detected place, etc.

5 EFFECTIVENESS OF THE LEAN MANUFACTURING APPLICATION

The team has evaluated the financial benefits for each solution and for the industrial break-even point it corresponds to the investment recovery period:
Break-even point = investment / savings per unit of time.

In this case, since the project was completed, the company obtained an immediate gain of 39,5013 DH (gain on packaging and storage cost), which covered the investment of 22,2009.2 DH (Supermarket and Bac Odette) (see Table 5), adding a gain of 17,3003.8 DH and a monthly sum of 2,7937.36 DH related to the handling equipment rented at 2860/month, gain of the reconditioning time of 2,560 DH/month (gain of 41.18 hours) and gain on the rental price of the storage areas of 2,2516.56 DH (rental price of the square meter in the free zone is 792 dh/month) where Table 6.

Table 5 – Total Cost of Solutions

<i>Solution</i>	<i>Cost</i>
Bac Odette	53,209.2 DH
Supermarket purchase	168,800 DH
Total	222,009.2 DH

Table 6 – Cost Savings for Each Solution

<i>Solution</i>	<i>Saving</i>
Storage Surface (a monthly gain)	22,516.56DH
Packaging	141,491DH
Handling equipment (a monthly gain)	2,860DH
Packaging	141,491DH
Storage Cost	200,313DH

6 CONCLUSION

This paper provides a specific and practical application of Lean Manufacturing following the DMAIC approach, this concept that is generally linked to six sigma applications. Despite the different application frameworks of Lean, the proposal to implement a lean project following the DMAIC model offered some advantages that were not available in comparison with others, such as the structuring of the application steps and especially at the analytical phase, which allowed the correct analysis of the problems and the best choice of tools to apply.

In each phase of the DMAIC cycle a large number of Lean tools were used like kaizen, Gemba walking, Heijunka, Kanban, Mizusumashi, Visual Management and spaghetti diagram which allowed:

- A reduction in turnaround time with 21%
- A reduction of 90% in WIPs
- A gain of 28.43 m² of storage space
- A reduction in forklift load by 13%
- An Increase in the installations' safety level by eliminating stock pillars and reducing forklift traffic
- The Kanban, Heijunka and the Mizusumashi train have streamlined the flow in the workshop, contributed to the inventory reduction and the human and industrial capacity optimization

These solutions have generated a gain of 39,5013 DH (gain in packaging and storage cost), which largely covers the investment of 22,2009.2 DH (Supermarket and Bac Odette), as well as benefiting from a monthly gain of 27,937.36 DH/month.

After this implementation of Lean Manufacturing, the company planned to computerize the Kanban information, this solution will allow better real-time production visualization and this change will allow the main customer RENAULT to follow the production of its articles in real time as well as its orders.

To conclude, the most recognized framework in the literature for the Lean implementation is following the 5 principles especially that this framework focuses on the value in each step, but the particularity and the advantage of the DMAIC concept is the project structuring which allowed all team members to observe and follow the implementation progress.

For the research perspectives, a quantitative study is envisaged to unveil the Lean implementation mode in the Moroccan industry and specifically the automotive industry as well as the barriers and obstacles to the success of the lean project. In addition, a quantitative study will be conducted to verify the link between the

implementation of Lean and the social and environmental dimensions in the Moroccan industry.

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Innovation by Increasing Ideality – A New Method for Overcoming Process Related Problems

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ABSTRACT

Purpose: In production, problems that are difficult to solve could occur. When a classic problem-solving toolset is not enough, a company must accept not fully satisfying solutions or secondary problems. This paper proposes a new method called Innovation by Increasing Ideality (3I), which helps to resolve difficult problems in production.

Methodology/Approach: Based on a previous literature review a new method was designed. The method leads the solver by a set of steps that lead to a well-described problem, with many ideas or ways, where the solver should search for a satisfying solution. The method is based on TRIZ principles, but it is user-friendly even for users who are not TRIZ specialists but have only basic knowledge of TRIZ principles and its tools. The method is demonstrated in a case study, where a problem with the transportation of parts is successfully solved.

Findings: Newly proposed method, compared with the traditional way of resolving a problem, got a much better solution in a shorter time.

Research Limitation/Implication: Only one example of use. There is a need for more applications in future.

Originality/Value of paper: The paper describes a new method for overcoming difficult problems in production. The method uses TRIZ principles to innovate the process where the problem is. The presented method can serve as a new powerful tool for industrial engineers in practice.

Category: Conceptual paper

Keywords: 3I; problem-solving; process innovation; innovation method; TRIZ

1 INTRODUCTION

Problems related to production or production logistic occurring every day. There are many tools and methods how to deal with most kinds of problems. Generally, a lean thinking toolset can resolve a majority of problems in production.

Sometimes a more difficult problem appears, and no satisfying solution for this problem can be found using the classic toolset of industrial engineering. Partial solutions could lead to secondary problems, new costs, or the problem can occur again. There could be cases when the problem is somehow specific, and it can be solved by using specialised tools or methods. Examples can be seen in many studies. An analytical approach (Meister et al., 2019) is used for resolving problems in complex systems with a significant amount of data. The problem with detecting a special kind of defects could be resolved by using an optimised fuzzy C-mean clustering method. That is shown in the identification of defects on leather surfaces (Mohammed, Kumar and Prasad, 2020). Many authors are proposing a special software as a problem-solving tool. Enhancement of the problem-solving process in a production plant using a knowledge-based multi-agent software solution is shown in (Camarillo, Rios and Althoff, 2018). A digital twin as a method for resolving a problem with leather cutting process optimisation is described by Horvathova, Lacko and Hajduová (2019). Machine scheduling problems can be resolved by a multi-objective scheduling approach (Shahzad, Gulzar and Shahzad, 2020). Artificial intelligence and neural networks could help to resolve complex problems. That can be seen in using the artificial neural network to identify factors for industrial productivity (Gutiérrez-Ruiz et al., 2020). Another approach is in Horvat et al. (2020), where communication while solving the problem is improved. Burch, Burch and Batchelor (2019) describe a positive effect to creative problem-solving in groups. The search for that specialised tool can be time-consuming, and there is no certainty that a specialised method was already designed for a specific problem. That is why a generally applicable method for resolving difficult problems in production is needed.

To find a satisfying solution to a majority of difficult problems, the process where the problem is should be innovated. The question is how to approach to effective but easy way to innovate the process or its part. Wu, Lin and Yu (2019) enhanced the innovation of services by customer involvement. An innovative problem-solving approach can also be managed by innovation or ideation contests (Campos-Blázquez, Morcillo and Rubio-Andrada, 2020; Menon, Mishra and Ye, 2020). Another way to pursuit innovation could be a patent analysis (Choi, Lee and Sawng, 2019; Lee, Lee and Lin, 2019). One of the most powerful innovation approaches is the use of systematic creativity represented by TRIZ – the Theory of Inventive Problem Solving (Altshuller, 2000; Anosike and Lim, 2014; Caligiana et al., 2017; Harlim and Belski, 2015; Jin, San and Li, 2008; Li, Li and Yang, 2011; Lin et al., 2016; Maia, Alves and Leão, 2015; Navas, 2017; Song and Sakao, 2017). The problem is that TRIZ is complex and challenging to learn (Averboukh, 2003; Azlan, Ariz and Yusof, 2014; Birdi, Leach and

Magadley, 2012; Brad, 2010; Haines-Gadd, 2015; Ilevbare, Probert and Phaal, 2013; Nakagawa, 2011). That is why there is a low probability that the tools of TRIZ will become a part of industrial engineering's toolset. There is a need for a new method for resolving difficult problems in production. Powerful as TRIZ, but easy to use by industrial engineers in practice.

This paper aims to develop a new method based on the TRIZ principles for overcoming problems in production processes. The method is also demonstrated on the real problem with the transportation of heat exchangers in production logistics.

1.1 Problem-Solving in Production by TRIZ

The Theory of Inventive Problem Solving, known as TRIZ, is a set of tools and methods for overcoming challenging problems. Many authors already published studies aiming at the use of TRIZ for problem-solving in production processes or processes related to production. Swee et al. (2017) try to improve the quality of production by applying TRIZ tools. Lin et al. (2016) used TRIZ tools to optimise a coffee roasting process. The integration of TRIZ methods into an approach for process and product innovation is described by Li et al. (2017). Livotov et al. (2018) use TRIZ with process intensification. Alves, Sousa and Navas (2020) describing the possible integration of Lean thinking tools with TRIZ ideas. Morgado, Sandiães and Navas (2019) use a contradiction matrix together with SMED and 5S to improve management activities. Russo and Spreafico (2020) describe a guideline for using TRIZ for problem-solving in the way of eco-innovation. Sojka and Lepšík (2020a) reviewing the implementation of TRIZ, or TRIZ with other methods for process improvement. Results are that there is a need for a method that is easier to use because TRIZ is hard to use by engineers in companies who are not TRIZ experts. There is a possible way how to approach efforts to use the TRIZ to enhance the production processes, a new standalone method based on TRIZ principles (Sojka and Lepšík, 2020b).

Even that, many authors described the use of TRIZ for problem-solving. TRIZ is still hard and slow to learn. For engineers in companies, TRIZ training is a long-term goal, so they prefer to learn classic tools that are faster and easier to learn and can provide good solutions for most problems in production. To reach more frequent use of TRIZ a more straightforward approach is needed. The first thing could be a clear guide on how to describe problems and solve them using basic principles of TRIZ, even if the solver has only a few experiences with TRIZ.

2 METHODOLOGY

2.1 Development of the New Method

The new method is mainly based on the ideality principle of TRIZ. The level of the ideality of the technical system is described by equation (1) below (Anosike

and Lim, 2014; Domb, 2007; 1997; Slocum, Lundberg and Walter, 2003; Soderlin, 2003):

$$Ideality = \frac{\sum benefits}{\sum harms + \sum costs} . \quad (1)$$

Benefits, from the ideality equation (1), represent a sum of positive functions and their effects on the system, harms represent negative functions and their effects on the system, and costs represent costs of the system and costs for innovation. The main idea is that by resolving the problem, the system, in this case, the production process, should be more ideal.

The method for resolving difficult problems in production should use the TRIZ principles in order to be powerful, and at the same time, it should be easy to use and learn. That is why only some TRIZ tools were used, and the application of the method guides the solver. Each step has a clear question or instruction to answer. The method is based on a set of questions, leading to a deeper understanding of the physical principles of the problem, and it allows the solver to look at problems from a different perspective. That allows to use of TRIZ basic tools more easily, and it should provide a satisfying solution to the problem.

2.2 Innovation by Increasing Ideality (3I)

The 3I method for overcoming problems is not focusing on the problem itself but innovating activities where the problem occurs. The method's main goal is to innovate the process and increase its degree of ideality in the way of overcoming the problem. However, the problem is not resolved but overcome by increasing the ideality of the process. The steps of the method are: the description of the problem, the purpose of the process step where the problem occurs, the principle of the process, the ideal state of the process, questions how to achieve the ideal state, inspiration in scientific effect and trends, overcoming contradictions, use of other TRIZ tools, list of ideas and searching for final solution based on the list of ideas.

The first thing is to determine what the problem is and where the problem occurs. That should be the easy part. This step aims to describe and know that there is a problem in production that occurs in a specific step or steps. The next step is to describe the purpose of the activity, where the problem occurs. The answer to the question "What is the purpose of this activity?" describes the goal of the process step. That helps the solver to understand what is needed to achieve. After that, a question about the principle of activities is set. The principle on which a current state of activity is based. "What is a principle of the activity, where the problem occurs." The answer should be a simple description of a physical principle used to achieve the purpose of the activity. These questions and their answers give the solver a clear description of what is needed and how it is made now. After determining these initial answers, more TRIZ based questions can continue with

the description and solution of the problem. The crucial question is, “What is the ideal state of this activity?”. By answering this, the solver should try to find an ideal state on how to achieve the purpose of the activity. To describe the ideal state, words as “self” and “itself” are used. The ideal state gives a way in which the solver should try to find a new solution for improving the activity to prevent current problems. After the ideal state is described, there can be seen what is between the current state and the ideal one. In other words, what we should do, or should not do, to achieve an ideal state. It is almost impossible to achieve the ideal state, so there should be an effort to be as close as possible to this ideal state. In order to get closer to the ideal state, an ideality question should be made. This question says what is needed to eliminate to achieve a more ideal system. It is based on the trimming activities from TRIZ. When the ideal state is described and the ideality questions give way to what to do, searching for solutions can begin.

Inspiration is the first step of a search for solutions. The catalogue, or database, of scientific effects is used for searching for existing innovative solutions to a similar problem. Evolution trends of TRIZ can also provide a way for innovation of the process’ activity. Finally, research in technologies and other fields can provide other innovative solutions that were discovered before. Previous steps help the solver understand the problem and process’ step, so it is easier to use inspiration tools to find a satisfying solution. The ideality question is also a good start to determine contradiction. When the ideality question is set, a technical contradiction can be described. The technical contradiction can be solved by the use of a contradiction matrix or other TRIZ tools. Alternatively, the problem can be intensified, and physical contradiction can be determined and resolved. Resolving technical or physical contradictions should bring a powerful solution to the process innovation. Contradiction matrix, inventive principles, separation principles, or substance field analysis could be used for that. For more solutions, other TRIZ tools can be used. For example: 9 windows, RCA, Little Men Method, etc.

All ideas and possible solutions are collected and should be written into a list of solutions. This list is the output from the 3I method. For the final solution, the inspiration step can be done again. After solutions are found, there is a need to compare them with the real world. Sometimes a very good solution cannot be easily applied to the real process because there is another problem linked to it, and the solver could miss it during the solution process. In that case, a new problem can be solved again using TRIZ tools or a different solution (less ideal one) from the list of solutions that can be chosen. The main steps of the 3I method are shown in Figure 1 below.

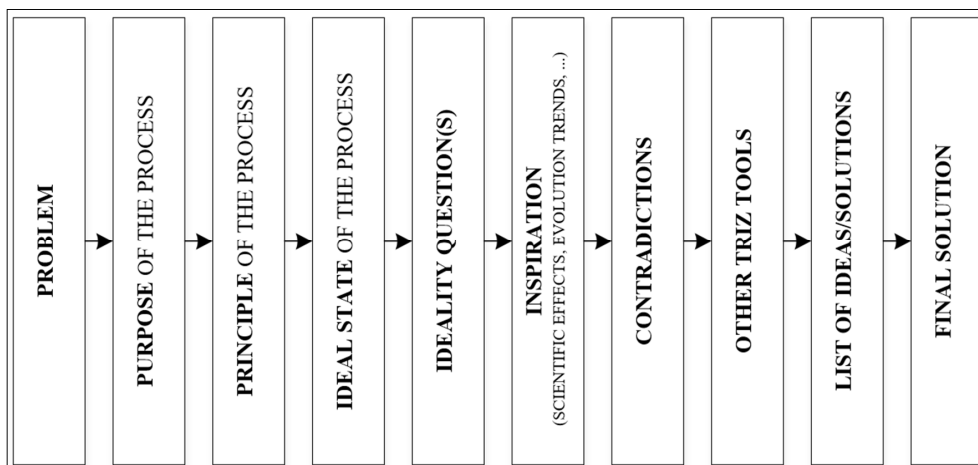


Figure 1 – Main Steps of Innovation by Increasing Ideality Method (3I)

3 RESULTS

A case study was made to show how the Innovation by Increasing Ideality method for overcoming problems in production processes works. The application of this method was made in a company in the Czech Republic, which produces custom heat exchanger units. The case study was made on a problem with the transportation of parts from storage to processing line in a different building. The overall process is about the assembly of heat exchanger modules.

3.1 A Case Study – Problem with Transportation

The problem occurs while exchangers should be transported from storage to the assembly line. It is a custom production, so there is often a need only for few pieces of exchangers. Nowadays, exchangers are stored on pallets. The whole palette is transported to the assembly line, where workers open the palette and use a crane to take the demanded number of exchangers. After that palette is closed again, and the rest of the exchangers are transported back to the storage.

The problem is that there are fewer exchangers inside of the palette and can be damaged by themselves because the route between storage and production line is not flat; this should be solved. In many cases, it is solved by connecting exchangers together. However, sometimes only one or two exchangers are left, so even if they are connected, they have weak stability and can be damaged during transportation. Pallets with exchangers can be seen in the Figure 2 below.

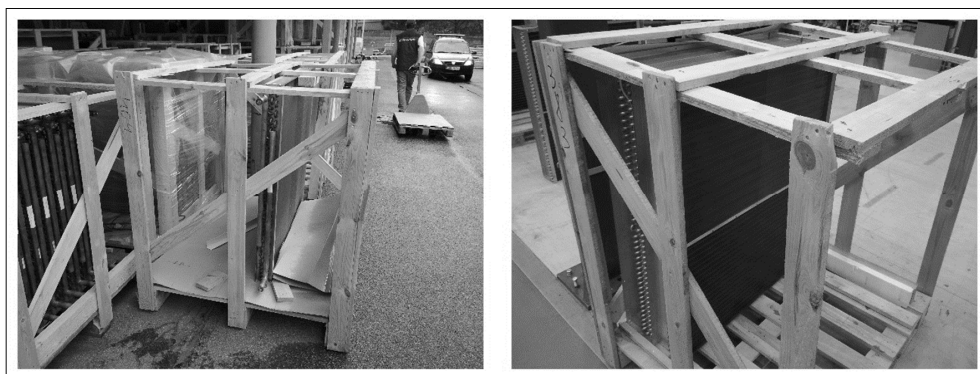


Figure 2 – Pallets with Last Exchangers, in Storage and Near the Processing Line

An even bigger problem is the transport itself from storage to line and back several times. Also, there is quite a lot of time for opening and closing pallets by the line workers. The productivity of the line is decreasing with each opening and closing of the pallet. From these reopening–reclosing procedures, there is dirt on the workplace, causing other related additional works and problems. The idea is to transport only the demanded number of exchanges from storage to the assembly line. The problem is to find a suitable solution on how to do it. Exchangers are big and heavy, so they cannot be lifted by hand, and there is no crane in storage. Storage is in a different building than the assembly line, and the route between is not flat and is full of obstacles. And because it is not a crucial problem, the company's management does not want to spend a big amount of cost on the solution. Some examples of previously proposed solutions and their negative effects can be seen in the Table 1 below.

Table 1 – Previous Solutions and Their Harms

<i>Previous solution</i>	<i>Negative effects</i>
Fixation of parts inside of pallet on the way back (rope, support, stoppers, ...)	There is still transport back, a place for storing, extra work
Transport via "A" pallets	Transport back, if more than two exchangers left - more pallets are needed
Open pallets in storage	No crane in storage
Use of "T" constructions	Impossible (exchangers without frame)
Transport via small wheels	Storing place, hard handling, no crane in the storage
Store rest exchangers by line	No room for storage near the line

Although many attempts to solve this problem were made, and many proposed solutions were tried. Every time another negative effect related to the solution appeared.

3.2 Case Study – Use of the 3I Method to Overcome the Problem

On the problem situation described above, the 3I method for resolving difficult problems described in chapter 2.2. was used.

Firstly, a problem must be clearly described. The problem is that exchangers (parts) are damaged during transportation. When a problem was studied deeper, it came up that only exchangers which are transported back to storage and then again to the line are damaged because of weak stability inside of palettes. The real problem is that there is a need to transport parts (exchangers) back to storage. The second step of the method is to describe the purpose of the process where the problem occurs. The purpose is clearly to deliver exchangers (parts) to the assembly line. The principle of how the purpose is currently achieved can be described as the transportation of parts on palettes. There are residual parts that must be transported back to storage. There can be seen that problem occurring because of the principle of the activity. After purpose and principle are known, the ideal state can be described. More than one description of the ideal state can be proposed. The ideal state is when the exact number of parts (exchangers) is safely delivered to the assembly line. Or the exact number of parts appears near to the assembly line. The third formulation can be, there is no need to transport parts/or transport them back. Ideality questions can be described as “How can be parts transported in needed number, and without damage?” or “How to have parts near to assembly line without the need for transporting them?”.

The use of scientific effects can be helpful at this moment. There is known what should be achieved. A purpose and principle are also known. Direction to the ideal state is clearer by finding several good inventive principles. To get closer to the information about possible answers to these questions the technical contradiction should be determined and resolved using inventive principles and the matrix to resolve technical contradictions. Several technical contradictions can be determined. Found principles are shown in the Table 2. The next step can be a determination of a physical contradiction. The main problem with all solutions is that there is a need for a crane for manipulation with one part in storage, but there is no money and space for purchasing a big crane for the storage building. Physical contradiction, in this case, can be formulated: there is a need for a crane to manipulate with parts in the storage, and on the other way, there should not be a crane because there is no money for that. Physical contradictions can be solved by separation in time, space, or principle.

By eliminating the crane from the system, a solution appears. Storage and assembly line should be placed together. In that case, there is no need for transportation. And parts can be taken one by one exactly by production demands. Unfortunately, there is no space and finance to manage the re-layout of the production plant. Another solution must be found. Some cheaper solution must be found. Separation in time – a crane is only needed when one part is handled. Separation in place – a crane, should be in storage, and after that, near to the assembly line.

The whole process step by step is summarised in the Table 2 below.

Table 2 – Guided Problem Description Step by Step

Problem	<ul style="list-style-type: none"> • Parts are damaged during transport. • There is a need for transporting parts back.
Purpose	<ul style="list-style-type: none"> • To deliver parts to the line.
Principle	<ul style="list-style-type: none"> • Transport on pallets.
Ideal state	<ul style="list-style-type: none"> • Exact number of parts safely delivered to line. • There is no need for transport/transport back.
Ideality questions	<ul style="list-style-type: none"> • How can parts be transported in exact number? • How to get parts by the line without transport?
Technical contradiction	<ul style="list-style-type: none"> • 15. Dynamics, 2. Taking out, 17. Another dimension, 40. Composite materials, 18. Mechanical vibration, 3. Local quality, 28. Mechanics substitution, 32. Colour changes, 35. Parameter changes, 30. Flexible shells and thin films, 34. Discarding and recovering, 2. Taking out
Physical contradiction	<ul style="list-style-type: none"> • There is a need for a crane, in order to manipulate with individual parts, and there is a need to do not have the crane, in order to do not spend much money. (Separate in time, space, principle)
List of ideas	<ul style="list-style-type: none"> • Only one part at once should be transported (or demanded number) • Dynamic solution • Use of another dimension • Use of vibrations • Use of gravity and other fields • Use of thin protective layers • Use of an object to transport which disappears • It has to be cheap • Re-layout (storage and line together) • Crane is used when is manipulating with part (storage, line)

If these conclusions and previous conclusions from technical contradictions are put together, a solution to the problem can appear. It should transport only one part, dynamically, cheap, it uses a different dimension, the part is safe during the transport, it has something like crane during the handling in storage and near the assembly line.

Movable workshop cranes can be used. They are cheap, and they can lift exchangers easily in storage, parts are safe during the transport (they are surrounded by air), it uses another dimension – parts are hanging. An example of this crane is shown in the Figure 4 below.

It can be seen that a simple solution for the difficult problem can be found quite easily by the use of TRIZ principles. There were many tries to find a satisfying solution to this problem, and many employees tried to solve it using well-known tools of lean thinking or common sense. These tools were not enough. A more robust method was needed to find a suitable solution, which is the workshop crane. Probably there can be found another satisfying solution, maybe an even

better one. With the presented method, it is possible to find a satisfying solution by industrial engineers in practice, not only by innovation and TRIZ experts.



Figure 4 – Workshop Crane for the Safe Transport of Exchangers

4 DISCUSSION

When attempts to overcome a problem, from the case study presented above, are compared, a clear advantage of using TRIZ based approach appears. See a Table 3 below.

Table 3 – Comparison of Results from Classic Approach and Application of 3I

<i>Comparing parameter</i>	<i>Classic approach</i>	<i>3I</i>
Number of attempts	More than six attempts	Only one attempt
Time for searching the solution	Years to search for a good solution	Days/weeks to apply the method
Outcome	No satisfying solution found	Satisfying solution found

Previously many attempts during several years were tried, and no satisfying solution was found. The 3I method was used, and on the first attempt, a good solution to a problem was found. When a difficult problem occurs, the 3I method could help to overcome it faster. Deciding what a difficult problem is and what is not can be tricky. However, the method can also be used for easy problems or only after several false attempts. One can say the TRIZ itself can be used, and maybe even better results can be achieved. TRIZ is hard to learn and very hard to use for non-experienced users (Averboukh, 2003; Birdi, Leach and Magadley, 2012; Haines-Gadd, 2015; Ilevbare, Probert and Phaal, 2013; Nakagawa, 2011). The method of Innovation by Increasing Ideality (3I) leads the solver through the process of idea generation and use of TRIZ tools, so even with only basic knowledge of TRIZ's principles, quite good results could be achieved. This initial study was made only on one case study. That is why more applications of the 3I method are needed to verify its functionality.

Many authors discuss problem-solving or process improvement by innovations. There are failures during the innovation attempts, which are caused mainly due to the lack of core competencies (Sawng, Shin and Kim, 2019). A model of innovative activity of industrial enterprises for managing innovative enterprise development is introduced by Gonchar, Cherep and Cherep (2019). Ouedraogo, Ouakouak and Salem (2020) discussed creative problem-solving and an approach for leading employees and managing innovation. A study presented by Zhu (2020) on how technological innovation is related to the age of employees points to focus on innovation education. The 3I method fits into these findings. It helps to resolve problems by the innovation of the process. The 3I method also helps to learn how to use TRIZ and systematic creativity way of thinking.

The following steps should lead to applying the 3I method to many different problems to get data about the real functionality of this proposed method. We believe that this method has the potential to be used not only for resolving problems but also for process innovation in general. For that purpose, some modifications to the method will probably follow.

5 CONCLUSION

As it was presented in the case study, TRIZ can help with the solution of difficult problems. When there is a guideline for describing a problem and how to proceed while resolving the problem, or innovation of the process step, even not TRIZ expertised solver can come up with a satisfying solution. If the time needed to resolve the problem is compared, the proposed 3I method is much faster than guessing and trying to resolve the problem in a traditional way. The use of the 3I method for description and overcoming difficult problems in production was shown in a case study from a real company. The solution to the problem with the transportation of heat exchangers between storage and production line was proposed to use workshop cranes. This application was here demonstrated only in one example. That is why more case studies and applications are needed to have strong proof, and this method works universally and well.

Results showed that this new method could help companies to overcome found problems in a shorter time and with higher efficiency. Because this new method is based on TRIZ techniques, better, more ideal solutions should be found. In the same way, the method is designed to be used by TRIZ beginners, there are no requirements for deep TRIZ knowledge, and still good and satisfying results could be found. The method should be applicable not only for problem-solving purposes but for process improvement in general.

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CONFLICTS OF INTEREST

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Effective TQM Implementation in the Service Industry: A Proposed Framework

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ABSTRACT

Purpose: This paper aims to explore the framework, practices, and implementation of total quality management (TQM) in the service industry.

Methodology/Approach: The present study focuses on the existing literature on several TQM dimensions and developed a framework that would allow the service industry to efficiently apply TQM, resulting in enhanced organizational performance.

Findings: The research findings suggest that the relevance and implementation of TQM practices have a strong linkage to organizational performance. Managers shall work for the accomplishments of TQM to achieve success in local and global competition. By implementing TQM practices effectively in the service industry, managers can see improvements in the organization's function. Therefore, managers shall accept the TQM approach to improve overall service quality and organizational performance.

Research Limitation/implication: The study is limited to secondary data collection and no primary research is carried out to verify the proposed framework.

Originality/Value of paper: The present study contributes to the literature on TQM by developing a framework for the service industry. This adds to the existing knowledge on TQM in the service industry and builds a foundation to carry out future research. The proposed TQM framework will empower the organizations for superior performance by evaluating the factors, defining rooms for improvement, and designing ways to achieve business excellence.

Category: General review

Keywords: total quality management; service quality; profitability; customer satisfaction; business sustainability

1 INTRODUCTION

Service Quality (SQ) implications are increasing in industry irrespective of the product or service industry. It is due to its relevance and is a significant factor in the customer's choice of service. Firms have begun to understand SQ's consumer experience and how well it can be connected to service elements to fulfil the expectations of consumers (Ansari, Farooqui and Gattoufi, 2018). This boosts business in the form of repeat buying, customer loyalty, customer retention and "positive word of mouth" (Ansari, 2020). According to Kumar and Sharma (2017b), in the competitive league, organizations would like to succeed in their improvement process; thus, to concentrate on making their product quality and service levels better than others to attract customers.

The quality management or Total Quality Management (TQM) movement has several leaders, publishing ground-breaking works that have contributed to this field. Leaders or researchers like Juran (2000) indicated that TQM leads to sustainability in long term and having strong economic performance. TQM delights internal and external customers by fulfilling and exceeding their expectations continuously. It involves everyone in the organization for gaining continuous improvement. TQM is management philosophies that empower every member of the organization, persuade, and promote each employee to take part, contribute, and proposes a proposition for the overall improvement of the system to achieve continuous improvement (Lleo et al., 2020; Garcia-Alcaraz et al., 2021). TQM has a definite effect on the success of those organizations enforcing their practices and principles (Hassan et al., 2012). It believes in the principle of cost reduction and prevention. According to Bigliardi and Galati (2014), benefits of implementing TQM listed in most works include improved customer satisfaction, enhanced quality, efficient delivery of products and services, cost minimization, and advanced performance.

In the last couple of years, TQM has been widely discussed in the literature, which is a management philosophy. Most of the studies have been investigated mainly in manufacturing sectors. However, researchers have paid serious attention to service sectors as well in evaluating TQM. According to Antony et al. (2002) and Manville et al. (2012) Implementation of TQM in a service organization differs from the implementation of TQM in a manufacturing company due to the intangibility of the service provided and the quality measurement in the service organization. To help with the effective TQM implementation in the service industry, it is critical to determine the critical success factors of TQM within the service sector, which is the main aim of the current study. Based on the findings, a framework is presented for effective TQM critical practices application in the service Industry. The rest of the paper is organized as follows, where Section 2 covers the extensive literature review on TQM and its different aspects to improve organizational performance. Methodology used in the study is discussed in Section 3, whereas Section 4 presented the framework of TQM in the service industry. Finally, the conclusion

and study implications are presented in section 5 including the limitations and the future scope of the study.

2 LITERATURE REVIEW

2.1 An Overview of TQM

The concept of quality management has been acknowledged since ancient times in Japan, especially since the Second World War, in the late 1930s. After that, several manufacturing firms have concentrated on improving quality and using tools that explicitly strive to quality control in these firms (Talib, Rahman and Qureshi, 2010; Demirbag et al., 2006). Moreover, both the United States and the United Kingdom have recognized the concept of quality management specifically in manufacturing industries. Consequently, in various worldwide standards such as the ISO 9000, quality management was widely acknowledged and the concept of quality management was widely accepted (Sachdeva, Bhardwaj and Sharma, 2007).

In the mid-1980s, Edwards Deming, Kaoru Ishikawa, and Joseph Juran (Hackman and Wageman, 1995) introduced key concepts for Total Quality Management (TQM). Although it is known that TQM is not a clear-cut term (Hackman and Wageman, 1995), TQM is generally understood to enhance the quality of products and services as an integrated organizational tool. As Deming (1986) introduced, “TQM uses a particular set of principles, practices, and techniques to expand business and profits by avoiding reworks, rejections, waste, customer complaints, and high costs.” According to Goetsch and Davis (1995), TQM “is a business approach that aims to optimize an organization’s competitiveness by continually improving the quality of its goods, services, employees, processes, and environments”.

TQM is a philosophy of company-wide management to improve the quality of the products or services and the processes continually by concentrating on consumer expectations and needs to maximize firm’s performance and overall customer satisfaction (Sadikoglu and Olcay, 2014). It consists of several tools and methods of quality, as well as different principles and beliefs shared by all employees within the same organization (Lleo et al., 2020; Garcia-Alcaraz et al., 2021; Gharakhani et al., 2013). According to Lakhal, Pasin and Limam (2006), TQM can be described as a strategy for generating and transferring more effective and superior services by achieving cooperation among members of the organization.

TQM has been defined as a management philosophy as well as a mindset that has enabled many businesses to progress towards achieving excellence in businesses (Magd and Karyamsetty, 2020). TQM also enables the firms to develop a participation culture, quality-mindedness, teamwork, trust, zeal for continual development, continual learning, innovation, creativity, and, ultimately, a

working culture that pays to the success and sustainability of a firm (Yusof and Aspinwall, 2000).

TQM also includes all team members of the company in the process of meeting consumer needs by employing problem-solving methods to increase goods and services quality of the organization. The key objective of the TQM concept is to achieve a holistic alignment between organizational personnel and their roles to achieve better development, improvement, and protection of the standard of goods and services to attain consumer satisfaction (Talib, 2013). TQM philosophy concentrates specifically on enhancing the business quality and manager satisfaction by maximizing employee participation in decision-making activities using quality enhancement teams and quality circle approaches (Yusuf, Gunasekaran and Dan, 2007). It is a consumer-driven management discipline that intends to meet and exceed consumer standards by delivering goods or services that are defect-free the first time, on time, all the time. Though the primary aim is to appease external customers, TQM admits that it would be challenging to fulfil the expectations of external customers' without fulfilling the need of the internal customer. It thus aims to reach or surpass the needs of both internal and external clients (Mersha, 1997).

TQM is to integrate all the efforts towards the improvement of overall quality. It strives for overall improvements in the quality of the products and services to meet customers' contentment, which could lead to their loyalty and organizational performance. According to Gharakhani et al. (2013), TQM has been generally identified as a management technique for various services industries, which ultimately aims to improve organizational performance. Since TQM philosophy discusses the overall improvement of work, employees' participation, customer involvement for overall quality improvement. TQM philosophy focuses specifically on maximizing customer satisfaction through employee participation in decision-making activities using quality enhancement teams and quality circle approaches (Yusuf, Gunasekaran and Dan, 2007). All the business sectors are facing challenges from local and global competition due to the TQM implementation globally. At each of the TQM practices, several principles have been identified through the literature review that are outlined in Figure 1, which indicates that all the principles are interconnected with one another and contribute to TQM when integrated.

As shown in Figure 1, the framework of principles represents a polycentric structure that begins with customer attention and then extends with leadership, people involvement, process approach, system management approach, proof-based decision making, and finishes with relationship management. In this coherent network structure, all the above principles are very necessary for management performance (both individually and jointly) and achieve full efficiency and effectiveness when operating together that means acting in a harmonious, coordinated, and synergetic way (Luburic, 2015; Perović and Krivokapić, 2007).

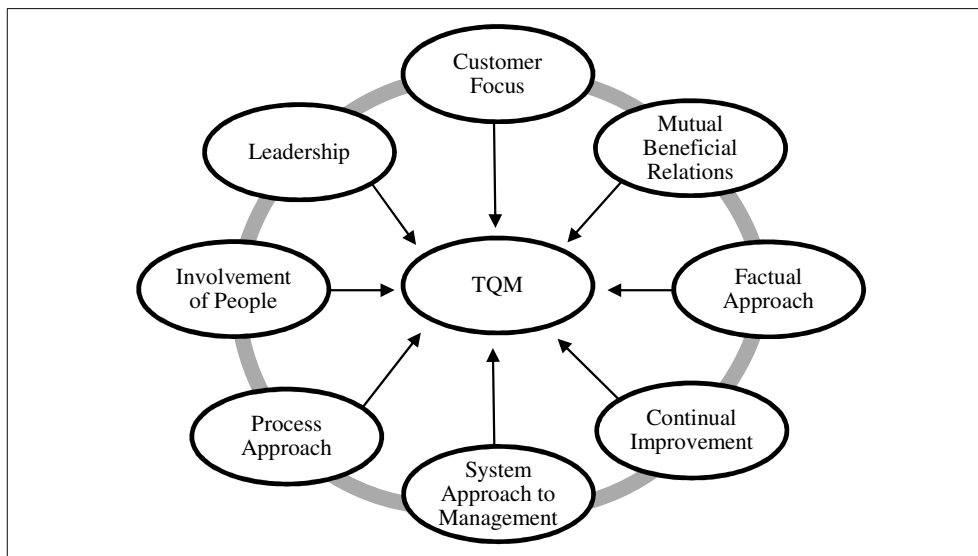


Figure 1 – Overview of the Eight Quality Management Principles

The concept of TQM is one of the modern management principles that has improved boost competitiveness among companies (Karamouz et al., 2020; Snyder, Eriksson and Raharjo, 2020). This has arisen from the degree of consumer knowledge that helps them to choose a high-quality product and service at a fair price. For all those reasons, most organizations' management encourages the adoption of a concept of TQM (Ho, 1994). As Reid and Sanders (2007) indicated: "TQM means collecting and exceeding customer expectations by involving a combined attempt on the part of each person in the firm." Demirbag et al. (2006) concluded that quality management is one of the extremely important aspects of any organization. There is a general agreement that TQM is a way to operate institutions to boost the overall effectiveness of the organizations. Kedar and Borikar (2016) says that "trying to describe TQM is like shooting a moving target". TQM has been described as a corporate culture driven by continuous improvement in improved customer satisfaction, with the active involvement of all personnel in the firm (Kumar and Sharma, 2017a). It highly focuses on business process management and customer satisfaction (Kumar et al., 2018). Doulatatabadi and Yousof (2014) concluded that TQM Concepts focus on four elements as illustrated in Table 1.

Table 1 –TQM Concept (Doulatatabadi and Yousof, 2015, In: Magd, 2015, p.41)

<i>Concepts</i>	<i>Total Quality Management</i>
Philosophy	“To combine people and quality techniques to achieve continuous improvement in the quality of the product and hence in all aspects of the operation.”
Principles	“Continual improvement, customer-focused, supplier relationships, people, involvement, leadership, and process approaches.”
Process	“Statistical Process Control (SPC), Plan, Do, Study, Act.”
Performance	“Organization’s continuous improvement, employee development, and customer satisfaction.”

Three fundamental aspects are integrated into the TQM approach: involvement, commitment, and continuous improvement. Manufacturing and service appreciate the commitment from top management, continual development, customer service and satisfaction, teamwork, employees’ training and development, customer’s feedback as part and parcel of TQM success factors. According to Kumar, Garg and Garg (2011), communication within the company is of the least importance for TQM in both the service and manufacturing industries. It addresses the issues of customer loyalty, customer satisfaction, service quality, repurchase, and profitability. Therefore, the support of senior management is necessary. At the same time, employee encouragement and involvement are vital elements of the TQM program, since employees must buy-in the TQM concept (Lleo et al., 2020; Garcia-Alcaraz et al., 2021).

The quest for improvement in TQM is an endless process. Thus, newer, and higher targets are set as the earlier goals are achieved. The core of TQM is to constantly search for gradual improvements. The continuous search for change includes the full engagement and involvement of all the organization’s stakeholders, including executives, staff, vendors, and customers. The buy-in by employees is especially important, without whose help the TQM initiative would be fruitless. Partnerships with suppliers must be forged, too. Collaboration among employees and departments is motivated at TQM through team effort, and quality management becomes the responsibility of all. In organizations with a well-established TQM culture, the role of the manager shifts from being an admin and regulator to that of mentor and benefactor (Merasha, 1997).

In any organization, whether its manufacturing or service, private or public, TQM’s basic principles apply everywhere. If properly planned and implemented, TQM can benefit private companies to achieve sustainability in national and foreign markets and allow nations to accomplish their goals for economic growth. Given that the adoption of TQM entails a significant shift in organizational culture and structure, the method of its application should be tailored to fit a case and depends on an objective evaluation of the internal and external environment in which a firm function (Merasha, 1997).

2.2 TQM Gurus Approaches

Several quality gurus came with TQM philosophy such as Crosby (1979), Ishikawa (1985), Deming (1986), Feigenbaum (1991), and Juran and Gryna (1993) and they had a distinct perception of TQM. According to Hackman and Wageman (1995), TQM core ideas were pioneered in the mid-1980s by Deming (1986), Ishikawa (1985), and Juran (2000), although known as TQM, but are not a clear-cut term.

Deming approach (1986) to TQM was thru the formation of an organizational system, which could foster cooperation and learning that could lead to continuous improvement in service delivery. TQM is a company-wide management philosophy to continually improve the quality of products/services/processes by focusing on the needs and desires of the customers to increase organizational performance and overall customer satisfaction (Sadikoglu and Olcay, 2014). Deming also pleaded that, because leadership matters, top management should take the lead in reforming processes and systems, and he came up with 14 TQM principles.

On the other hand, Juran and Gryna (1993) approach was in the view of TQM to delight customers, empower employees, and articulated for greater revenues and lesser costs and they understood that the major quality issues are from the management/executive side instead of the workers' side. According to Kumar et al. (2017), emphasis on educating and raising knowledge of business activities and procedures takes workers to the organizations through leadership, development, customer-centered, teamwork, organizational sustainability, and improved decision-making capacity. Juran (2000) emphasizes quality circle and self-managing units, which can encourage the quality enhancement, bridging the communications gap between employees and management, and better harmonization among employees. According to Juran (2000), it is very crucial to recognize customer requirements, and understanding of future expectation to ensure the product meets customers' requirements.

Crosby (1979) identified principles and practices of quality management such as management participation, employee recognition, education, prevention, and failure costs for excellence or zero defects. Crosby stresses (1979) upon the management style, change the thinking, and accept mistakes and defects. He also suggested a 14-stage program that can guide companies in following quality improvement practices. According to Curkovic et al. (2000), there is a strong association among the implementation of quality management practices and the improvement of firm's performance.

Ishikawa (1985) pleaded for quality management should widen its scope beyond the product and service and appealed that the firm's success is completely reliant on considering quality development and continuous improvement as a never-ending process and supported that employee engagement and participation is significant to the fruitful accomplishment of TQM. According to Sadikoglu and Zehir (2010) influences of employees' performance ultimately benefits the

performance of the entire organization. Ishikawa (1985) believed that quality circle is important for achieving TQM and highlighted the significance of education, saying that quality management starts and culminates with it. Tools such as cause and effect diagram, pareto charts, histogram, check sheets, scatter diagram, and stratification chart have been associated with Ishikawa (1985).

Feigenbaum (1991) described TQM as an effective approach for integrating efforts to achieve customer satisfaction in terms of quality development, quality maintenance, and quality improvement. Four key steps were suggested by Feigenbaum (1991), such as setting quality standards; evaluating conformance with these standards; intervening when standards are not met; and aiming to strengthen those standards. There is a strong correlation between the adoption of quality management practices and the improvement of organizational performance, according to Gupta (2000).

The TQM methodologies of five quality management gurus were examined, and it became clear that each had its own individual approach. However, irrespective of their approaches, the principles and practices of all the gurus supported TQM understanding. It is believed that these principles may apply to any sector to improve performance and can be summarized as follows:

- It is management's responsibility to deliver leadership, encouragement, and empowerment;
- The company should have strategy and policy;
- Employee education and training to be given high priority;
- Employees to be rewarded for their efforts;
- Quality improvement process to be given high importance and
- Quality circle should be implemented across the industry.

2.3 TQM: An Organizational Performance and Sustainability

According to Juran Institute, TQM is the collection of management processes creating responsible top management, pleased clients, motivated staff, and superior quality products at low-cost. This directs to sustainability in the long run and strong economic performance (Juran, 2000). Organizations have started understanding in recent years that TQM is the way forward towards ensuring long-term sustainability and overall performance of companies (Mushtaq and Peng, 2020; Karamouz, Ahmadi Kahnali and Ghafournia, 2020). Organizations are required to devise and execute plans within a global context in a dynamic world (Magd and Karyamsetty, 2020; Zakuan et al., 2012). Nowadays, many companies use quality as a strategic tool. Enhanced quality contributes to improved productivity and profitability, which enhances the competitive market position of the company (Mersha, 1997). In the competitive league, organizations would like to succeed in their process of improvement; thus, to attract customers,

they emphasize on manufacturing and offering better quality products and service better than others (Kumar and Sharma, 2017b). Besides, Kumar et al. (2017), emphasized educating and raising knowledge of business activities and procedures, takes workers to the organizations through leadership, development, customer-centered, teamwork, organizational sustainability, and improved decision-making capacity.

TQM is widely adopted and successfully introduced for both small and large businesses, giving them the edge for global and local competition by providing high-quality products to meet customer needs (Karamouz, Ahmadi Kahnali and Ghafournia, 2020; Snyder, Eriksson and Raharjo, 2020). According to Quazi and Padibjo (1998), TQM's efforts in the U.S. and Japan underlined TQM's increasing importance and profitability effects. Lakhal, Pasin and Limam (2006) conclude that companies with current TQM systems significantly met investment return standards in the industry.

Interest in TQM practices has been significantly improved over the last two decades and is deemed a valuable area for many research scholars (Arumugam, Ooi and Fong, 2008; Yusof and Aspinwall, 1999). Gharakhani et al. (2013) indicated that TQM has been generally recognized as a management technique for various services industries, which ultimately aims to improve organizational performance. TQM is seen as a systematic combination of various models, practices, communication processes and people to meet each consumer requirements (Van Ho, 2011). In line with rising demands for high-quality goods and services, companies have recognized the value of implementing TQM practices to manufacturing processes to produce high-quality products and minimize costs. TQM is known as a strategy that considers consumers as the key concern, aimed specifically at providing high-quality products and services by constantly enhancing manufacturing processes (Magd and Karyamsetty, 2020).

Despite these qualities, corporate culture, policy, leadership, and structure often perform an important role in meeting the organization's TQM needs. Zu, Robbins and Fredendall (2010) clarified that it acknowledges an effective organizational culture for the positive adoption of TQM. The culture of a company is one of the crucial factors in the success or failure of a company (Zgodavova, Hudec and Palfy, 2017; Zu, Robbins and Fredendall, 2010). House et al. (2004) stressed the company's culture in its hard and soft elements, which has prompted a revolutionary change in TQM emphasis. The 'hard' factors concentrate on methods, strategies, and systems, while the attitudes and community, etc. seem to be more visible to 'soft' facets of TQM. It is also evident that the TQM implementation concerning relevant cultural aspects is the standard and efficacy for the firms to achieve better results and outputs. Effectiveness will enhance the value of decision-making and strategic planning. In the practice of improving quality and increasing product value to improve the profitability of companies, leaders play a crucial role (Kumar et al., 2018).

The measurement of success at all managerial approaches is considered an integral feature. The two key organizational performance indicators that have a direct impact on TQM activities are cost and quality. Brun (2011) and Sadikoglu and Zehir (2010) both consented that the application of numerous TQM practices like process management, training, customer management etc. influences the performance of employees that ultimately benefits the entire organization's performance. Gharakhani et al. (2013) also suggested that TQM substantially influences the organizational performance, especially its financial performance.

Implementing TQM has been an essential factor in enhancing the performance of an organization. The relationship among TQM and organizational performance has been studied by numerous scholars (Ali and Khatoon, 2016). These researches showed that there is a beneficial association among the successful application of TQM and the performance of an organization in which, if one company implements TQM practices effectively, its organizational performance will be significantly improved (Prajogo, Power and Sohal, 2004), its operating expenses will be reduced, and its productivity will be increased (Lam, 1995). Most past researches indicated that total TQM practices and approaches have been positively resulted to various key success areas such as performance and productivity, innovation performance, customer satisfaction, employees' satisfaction, quality performance, competitive edge, customer base, financial results, and overall performance of the firm (Sadikoglu and Olcay, 2014), as shown in Table 2.

Table 2 – Impact of TQM on Organizational Performance

TQM practices impact on organizational performance	<i>Performance Areas</i>	<i>Source</i>
	Operational performance	Sadikoglu and Zehir (2010); Tari and Claver (2008); Saravanan and Rao (2007); Demirbag et al. (2006);
	Inventory management performance	Sadikoglu and Zehir (2010);
	Employee performance	Al-Saffara and Obeidat (2020); Sadikoglu and Zehir (2010); Fuentes, Montes and Fernandez (2006); Mohrman et al. (1995);
	Innovation performance	Siregar et al. (2019); Honarpour, Jusoh and Nor (2018); Sadikoglu and Zehir (2010); Prajogo and Hong (2008); Santos-Vijande and Alvarez-Gonzalez (2007);
	Customer results	Sadikoglu and Zehir (2010); Fuentes, Montes and Fernandez (2006); Das et al. (2000); Choi and Eboch (1998); Mann and Kehoe (1994);
	Market and financial performance	Sadikoglu and Zehir (2010); Fuentes, Montes and Fernandez (2006); Agus and Sagir (2001); Escrig, Bou and Roca (2001); Easton and Jarrell (1998); Mann and Kehoe (1994);
	Aggregate firm performance	Sadikoglu and Zehir (2010); Sharma (2006); Kaynak (2003); Merino-Diaz de Cerio (2003); Brah, Tee and Rao (2002); Douglas and Judge (2001); Choi and Eboch (1998); Hendricks and Singhal (1996).

Sampaio, Saraiva and Guimaraes Rodrigues (2009) observed that most research attempting to connect the impact of quality management principles and practices on organizational performance concluded that a clear link exists between adopting quality management practices and enhancing organizational performance (Magd and Karyamsetty, 2020; Quazi and Jacobs, 2004; Tari and Sabater, 2004; Dick, Gallimore and Brown, 2002; Ozgur, Meek and Toker, 2002; Tari and Molina, 2002; Curkovic et al., 2000; Gupta, 2000; Romano, 2000; Terziovski and Samson, 1999; Adam et al., 1997; Mann and Kehoe, 1994; and Maani, 1989). Accordingly, empirical studies indicate that TQM has a positive effect on the success of those organizations enforcing their principles and practices (e.g., Hassan et al., 2012; Taddese and Osada, 2010; and Prajogo and Hong, 2008). Some of the validated benefits of implementing TQM listed in most works include better customer satisfaction, cost minimization, advanced performance, quality enhancement, and efficient delivery of goods and services (Bigliardi and Galati 2014; Prajogo and Hong 2008; Kumar and Boyle 2001; Kiella and Golhar 1997). Figure 2 demonstrates the consequence of implementing TQM on the organization's performance and business sustainability.

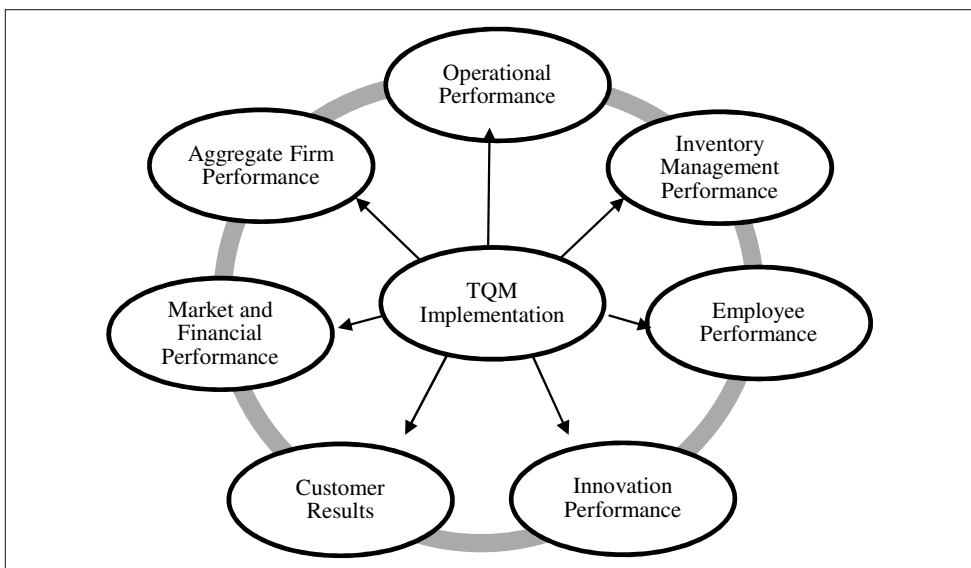


Figure 2 – TQM Implementation Impact on Organization's Performance and Business Sustainability

3 METHODOLOGY

The present study is focused on identifying the critical success factors and developing a framework for effective TQM critical practices implementation in the service industry. An extensive review of the literature was carried out using the available literature on TQM to highlight the importance of TQM and discuss

the factors related to TQM that enables the organizations to enhance the performance and achieve success in this competitive world.

The study is based on analyzing the available literature or the current body of knowledge to develop a framework. The literature review is carried out under different themes to create a theoretical base for the framework. The main papers on TQM were defined for the first phase, containing the keywords of “quality management”, “TQM in manufacturing”, “TQM in the service sector”, “critical success factor for TQM”, “TQM and organizational performance”, and “TQM and organizational sustainability” in the academic databases including Scopus and Web of Science in particular. The main aim of the review was to compile studies in the field of quality management that addressed TQM success factors for improving organizational performance and sustainability, resulting in overall success. The factors that are highlighted in the framework were identified through the literature review and are very essential to TQM that enables the organization’s performance and business sustainability. In this way, a final framework is presented that would act as a comprehensive guide for future researchers and business practices.

Secondary literature was gathered from various research papers, articles, and case studies in peer-reviewed journals; reports; industry white papers, and conference proceedings. The author referred to the journals related to quality management published by well-known publishers including Elsevier, Emerald, Wiley, Springer, Taylor & Francis, Sage, Inderscience, etc.

The authors have referred to various highly reputed international journals for this study. Some of them are The TQM Journal, Total Quality Management and Business Excellence, International Journal of Quality & Reliability Management, Quality Management Journal, Benchmarking: An International Journal, International Journal of Production Research, International Journal of Operations and Production Management, Journal of Operations Management, International Journal of Production Economics, Decision Sciences, Journal of Manufacturing Technology and Management, International Journal of Productivity and Performance Management, Academy of Management Journal, Industrial Management & Data Systems, Organizational Dynamics, and Management Science.

4 DISCUSSION AND FRAMEWORK

This section covers the discussion on TQM implementation in the service industry, the critical success factors of TQM in service industry. Finally, a framework for effective implementation of TQM in service industry is proposed.

4.1 TQM Implementation in the Service Industry

Quality Gurus such as Crosby (1979), Ishikawa (1985), Deming (1986), Feigenbaum (1991), and Juran and Gryna (1993) came with a different

perception of TQM, which could be key success factors for TQM. As per Hackman and Wageman (1995), TQM core ideas were pioneered in the mid-1980s by Juran (2000), Deming (1986), and Ishikawa (1985), which could be the best way to achieve total quality. Match and mix of these models can be done to get a blended solution for the service industry. It would depend on the respective industry, its size, regions, market competition, and so on.

To develop such a model for the service industry would have to identify and measure the critical success factors, such as market analysis, strengths and weaknesses, opportunity and threats, financial and non-financial issues that could be influencing the effective TQM implementation. The service sector shall determine to quantify its current quality level, maturity level, and what it would like to achieve in the short and long term (Brint and Fry, 2019). Accordingly, service sectors work-out based on their vision, mission, goals, and strategic planning. According to Van Ho (2011), TQM is seen as a systematic combination of various models, practices, people, and communication processes to meet all consumer requirements. It also needs to identify and evaluate basic needed quality, barriers for improvement, and how to overcome such a barrier for the achievement of TQM. The application of TQM in the service industry results in a higher level of service and greater customer satisfaction (Pakurar et al., 2019).

Based on various quality models as proposed by Quality gurus, service organization shall select, manage, and adapt to the model that fits best. TQM can be described as a strategy for generating and transmitting more effective and greater services by attaining teamwork among the employees of the firm (Lakhal, Pasin and Limam, 2006). To gain eventual success service organizations should attain to achieve their goals and objective with high priority. The excellence of achieving TQM should be based on the service processes and should be easily implemented. The critical factors for consideration are company size, area of business, location, market competition, and their strengths and weaknesses. For both small and large companies, to have an edge over the competitors on the global and local markets, delivering high-quality services is must to meet consumer needs (James and James, 2020; Brint and Fry, 2019 and Zgodavova, Hudec and Palfy, 2017).

The service sector is one of the world's most significant industries, particularly in developing nations (Schneider et al., 2003). In non-manufacturing organizations, TQM has an important role to play; competing more effectively has become an overwhelming concern in the interdependent global economy for virtually all organizations today (Mohanty and Behera, 1996). In the earlier days of TQM's evolution, the sole attention was to apply all of the research and principles in the manufacturing industry. There was not much definition of the quality factors for the service sector at that time. As the competition increased demand for quality of service, then the need for TQM implementation in the service sector was realized (Juneja, Ahmad and Kumar, 2011). At that time, it was the biggest question: "Will TQM concepts apply to service industries?". Corporations like

American Express eventually started conceptualizing and implementing TQM to the service industry in the late 1980s (Kumar, Garg and Garg, 2011).

The American Marketing Association defines services as activities, advantages or satisfactions that are presented for sale or in relation with the sale of goods. “Services are economic activities offered by one party to another: often time-based, performance leads to desired results on receipts, objects, or other assertions for which the buyer is responsible. Service customers expect value from access to goods, labour, professional skills, facilities, networks, and systems, in return for money, time, and effort; but they typically do not take ownership of any of the physical elements involved” (Lovelock, 2007). Service organizations provide a broad range of facilities, such as public utilities; public information offices; hospitals; educational institutions; police and fire departments; travel and tourism agencies; banks and insurance firms; restaurants; hotels; and transport companies. These corporations often communicate directly with enormous numbers of clients. These customers must identify and resolve the various, varying needs and contrasting priorities. As society becomes educationally advanced and more progressive, the demands of society for service quality are increasing (Ansari, 2020; Mohanty and Behera, 1996).

The competition, as well as the increase in the share of the service sector, led to a need for TQM practice in service industries (Talib and Rahman, 2010). And today we are experiencing a significant amount of service firms using strategic steps to introduce TQM (Mohanty and Behera, 1996). Effectively implementing TQM in service organizations includes an appreciation of the specific features of service operations; customer’s and service provider’s role; and implementation of suitable quality assurance principles and techniques. It is unsafe to accept that the methodology used within a manufacturing organization to implement TQM can be directly modelled in the service organizations (Mohanty and Behera, 1996). The initiation and TQM implementation into a service sector is a crucial task according to the authors. It needs a detailed analysis of consumer prospects, analysis of the present system, quality standards, procedure and activities, development of measurement and control systems, and integration of this structure into the business.

Several of the main points outlined by Mohanty and Behera (1996) in terms of quality service are as follows:

- Quality of service is not interchangeable with customer service, while customer relationships and customer service are component of the service quality;
- Manufacturing centered models and techniques for managing quality can be more complicated than assistance unless a good knowledge of the specific nature of the service industry is used to re-emphasize the model and choose a suitable collection or series of techniques;

- Organizational product-positioned culture requires to be shifted to a customer-positioned culture;
- Noteworthy changes can arise if the “Quality Message” is used effectively in education and training.

Mefford (1993) suggested a “total service quality” strategy for better quality and enhancement of service sector companies. Key aspects of this approach include a conceptual foundation, organizational engagement, empowerment of workers, process alignment, emphasis on continual improvement, and feedback loops.

Lakhe and Mohanty (1994) outlined a quality management application framework for enhancing the inner quality of service operations as (a) determining the field of quality management focus (b) defining the service process or operation (c) evaluating the existing system/framework (d) developing an “excellence model”, (e) identifying the crucial improvement areas (f) developing process control systems (g) integrating process control in management control (h) development of a quality improvement process.

4.1.1 Steps for Implementing TQM in a Service Industry

The following steps are outlined in Juneja, Ahmad and Kumar (2011) and Mohanty and Behera (1996) for the implementation of TQM in a service sector:

- *Step 1. Develop a strategy for service quality:* Accomplishing complete quality of service needs a well-defined goal, flexibility, and discipline. Top management must start with the initiative to create, spread, and execute a quality improvement program. The Chief Executive needs to ensure a quality presence that is strong, highly evident, and widespread. His/her ongoing participation can be conveyed through different means, like encouragement, inspiration, guidance, and direct intervention;
- *Step 2. Analyze the service process and define the quality measures:* The mechanism by which service functions work must be well established and its quality dimensions should be defined for successful enforcement and review. In a service system, the quality dimensions are defined as cost dimension, time dimension, psychological dimension, and error dimension. Organizations must review their current policies, documentation, and monitoring processes and develop new effective measures that require input from customer’s feedback while determining quality measures;
- *Step 3. Build process control system:* The establishment of process controls is important for constant management of the service process. To this end, reviewing the current process is important to define core performance areas, gather data, and establish a trial management system. The emphasis must be on recognizing what needs to be assessed and tracked to provide consumer satisfaction;

- *Step 4. Investigate the process to find improvement opportunities:* This phase aims to determine internal process issues that affect customer service and cost and examine the process improvement opportunities;
- *Step 5. Improve process quality:* The participation phase aims to reach a new level of process performance and sustain that level. It includes frequent analysis with all staff regarding the quality enhancement prospects and success in quality management. Lastly, it can be said that the service sector cannot survive without the appropriate quality of service and the quality of service can only be accomplished by applying TQM's principles in the service sector (Fatemi, Wei and Moayerifard, 2016; Zakuan et al., 2012; Juneja, Ahmad and Kumar, 2011).

4.2 Comparative Analysis of TQM Implementation in the Service and Manufacturing Industry

Firstly, the authors have reviewed the practices/critical success factors of implementation of TQM based on quality awards (see Figure 3) in the reflection of the belief that these critical success factors are applicable across all the sectors and specifically to manufacturing. It is claimed that the critical success factors may differ since the intangibility of the service provided and the quality measurement in the service organization (Manville et al. 2012; Antony et al. 2002). Quality managers in manufacturing organizations can quantify the product's quality or the supplier's quality, but in a service organization, the quality of the services is very hard to measure (Talib, 2013). Juneja, Ahmad and Kumar (2011) stated that TQM practices in service organizations are not the same as manufacturing organizations. They are distinct in operation, process, customer relationship, and product qualities. The manufacturing industry focuses on the processes and quality of the goods, while the service industry pays further emphasis on customer support and acceptance (Sureshchandar, Rajendran and Anantharaman, 2001).

By looking closely at figure 3 in identifying the most common critical factors for effective TQM implementation identified by the quality awards are "Leadership; Strategy and Policy Planning; Information and Analysis; People Management; Process Management; Customer Management Satisfaction; Business Results; Performance and Management of Suppliers/Partners; Impact on Society; Resources Management".



Figure 3 – Critical Success Factors Based on Quality Awards (Magd, 2015)

The Malcolm Baldrige National Quality Award (MBNQA) from the United States, first given in 1989, and the European Foundation for Quality Management (EFQM) Excellence Award, first given in 1992, have been widely acknowledged as the most influential business excellence model (Carvalho et al., 2019; Bandyopadhyay and Leonard, 2016; Zgodavova, Hudec and Palfy, 2017; Talwar, 2011).

The latest version of MBQNA's Baldrige Excellence Framework (2019-2020) includes the world-renowned criteria for performance excellence, core values and concepts, and guidelines for evaluating organizational processes and results for service organization specially business/nonprofit, healthcare, and education industries. The model includes seven critical aspects for performance excellence that are leadership, strategy, customers, knowledge management, workforce, operations, and results (ASQ, 2019).

Similarly, the EFQM model is also periodically updated to respond to the global and business environment dynamics and trends. The latest version of this model is EFQM 2020, which includes total of seven criteria and the RADAR (Result, Approach, Deploy, Assess, and Refine) assessment tool, and encompasses three separate dimensions: direction (why), execution (how), and results (what) (Fonseca, Amaral and Oliveira, 2021; Nenadal, 2020). The seven factors for performance in the updated model are purpose, vision & strategy; organisational culture & leadership; engaging stakeholders; creating sustainable value; driving performance & transformation; stakeholder perceptions; strategic & operational performance. The EFQM 2020 model is based on the Sustainable Development Goals (SDGs) of the United Nations and European business ethical standards (Fonseca, Amaral and Oliveira, 2021).

In addition, TQM common critical success factors based on twenty six empirical research as highlighted in the study of Magd (2015) are "Top management commitment & Leadership; strategic planning; customer focus and satisfaction; quality culture, quality information and performance measurement; benchmarking; human resource management & development; training; employee empowerment and involvement; employee satisfaction; process management; resource management; business results; product and service design; supplier management; continuous improvement; and communication".

Based on the available literature, top management & leadership commitment, customer satisfaction, human resource empowerment and training, teamwork, innovation and continuous improvement, information analysis & management, effective communication, process management, employee involvement & recognition, quality systems, benchmarking, and strategic quality planning are the main success factor for TQM implementation in service industry. Table 3 presents the key success factors in the service industry for TQM implementation. These factors are discovered by the authors from the past studies.

Table 3 – Key Success Factors for TQM Implementation in the Service Industry

<i>Success Factors</i>	<i>Source</i>
Leadership & Top Management Commitment	Hussain (2020); Fatemi, Wei and Moayeryfard (2016); Moghadam et al. (2013); Kumar, Garg and Garg (2011); Ali Noor, Mahat and Zairi (2010); Fotopoulos and Psomas (2009); Sit et al. (2009); Al-Marri et al. (2007); Brah, Tee and Rao (2002); Woon (2000);
Customer Focus & Satisfaction	Fatemi, Wei and Moayeryfard (2016); Moghadam et al. (2013); Talib, Rahman and Qureshi (2012); Brun (2011); Kumar, Garg and Garg (2011); Yee-Loong Chong (2011); Ali Noor, Mahat and Zairi (2010); Fotopoulos and Psomas (2009); Sit et al. (2009); Al-Marri et al. (2007); Prajogo and McDermott (2005); Brah, Tee and Rao (2002); Woon (2000);
Human Resource Training and Empowerment	Hussain (2020); Fatemi, Wei and Moayeryfar (2016); Moghadam et al. (2013); Talib, Rahman and Qureshi (2012); Brun (2011); Kumar, Garg and Garg (2011); Yee-Loong Chong (2011); Ali Noor, Mahat and Zairi (2010); Fotopoulos and Psomas (2009); Sit et al. (2009); Ueno (2008); Al-Marri et al. (2007); Prajogo and McDermott (2005); Brah, Tee and Rao (2002); Woon (2000);
Employee Involvement & Recognition	Al-Saffara and Obeidat (2020); Fatemi, Wei and Moayeryfard (2016); Yee-Loong Chong (2011); Ali Noor, Mahat and Zairi (2010); Fotopoulos and Psomas (2009); Sit et al. (2009); Ueno (2008); Al-Marri et al. (2007); Prajogo and McDermott (2005);
Information Analysis & Management	Moghadam et al. (2013); Ali Noor, Mahat and Zairi (2010); Fotopoulos and Psomas (2009); Al-Marri et al. (2007); Prajogo and McDermott (2005); Brah, Tee and Rao (2002);
Process Management	Hussain (2020); Moghadam et al. (2013); Brun (2011); Fotopoulos and Psomas (2009); Sit et al. (2009); Al-Marri et al. (2007); Woon (2000);
Quality Systems	Fatemi, Wei and Moayeryfard (2016); Talib, Rahman and Qureshi (2013); Al-Marri et al. (2007); Woon (2000);
Teamwork	Talib, Rahman and Qureshi (2013); Brun (2011); Kumar, Garg and Garg (2011); Ueno (2008);
Benchmarking	Talib, Rahman and Qureshi (2013); Ali Noor, Mahat and Zairi (2010);
Continuous Improvement & Innovation	Hussain (2020); Siregar et al. (2019); Honarpour, Jusoh and Nor (2017); Misra (2014); Talib Rahman and Qureshi (2012); Kumar, Garg and Garg (2011); Ali Noor, Mahat and Zairi (2010); Fotopoulos and Psomas (2009); Al-Marri et al. (2007);
Effective Communication	Brun (2011); Kumar, Garg and Garg (2011); Ueno (2008); Al-Marri et al. (2007); Brah, Tee and Rao (2002);
Strategic Quality Planning	Fatemi, Wei and Moayeryfard (2016); Fotopoulos and Psomas (2009); Al-Marri et al. (2007); Woon (2000).

Kumar, Garg and Garg (2011) observed that both sectors (manufacturing and service) appreciate the commitment from top management, continual development, customer service and satisfaction, teamwork, training of employees, and customer's feedback as to success factors of TQM. But, when it comes to the TQM application in the manufacturing industry, customer satisfaction, continuous improvement, and teamwork are the most important factors for TQM. Whereas in the service organization the most critical factors for TQM are customer satisfaction, teamwork, and continuous improvement. The

study also revealed that communication within the company is of the least importance for TQM in both the service and manufacturing industries. Nevertheless, the analysis of the literature found that communication and information sharing are very necessary for successful and efficient operations within the entire organization. Better communication within and outside the organization may reduce both internal and external customer-related misunderstandings and uncertainty about their requirements. Top management is accountable for communicating and explaining the goals and policies related to quality to their employees. Besides, the involvement of top management and leadership in the quality management process can inspire personnel to perform a dynamic part in quality-related activities Kumar, Garg and Garg (2011).

It can be inferred that the crucial success factors of TQM implementation in service organizations are completely distinct from the success factors in the implementation of TQM among industrial organizations. The most significant success factors for implementation of TQM in a service organization are leadership or top management commitment, employee participation, quality culture, employee training and development, and customer satisfaction.

4.3 Framework for Effective TQM in the Service Industry

This section discusses the framework for TQM in the service industry. TQM becomes key in today's world where all the companies are trying to satisfy the customers and maximizing profits. In this competitive world, every company is highly emphasized on minimizing their cost and providing better services to the customers. Therefore, to improve business performance especially in the service industry, the focus must be on TQM application as it is one of the crucial factors that play a major role in enhancing organizational success. Considering this, a TQM framework is proposed that will enhance the overall business performance of the service industry.

The preliminary conceptual framework of TQM was developed and accomplished based on concepts and key issues recognized through the review of literature and researchers' knowledge and understanding. The framework was developed based on TQM understanding and by forming a baseline for TQM implementation in the service industry. It was observed throughout literature that the key factors for TQM deployment are top management commitment, leadership, policy and strategy, and strategic planning, which would emphasis on process management, customer satisfaction, and continuous improvement.

The framework as shown in Figure 4 illustrates that the factors that are important to implement TQM in the organizations are leadership & top management commitment; continuous improvement; supplier management; business results; product and service design; strategic planning; customer focus and satisfaction; quality information and performance measurement; process management; employee satisfaction; benchmarking; resource management; employee

empowerment and involvement; training; human resource management & development; and communication.

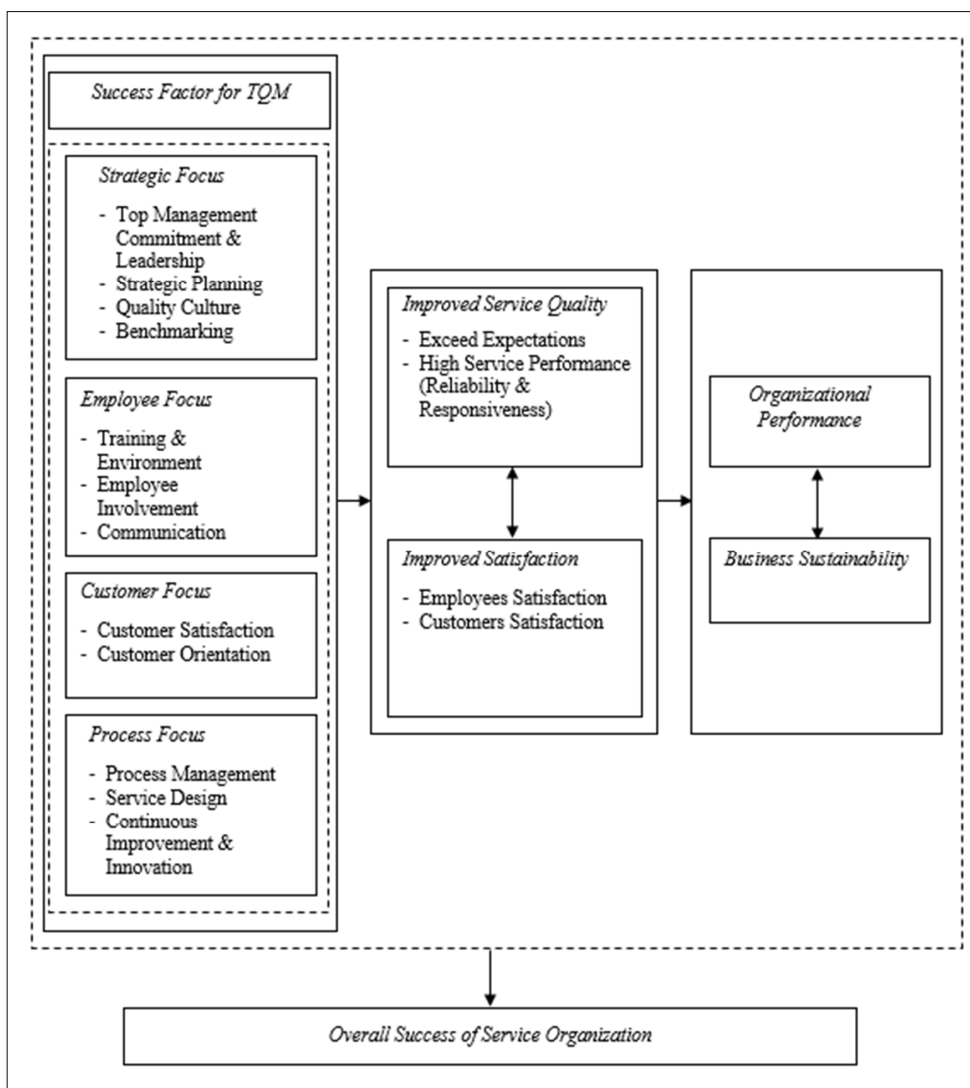


Figure 4 – Framework for Effective TQM in the Service Industry

Considering all these mentioned factors for implementing TQM will successfully lead to improved service quality and enhanced employee and customer satisfaction. Enhanced quality contributes to improved productivity and profitability, which enhances the competitive market position of the company. So, if the service quality will improve and the satisfaction level of employees, as well as customers, increases it will further lead to organizational improved performance and business sustainability. Further, this all will eventually lead to the overall success of the service organizations.

According to Kumar and Boyle (2001), the benefits of implementing TQM include improved customer satisfaction, enhancement in quality, efficient delivery of products and services, cost minimization, and advanced performance. Besides, the potential benefits can only be obtained by its effective implementation of TQM. As service system provides services directly to the customers through multiple contacts and each of these connections offers a prospect to provide excellent service through multiple transactions.

The system must be receptive and dependable enough to satisfy customer demand by making the services available on time, which is often considered as a key component of quality. The factors govern customer satisfaction that includes attributes such as speed, comfort, cleanliness, courtesy, and helpfulness of customer representatives. These factors offer mainly depend on customer expectations of service and each customer can have a different expectation. TQM means fulfilling and surpassing customer expectations by including a combined attempt on the part of each person in the firm (Reid and Sanders, 2007). At the same time, it is expected that employees are likely to avoid TQM implementation for bringing desired change. Therefore, employee involvement from the initial stage is mandatory to bring TQM related change in the organization.

Several studies in the past such as Brun (2011) and Sadikoglu and Zehir (2010) consented that the application of numerous TQM practices such as training, customer management, process management etc. influences the performance of employees, which then ultimately benefits the performance of the entire organization. Kumar et al. (2018) and Santos et al. (2015) also highlighted the crucial role of leaders in the process of quality enhancement and increasing product or service value to improve the organizations' profitability. The past studies also showed that there is a beneficial association between the successful implementation of TQM and organizational performance. Gharakhani et al. (2013) also suggested that TQM substantially influences the performance of an organization, specifically its financial performance.

5 CONCLUSION

In today's dynamic world, it is critical for businesses to focus on quality in their operations in order to meet the minimum requirements of customers on the one hand, while minimizing costs and maximizing profits on the other. By enhancing the quality of the services, customer satisfaction can be achieved that helps an organization to enhance profitability and business sustainability. Quality is not only important in the manufacturing sector but also in the service sector where customers are not attached to any tangible product. To sustain in this competitive and dynamic world, TQM is the only key for organizations to achieve overall success. Considering this growing concern in the service industry, the current study discusses the TQM practices and their critical success factors, followed by a proposed framework to achieve business excellence in the service industry. High commitment and engagement of the top management are one of the critical

requisites for implementing TQM in the service industry. The service industries are becoming more and more involved in adopting and implementing TQM for improving overall service quality, achieving desired results based on customer satisfaction, customer loyalty through the improvement of service delivery system, and finally gaining improved financial performance. It can be achieved by being competitive, effective, and becoming customers' choice of the service provider.

Research finding suggests that several factors are responsible for the success of TQM, such as employee motivation since employees are the major factors in the service delivery system. Employees must be trained and retrained for improved human capital. Qualified and competent employees will proactively contribute toward the implementation of TQM. It was also observed, and researchers suggested closely monitoring customer satisfaction, customer loyalty, which can be gauged through a frequent and continuous feedback system. Therefore, customer relationship management shall be given high priority for the successful implementation and achievement of TQM. Also, the commitment from executives is equally important for success as the implementation of TQM without the top management's support may fail the purpose of applying TQM in the service industry. In the context of the foregoing, it is to summarize that TQM is essential for service sectors and for obtaining precise results.

The present study contributes to the literature on TQM by developing a framework for the service industry. An extensive literature review was carried out to explore the various dimensions of TQM and detailed analysis was performed to showcase how it can be effectively implemented in the service industry. This adds to the existing knowledge on TQM in the service industry and build a foundation to carry out future research. The proposed TQM framework will empower the organizations for superior performance by evaluating the factors, defining rooms for improvement, and designing ways to achieve business excellence. The present study will also be highly useful for academicians and researchers who are working in the field of TQM in the service industry. The proposed framework would help them to understand every dimension for TQM implementation, allowing practitioners to implement various approaches in the service organization. It also provides insights on how managers can plan and adopt different approaches in their service processes to achieve better performance.

The developed framework will also enable the service organizations to implement TQM effectively in their organization to achieve high results and achieve overall success. This framework would also act as a comprehensive guide for future studies and business practices.

5.1 Limitations and Future Scope of the Study

The study is limited to secondary data collection and no primary research is carried out to verify the proposed framework, thus, this study offers several

future avenues for research. Future studies may be conducted empirically to verify the critical success factors for the service sector. A model can be developed for the service industry using this study and framework as a base. Also, the factors can be explored in an industry where goods and services are delivered simultaneously to customers and the final users.

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CONFLICTS OF INTEREST

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Determinants of Innovation Capability: An Exploratory Study of Inclusive Leadership and Work Engagement

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ABSTRACT

Purpose: The purpose of this paper is to explore how innovation capability can be enhanced by inclusive leadership. In particular, the focus is on identifying the key drivers of work engagement and the role of leadership in boosting the innovation capability.

Methodology/Approach: This research has a qualitative exploratory nature. The exploratory fieldwork is based on an in-depth interview with the CEO, field observations and on the analysis of relevant corporate sources.

Findings: The research provides further confirmation of the link between inclusive leadership, work engagement and innovation capability. Specifically, authentic communication and leadership traits such as trust, courage, humility, empathy and gratitude are considered to be among the most important enablers of an inclusive environment that leads to business success.

Research Limitation/Implication: This study contributes to a better understanding of how companies could enhance innovation capabilities by leveraging the power of inclusion. The subjective business evidence coming from only one company constitute the main limitations of the present study.

Originality/Value of paper: This paper contributed to leadership and innovation literature. The results of this work provide a thorough understanding of the mechanisms for improving work engagement and, consequently, innovation capability. By grounding our research in both theory and empirical evidence, we provide valuable insight for both academia and practice.

Category: Research paper

Keywords: innovation capability; inclusive leadership; work engagement; case study

1 INTRODUCTION

With the global acceptance of health measures against the spread of the coronavirus pandemic, two important factors have occurred that will have a significant impact on the business operations of companies in the future. The first is the global economic crisis, which has exposed all the weaknesses of existing business models, because the economy was not prepared for such challenges, there have been mass layoffs and the collapse of many companies. The second is a new geopolitical reality that will dictate further global economic relations and the way companies operate within them.

Indeed, the main driver of change in the next decade will be the business ecosystem (Lyman, Ref and Wright, 2018). This is an economic community supported by a foundation of shared organizations and individuals, i.e., organisms of business whose goal is to create a healthy, loose community of companies and organizations that can continuously evolve to survive rapid and disruptive market changes (Moore, 1993). In a world of increasingly specialized organizations, a single organization usually lacks the internal resources to develop and implement innovations. Therefore, organizations must rely on input from a variety of internal and external stakeholders to create value across the ecosystem (Talmar et al., 2020).

On the other hand, new digital technologies such as nanoelectronics, quantum computing, high-performance telecommunications networks and artificial intelligence pose an additional challenge. These herald the 5th Industrial Revolution and in themselves require the introduction of different and new ways of running modern organizations. In this context, the new approach envisages collaboration between people and technology, with the aim of mass customization of products and services to the user. This means that the employee will leave the manufacturing process to the machines and technologies, while he himself will be much more involved in the planning and design process. This increases the individual's field of activity, which consequently increases the employee's scope of work and responsibility (Doyle-Kent and Kopacek, 2020). Moreover, from the findings of the studies conducted earlier, it could be ascertained that leadership plays an important role in meeting the challenges of modern industrialization (Turisova et al., 2020).

Overall, the focus is on innovation, which is directly dependent on leadership and work engagement. In this regard, there are two challenges. The first relates to innovation, which is reflected in different perceptions of innovation by owners and managers on the one hand and employees on the other. Namely, owners and managers prioritize an innovative culture as something they want to spend the most time and resources on. This is not surprising as they see innovation as an opportunity to develop and create value. On the other hand, employees increasingly associate innovation with “danger” rather than “opportunity” (Zhexembayeva, 2020). They see them as an increased workload without results or even a threat of dismissal of employees if the innovation is realized.

The second challenge relates to employee work engagement, which remains low despite large financial investments. It is a modest 21% in the EU and 15% in Slovenia (Schaufeli, 2018). The main problem is that most initiatives to increase work engagement focus on short-term employee enthusiasm in terms of rewarding work performance. To improve results, a reward or benefit is given, but over time the effect wears off and results decline. To improve results, management introduces new benefits that fade and lose effectiveness after a period of time (Morgan, 2017).

While previous research has focused primarily on the relationship between innovation and transformational leadership, this research will examine the relationship between innovation and inclusive leadership. Recall that transformational leadership focuses on the leader's own quality to gain the respect of followers, which can increase their optimism in achieving goals (Eagly, Johannesen-Schmidt and Van Engen, 2003). On the other hand, inclusive leadership is an extension of *i.e.* relational leadership and understands the call for employees to contribute their own skills and respect for individual talents (Avery et al., 2008).

In addition, both the global economic crisis and digitalization bring to the fore the central question: how can employees be managed in such a way that individual systems deliver the best results and survive possible economic or societal shocks in the future without major shocks? Therefore, the aim of the research is to examine the role of the leader in nurturing employees and achieving innovativeness. In this regard, the aim of the research is to identify elements of inclusive leadership that have a significant impact on employee and organizational work engagement and innovativeness. The solutions obtained will help organizations that want to implement an inclusive leadership style to increase engagement and innovativeness.

This study is a contribution to the literature that provides insight into the study of the relationship between inclusive leadership and innovation and employee engagement. At the same time, it enables all interested companies and leaders in the local environment to calibrate their leadership methods in order to achieve greater innovation capability and thus efficiency in the global marketplace.

The paper is organized as follows. Section 2 presents the theoretical foundations and examples of each of the three conceptual mechanisms (*i.e.*, innovation capability, inclusive leadership, and work engagement). Sections 3 and 4 successively present our methodological approach and the derived results. Sections 5 and 6 discuss and conclude.

2 LITERATURE REVIEW

2.1 Innovation Capability

Innovation capability is defined as the ability to (1) develop new products that meet market needs; (2) use appropriate process technologies to produce these new products; (3) develop and adapt new products and processing technologies to meet future needs; (4) and respond to serendipitous technological activities and unexpected opportunities created by competitors (Adler and Shenhar, 1990).

In this sense, innovation capability is defined as “an important factor that enables innovative organizational culture, the characteristics of internal facilitating activities and the capabilities to understand and respond appropriately to the external environment” (Akman and Yilmaz, 2008). It should be emphasized that innovation capability is fundamentally a potential, that is, something that all companies have, regardless of whether they innovate occasionally or constantly (Som, Kirner and Jäger, 2015). Accordingly, innovation capability represents the potential for developing innovations.

It is therefore not surprising that innovation capability is referred to as a key means of achieving competitive advantage and sustainable success of an organization (Liao et al., 2017). Organizational innovation has various aspects depending on how it is viewed. It can be viewed in terms of organizational structure in terms of the degree of centralization and formalization that affects the flow of innovative ideas and how a company handles them from inception to implementation, how it assigns tasks to members, and how it makes decisions. From a process perspective as an approach to developing and implementing new ideas in relation to organizational processes as its learning capability. Organizational innovation can also be considered in terms of organizational change as the practices it uses to respond to market changes and overcome resistance to change (Prasad and Junni, 2016).

In this context, innovation capabilities have been classified by experts into different categories. Lawson and Samson (2001) in their study state that innovation capability consists of seven different elements, namely: vision, core competencies, organizational intelligence, creativity, idea management, organizational structures, culture and climate, and technology management. Terziovski (2007) suggests only two categories: Collaboration and Knowledge Transfer. Björkdahl and Börjesson (2012) mention that innovation capability is expressed as follows: Innovation strategy, prioritization, culture, idea management, external environment and linkages, implementation, decision making systems and rules, organizational context and learning systems and decision making rules, organizational context and learning.

The most common dimensions in which innovation capability occurs are: Knowledge management, organizational culture, organizational learning,

leadership, collaboration, creativity, idea management, and innovation strategy (Idris, 2016).

Scholars have found that organizations need to address various aspects of innovation capability to fully improve innovation (Agarwal and Selen, 2009; Anderson, Potočník and Zhou, 2014; Le and Lei, 2019). While most studies focus on examining innovation capability in general, this research will focus on examining individual and organizational innovation capability.

2.2 The Impact of Inclusive Leadership on Innovation Capability

Numerous scientific studies have shown that leadership has a positive influence on the ability of employees and the company to innovate. In this regard, the role of leadership (Aragón-Correa, García-Morales and Cordón-Pozo, 2007) is: (1) to motivate the company rather than control it; (2) to coordinate activities at lower, middle and top levels; (3) to encourage employees to try new ideas without fear of failure or consequences; (4) to encourage employee participation in innovation activities; (5) to create structures to support innovation activities.

Leaders need to focus on motivating and encouraging people to be more successful and aligning all employees with a vision and purpose (McMillan, 2010). Acceptable visions have three purposes: first, the vision clearly states the overall direction of change. Second, it motivates employees to take a step in the right direction, even if the steps are not easy and may even be painful. Third, the vision helps to coordinate the actions of a large number of people extremely quickly and efficiently (Kovač, Mühlbacher and Kodydek, 2012). Leaders inspire their followers, make them aware of the importance of the organizational mission and goals so that they can think creatively and act above expectations. Leaders recognize the contributions of followers and constantly encourage them to seek new ideas inside and outside the organization. At the same time, they promote organizational learning, which is considered one of the most important precursors of organizational innovation (Villaluz and Hechanova, 2018).

The role of managers is to set the goals of the innovation strategy and inform their employees about them, while justifying why they must be achieved. Leaders provide guidance, advise on organizational priorities, and create a supportive environment for implementing innovation initiatives. Leaders help individuals trust themselves, participate in the decision-making process, and set high goals for themselves. They constantly communicate sincerely with their employees and deepen their relationships, which increases job satisfaction, improves work engagement, and resolves conflict. Under such circumstances, followers are willing to accept challenging tasks if they know that their leaders will support them and provide the necessary help (Szczepańska-Woszczyńska, 2015).

To this end, various types of leadership are employed, of which transformational leadership has been the most common and well-studied for some time, while recently there has been an increase in research in the area of inclusive leadership. Nemphard and Edmondson (2006) were the first to point out the introduction of

inclusive leadership in management in terms of how managers communicate and behave to encourage their subordinates to work and create benefits. Involved leadership is described as a type of relational leadership where the manager is always available to their subordinates (Choi, Tran and Kang, 2017). The relationship of an inclusive leader is based on empathy, respect for all employees, their personalities and specific talents, based on an environment where each individual can express their ideas and suggestions without fear. Taking into account the diversity of the entities involved, the inclusive leader helps to build shared knowledge and create an organizational climate with a sense of belonging and flexibility to maximize individual and team innovation and consequently achieve competitive results. Based on the above arguments, the following research question is proposed:

RQ1.: How could managers increase the innovation capability of employees and the organization by encouraging employee engagement?

2.3 The Impact of Work Engagement on Innovation Capability

People demonstrate engagement when they physically engage in tasks, either alone or with others; they are cognitively alert, focused, and attentive; they are emotionally connected to their work and to others in the service of their work (Kahn, 1990). While work engagement is usually defined as “a positive, fulfilling, work-related state of mind characterized by vigor, dedication, and absorption” (Schaufeli et al., 2002). In this sense, engaged employees are active agents who believe in themselves and generate their own positive feedback. At the same time, they have values that are consistent with the organization, sometimes feel tired but satisfied, and are engaged outside of work.

Later, the concept of work engagement evolved from the study of the relationship between employees and their work to its association with human resources, work behavior, and psychology. In this regard, engagement consists of behavioral, emotional, and cognitive components whose common goal is realization in the form of energy, rational and emotional commitment, deep connection, positive attitude, and psychological presence (Rich, LePine and Crawford, 2010).

In realizing the above ideas or standards of work engagement, conditions and opportunities are created to think outside the box, discover individual potential in employees and cooperate with each other to innovate at the individual and organizational level. Thus, it is no longer just a question of how to enable employees to be engaged, but also how to motivate them to innovate (De Spiegelaere et al., 2015). Leaders of modern organizations are increasingly aware of the importance of organizational cultures characterized by adaptability, flexibility, and responsiveness (Denning, 2013). As a result, researchers are beginning to look beyond formal leadership styles, which have been predominantly associated with transformational leadership, and are instead exploring a range of more inclusive leadership styles (Caulfield and Senger, 2017). Therefore, in the current environment, it seems useful to try to understand

how engaged employees are, as collaboration is crucial in the field of innovation. (Alblooshi, Shamsuzzaman and Haridy, 2020). Following this line of reasoning, this study proposes the following research question:

RQ2.: What factors significantly influence work engagement and innovation capability?

3 METHODOLOGY

3.1 Empirical Method and Field Work

To answer the question raised, a qualitative exploratory study, a single case study, was designed (Yin, 2018). It was decided to use a qualitative study methodology as it is suitable for analyzing the complex process of determinants of innovativeness and allows for deeper perception and understanding of the subject under study (Eisenhardt, 1989; Yin, 2018). To ensure that the data collected reflect real experiences and not a priori judgments about the studied topic, only the most innovative firms (i.e., based on the list of companies outlined in Slovenian National Innovation Awards) were included in the sampling frame from which the present case was selected. The case company was purposefully selected to provide an appropriate research setting. We also restricted our sample frame according to the following criteria: Innovation award (C1 - national and international awards were considered); type of industry (C2 - manufacturing); age of the company (C3 - more than 10 years); research and development (R&D) activities (C4 - internal R&D activities); charismatic leadership (C5 – publicly available evidence). In view of the the above, Pipistrel d.o.o. was selected as one of the most innovative companies in European Union and companies that fit our selection criteria.

The fieldwork and investigation was developed over a period from summer 2014 to spring 2017 as part of a case study. The subject of the research is the highly innovative company Pipistrel d.o.o., which is a leader in its field and achieves excellent results in the global market. Anderson, Potočnik and Zhou (2014) state that the topic area of the relationship between strategic leadership and innovation is the most important, but so far rather neglected in empirical studies. Accordingly, the research is based on a 120-minute semi-structured interview conducted with the founder Ivo Boscarol for the needs of the book *From Talent to Success* (Vladić, 2017). In the research, we will additionally rely on the book written by the author of Ivo Boscarol, *NASA Blog* (Boscarol, 2011), which was written during the NASA Green Flight Challenge won by Pipistrel with the Taurus G4, the world's first four-seat electric aircraft. In addition, we will also use other literature and documentation available on the World Wide Web. Therefore, following Barratt, Choi and Li (2011), semi-structured interviews, archival sources (e.g., documents, websites, interviews, articles, books, etc.), and filed observations were used for the purpose of data collection (Table 1).

Table 1 – Summary of a Data Collection Approach

<i>Company</i>	<i>Period of data collection and investigation</i>	<i>Semi-structured in-depth interviews</i>	<i>Archival sources</i>	<i>Observation</i>
Pipistrel d.o.o. Aviation & aerospace company based in Slovenia Year of establishment: 1989	2014-2017	In-depth interview with the founder and Chief Executive Officer (CEO)	Internal company documents and presentations provided by senior management Official reports Official websites	Field research

3.2 Research Environment

Pipistrel d.o.o. is a world leader in the ultralight aircraft industry and in the field of electric aircraft development. It continuously receives many prestigious international recognitions and awards, which speaks for its innovation, sales performance and wide recognition. To get an insight into the uniqueness of the company, let's take a look at some key milestones. In 2010, Pipistrel won the European Business Award for the most innovative company in Europe in a competition of 15,000 companies. In 2015, they won the tender in a competition of 11 bidders and signed a contract with Indian Army for the delivery of approximately 200 Virus SW aircraft for a total value of €20 million. In 2018, an electric taxi with vertical take-off and landing was unveiled at the Uber conference in Los Angeles. Pipistrel is currently a world leader in the development of electric propulsion and a true pioneer of usable carbon-free aviation for both commercial and passenger transport.

4 QUALITATIVE RESEARCH RESULTS

Right at the beginning of the conversation, Ivo Boscarol emphasizes the importance of the individual value system, consistently setting success as a paradigm that has positive qualities and noble intentions:

“There is only a fine line between success and greed. Success must be our main goal in life, we must take pride in it and trust ourselves because of it. Aiming high is important. Trust is one of the values that is very important in business and in life. If you have confidence in your people and the courage to trust yourself, you can sell sand in the Sahara.” (CEO, Pipistrel)

Personal values occupy a central place in the system of inclusive leadership, as they are the basis of all actions in advance and collaboration with stakeholders, partners and employees. The leader's personal values create and shape the organizational climate, interpersonal relationships, work engagement, and the individual's ability to innovate. To emphasize the importance of personal values

in business and life, and a clear shift away from the type of success that has negative consequences, he continues:

“It is greed that produces a life beyond circumstances and means, to bury values, that is the problem. In fact, we blur the need between what is wanted and what is needed. Capital has re-educated us so much today that we buy 65 percent of the things we don’t need. Those 65 percent of things are what make us unhappy [...]. Money is so important to me, that I have a regular salary and that I know we can work normally. And that I have as much as I need for double jeans and gas; I don’t need more.” (CEO, Pipistrel)

In consequence, this means that the inclusive leader is willing to invest two of his or her most important resources, energy and time, in the given development of the inclusive business environment and the related organizational climate. In doing so, the leader clearly demonstrates to his or her employees that he or she is not merely delegating work, but is directly involved in creating a healthy climate and seeks to reach out to each employee. In turn, employees recognize that this is an honest and committed person who will consequently choose to believe, follow, and internalize the vision of such a leader. This is supported by the event of the 10th day of NASA Green Flight Challenge in the US, which the founder and owner of Pipistrel writes about:

“Yesterday, the usually frugal Gregor (note: Dr. Gregor Veble, research director at Pipistrel) came up to me and said, ‘You know, I have to thank you for making it possible for me to experience what I am experiencing now. I never thought I could be a part of a story like this. Thank you’. [...]. That is the biggest thank you an employer can get from their employee.” (Boscarol, 2011, p.91)

On the other hand, a healthy organizational climate centered on employees means the expression of views, ideas and criticisms in relation to all activities that are part of the business system. An interesting note in terms of confirming this relates to the event after which Ivo Boscarol made a proposal to NASA’s Chief Technical Officer to give universities, institutes and industry 3 years to improve competition and offer them \$5 million:

“The idea belongs to Tine (note: Tine Tomažič, development engineer) anyway. When we revealed it to our team, Jure (note: Dr. Jure Tomažič, senior electrical engineer) got angry: ‘It’s easy for Tine, he fades something out, and then we all have to work like crazy because he has a long tongue!’ This is very true, but without hard work there are no results, no satisfaction, no success. We know that already. Everyone. But because of ideas and hard work, we are all living our craziest dreams here now!” (Boscarol, 2011, p.91)

The inclusive leader wants to create a climate in which every employee can express his own opinion. He is aware that the work environment is composed of people whose characters, prior experiences, and worldviews differ from one another. Therefore, the leader’s goal is to involve employees in such a way that

they can express their own personalities and at the same time feel like an indispensable part of the team, as Pipistrel's CEO points out:

"There are many people who think differently, you just must not restrict them. You can't put obstacles in their way. If I told my developers what to do every day, we wouldn't get anywhere. The fact is that young people in particular have to have their own challenges, have to think for themselves. You give them a certain financial framework, you give them the experience you have, the strategy, the vision we're going to pursue, and you might give them the concept. Lately, my aircraft design is limited to a concept, I just say, 'This and that will sell in twenty years, and you do it. '" (CEO, Pipistrel)

Indeed, such teams grow professionally and personally, have high levels of work engagement, build their capability to innovate, and achieve excellent business results. The key components of the leader involved are empathy and gratitude, with which the leader shows employees that they are valuable and important in his eyes, while at the same time he spontaneously encourages them:

"A special thanks to all of you at Pipistrel who responsibly and conscientiously do your jobs while we spend the money you have created here. Without you, there would be no money for development, no aircraft to compete with (Taurus G4), and no money to stay in the US. Thank you to everyone from the workers in production, plastics, warehouse, logistics, quality control, support, administration, development [...]" (Boscarol, 2011, p.61)

An inclusive leadership style is based on respect for all stakeholders, so such a leader strives to listen to each employee and understand their needs as best as possible, as the Ivo Boscarol, CEO of Pipistrel pointed out in the interview (Bizovičar, 2017):

"We have always shared all cash prizes and profits with all employees, because everyone in the company deserves success [...]. Today, of course, it is important that the basic salary allows a normal standard of living. But also for young people it is more and more important what they do in life, that they can invest their energy in a visible result. That they can be satisfied with it, that they can proudly say where they work, that the working day is arranged in such a way that there is enough time for family and other activities, that they are respected by colleagues and management and that they have the weekends to themselves."

It can be argued that an inclusive leader combines two important components, intellectual ability and emotion. These help him to maintain a high level of work commitment and benefit in terms of a high level of innovation. Moreover, this spontaneously enables him or her to have a far-reaching reach that is linked to the company's vision and strategy. Within this, they also gained the NASA Green Flight Challenge, which attracted the attention of potential investors who can see a technically sophisticated product worth investing in (Željan and Voh Boštic, 2011).

If positive personal values are a prerequisite for building and creating an inclusive environment and relationship between the leader and the employees, then the main syntagm of their further development and progress is genuine two-way communication:

“The last time I gave a lecture in a school, and when I had finished the lecture there was silence. Then I added that if I finished that lecture anywhere in America, everyone would be waiting for my last word, and when I said it, they would raise their hands and ask questions. I emphasized that I think this is true for them as well. Everyone would like to ask something, but because they were educated like that in school, no one dares to raise their hand and ask, and this is the burial of Slovenian innovation, thinking and so on. Everyone who dreams of going outside is not cut out for it if you are so shy and afraid. Outside you have to expose yourself to be better than everyone else. When everyone is running outside, you have to jump. The fact is, people here are afraid to ask at the end of the lecture because they’re afraid of how eighty people will look at them if they raise their hand. That’s our problem.” (Vladić, 2017, p.69)

An inclusive leader is always available to their employees because they know that communication is key to maintaining engagement and motivation to move forward. Questions play an extremely important role in this process because they stimulate curiosity and thus have a positive impact on innovation. Questions are a way to understand the perceptions of different team members. In this way, all communication participants have the opportunity to broaden their horizons, test their existing beliefs and replace previous thinking patterns with new, more meaningful and effective ones. The result of the reciprocal process is the growth of human capital, which is expressed in the development of individual potential. For their realization and affirmation, the self-confidence and courage of an inclusive leader is needed, whose energy inspires employees to believe in their innovative abilities, which leads to the realization of the planned goals:

“When I said then that we must build an airplane that would fly two hundred miles an hour with fifty horses, fly a hundred yards, and weigh two hundred and fifty pounds, they said it could not be done. But a few weeks later, when it came to what systems we should put in, how different, innovative, think differently than all the other manufacturers, we did it. And still today, the philosophy is that our aircraft use significantly less energy than others. That makes them better, more efficient, quieter. That’s why they have a competitive advantage over everyone else.” (CEO, Pipistrel)

Work engagement and the inclusive environment created thus become the fundamental basis of the inexhaustible innovative capability of employees and the company as a whole, which cannot be disrupted by any negative events from the environment:

“We are strong because every day brings a new crisis. In the morning we often don’t know what it will be like at noon. One time a plane crashes over Ukraine, the second time it crashes in Argentina, the third time there are floods in

Australia, the fourth time there is an embargo in Iran. In fact, the more failures you have, the more you learn and the stronger you go into the future. We have made many mistakes and we are still making them, so it will probably be in the future. Mistakes are the best investment because they allow you to be strong in times of crisis, to be a strong team. Mistakes are something positive, they can have a very positive effect in the long run [...]. To withstand such shocks, there are rules: (1) as many different markets as possible, even remote ones, and of course they are not easy; (2) as many different models as possible, so that if one doesn't sell, you have another, a third, and so on, and you are less vulnerable; (3) organize so that if tomorrow demand drops, you don't have to lay people off, i.e. you should hand over as much production as possible to your business partners in order to strengthen your employees. By making mistakes, one learns to organize oneself in such a way that one can act to one's advantage even in the face of strong upheavals." (CEO, Pipistrel)

On the contrary, from this moment on all crises and business earthquakes become a source of learning and inspiration for the introduction of such changes as will make possible further unshakable business and progress in the planned direction. Despite all the business turbulence and tempting financial benefits from different business models, an inclusive leader insists on adherence to values:

"From the successful giants I have met, I have learned that humility is the greatest secret to success [...]. The key to success is to work for the long term and respect values. Today, it's not hard to succeed at the expense of others. If you succeed at the expense of your employees, at the expense of your suppliers, at the expense of your customers, it's easy. It just won't last. If you take advantage of eight-year-old girls working semi-free for you somewhere in third world countries, you can be successful. However, being successful and sticking to values is not so easy these days." (CEO, Pipistrel)

Along with empathy, therefore, honesty and fair dealings with one another are essential elements of inclusive leadership that fills employees with confidence and security. Thus freed from prejudice or fear, employees identify with the company's vision, are more committed, innovative and thus more productive in their work. The result is a global success expressed in the construction of the Pipistrel plant in the Chinese city of Jurong, which will include the production of two aircraft, the Alpha Electro and the four-seater Panthera, as well as the development of a 19-seater ship (Dumančič, 2018).

In the situation in the business world where almost all companies specialise in a particular segment of the business field, there is much scope for their mutual cooperation. In fact, their cooperation is essential if they are to survive economic turmoil and make visible progress in their own field. In such circumstances, companies no longer rely solely on their own innovative capabilities, but enter into business partnerships to acquire those innovative capabilities that they do not possess or whose implementation is judged to be economically unjustified. This

is how Pipistrel entered into a partnership and built a business ecosystem, according to its founder Ivo Boscarol:

“The Taurus G4 aircraft will be used for further research, development and improvements as part of the Mahepa project (modular approach to hybrid electric propulsion architecture), involving partners from Germany H2FLY GmbH Compact Dynamics, DLR - German Aerospace Center and Ulm University, and Delft University of Technology from the Netherlands, Politecnico di Milano and the University of Maribor [...]. The summers that have taken place over the last few weeks in private at Maribor Airport have proven that even in these extremely challenging times, with international collaboration, despite all the constraints and challenges that Covid brings, it is possible to achieve world-class development performance.”(Boscarol, 2020)

The result of this collaboration is the maiden flight of a four-seat hydrogen-powered hybrid electric aircraft, which will form the basis for another project of a 19-seat hydrogen fuel cell-powered passenger aircraft capable of flying up to 1,000 kilometres in two hours, silently and with zero emissions.

5 CRITICAL ANALYSIS AND DISCUSSION

From the exploratory study conducted, a number of findings are obtained with the aim of enhancing the understanding of the role of the emerging discipline of inclusive leadership (Najmaei and Sadeghinejad, 2019) in improving innovation capability. This research contributes to and enriches the existing body of research on leadership and innovation (Alblooshi, Shamsuzzaman and Haridy, 2020). Moreover, this work thus contributes to the call for more empirical and conceptual studies on inclusive leadership and its link to innovativeness. This section continues with the critical analysis that addresses the response to RQ1 and RQ2.

5.1 How Could Managers Increase the Innovative Skills of Employees and Organization by Encouraging Employee Engagement?

Whether it is at the level of an individual supervisor, a work group, or the highest level of leadership within the organization, effective leadership for innovation is paramount. Therefore, we treat this topic area as particularly important, but so far rather neglected in empirical studies (Anderson, Potočník and Zhou, 2014). An inclusive leader is characterized primarily by a strong commitment, the cornerstone of which is personal values. He therefore strives to combine personal values with an inclusive leadership style, with employees at the center of his concern (Bourke, 2016).

The owner and founder of Pipistrel, Ivo Boscarol, emphasizes at the very beginning of the interview the importance of values, which for him are the most important guide for every decision and activity in everyday life and in business.

He highlights the three most important values on which the whole strategy and vision of the company is based, as well as the organizational climate and innovation as their complementary part. Trust, courage and humility form the basis for healthy interaction and business. He adds two others whose purpose is to establish a genuine and direct contact with employees. It is empathy and gratitude that enable all messages to reach employees in a form that is most understandable to them.

As Kotter and Cohen (2002) explain, people are less likely to change because a good explanation or rational analysis is supposed to influence their thinking. For all of them, it is mainly the associated emotions that the leader influences when telling them the truth. In this way, employees recognize the authenticity of the leader, so they can easily build a trusting relationship with him, and thus they have the necessary energy to design creative solutions, work hard and achieve top results. The basic motive of employees is to be pleased and grateful that a person who knows how to recognize and nurture their potential is leading them. An important part of trust comes from the fact that a leader's words are always followed by actions when it comes to fulfilling his forecasts, rewarding employees and sharing profits.

In an inclusive environment, employees are empowered and encouraged to contribute to decisions and participate in discussions, speak openly, and promote and implement new ideas (Jong and Hartog, 2010). Pipistrel employees have a free hand in their work and there is no system of shaping or framing by the strategic management of the employees. On the contrary, considering the common denominator in terms of strategy and vision, employees can think within their own desires and associated potentials. An inclusive environment where everyone can express their thoughts certainly opens up opportunities for friction and criticism. The same is true for Pipistrel, where diversity of opinion contributes to more effective collaboration, while criticism promotes learning and consistent development for all involved (Bourke, 2016). Apart from this, leadership plays a crucial role for their organizations in managing, assessing and addressing complex risks (Pacaiova and Nagyova, 2015; 2019), where our case study company also excels.

From all this, we can conclude that leaders could promote employee work engagement to enhance employee and organizational innovativeness mainly by implementing values such as: Trust, Courage, Humility, Empathy and Gratitude. In this way, leaders could establish or improve the existing strategy and organizational climate. In this, the focus is on people who have the opportunity to express their thinking and potentials without restrictions, which directly leads to work commitment, motivation and innovation.

5.2 What Factors Have a Significant Impact on Work Engagement and Innovation Capability?

Building an inclusive environment means, first and foremost, setting a strategy and a vision and allowing each employee to express his or her own opinion. The points mentioned above and explained in detail in the previous chapter are the basis on which employees will participate inside and outside the company. The most important thing for the successful operation of an inclusive environment is undoubtedly the daily communication with the employees.

Inclusive presenters consider the opinions of their audience - not just who they are, but what they have to say. Whether they are leading small teams or an entire company, it is essential to provide regular opportunities for employees to voice their needs and concerns. It's the inclusive leader's job to ask them for feedback, acknowledge their input, and implement all that they objectively can. In addition, leaders often say they want to listen to employees, but don't actually offer opportunities for feedback or questions. Yet this is the quickest way for employees to become alienated from both the work and the vision of the company. To avoid this, it is advisable to be genuine and credible in communication (Zandan and Shalett, 2020).

Ivo Boscarol is simple, genuine, and empathetic in communication. We speak of a man who does not have one face for public, another for private, and a third for business. He is always the same in his appearances, with a distinct optimism and consistency that gives people a sense of calm and confidence. According to Ivo Boscarol, communication with employees is crucial, and the ability to ask questions is central because it neutralizes fear, which is destructive to an employee's creativity and skills. When you ask a question, you have to stand out, and this is a must for an individual or team that wants to be among the top or the best in the world. Asking questions stimulates curiosity, builds an individual's personality, strengthens interpersonal relationships and gathers new knowledge.

It should be noted that knowledge, which in a sense represents problem-oriented solutions, includes everything that certain actors use to promote actions, relationships, solutions, etc., regardless of the rationality or purpose of the knowledge element, both expertise and theory, practical rules and techniques, as well as recipes, mnemonics, worldviews, habits, superstitions, and religious or mystical beliefs of all kinds (Kovač, Mühlbacher and Kodydek, 2012). Knowledge is what positively influences the ability to innovate and enables the development of an organization. In fact, focusing on the development of human capital is an important prerequisite for the success and competitive advantage of a firm (AlQershi et al., 2020).

In Pipistrel, times of crisis are therefore seen as an opportunity to increase one's own development potential by learning from mistakes. In the long run, there are positive effects, such as a greater number of different markets, several different aircraft models, redistribution of work among partners, etc. At the same time, the crisis is also an opportunity to take a step forward and overtake the competition.

Moreover, innovation has become a critical factor in achieving long-term competitive advantage and sustainable development goals (Maletič, Gomišček and Maletič, 2021).

We can conclude that work engagement and innovativeness are significantly influenced above all by authentic communication, which must be honest and genuine in content. This creates an organizational climate in which there is a constant exchange of mutual opinions and dissemination of knowledge, which does not run away from any crisis but seeks inspiration and development opportunities in it.

6 CONCLUSION

In the research, we found that leaders can foster employee work engagement to increase employee and organizational innovativeness primarily by implementing personal values such as trust, courage, humility, empathy, and gratitude. At the same time, they need to create an organizational climate that allows and encourages dissent, discussion and criticism, thus contributing to personal development, learning and innovation of individuals.

The sustaining element of a good organizational climate and high motivation is authentic communication, characterized by the genuineness and good intentions of the leader focused on employee development. An important generator of engagement and innovation is the crisis in which the previous way of organizing and working contributes to more learning and knowledge accumulation, and thus to achieving a competitive advantage.

Moreover, we find that business ecosystems play an important role in innovation, to which experts attribute a promising future (Lyman, Ref and Wright, 2018). Their purpose is to overcome obstacles, network, form partnerships, and increase their own excellence, which translates into the development of potential and increased sales of products.

All this is a good guide for many companies trying to find appropriate and effective ways to innovate successfully, but still imitate and strive to become innovators (Le and Lei, 2019). Indeed, just over half of managers believe that their companies are unable to innovate effectively, which consequently brings the aforementioned skills gap to the fore (PwC, 2019). Add to this the implications associated with the “covid situation” and new digital technologies, and it is clear that innovation is and will remain the most important issue in the business world and also in the part of the scientific world that deals with organizations. This is also supported by a report from the European Commission, Directorate for Development and Innovation (De Nul, Breque and Petridis, 2021), which highlights the importance of Industry 5.0 and suggests close involvement of employees in the design and implementation of new industrial technologies, including robotics and artificial intelligence.

Research findings can help organizations engage employees to increase organizational innovation and employees as individuals. Moreover, this study aims to better understand the relationship between inclusive leadership and innovativeness by highlighting the special role of fostering work engagement. In this way, organizations can develop more appropriate employee leadership strategies to achieve engagement and high innovativeness at both the employee and organizational levels.

The research deepened the understanding of the importance of exploring such specific topics that had not been explored in the past. At the same time, the research contributed to a greater updating and enrichment of the literature in the field of leadership, work engagement and innovativeness.

6.1 Research Limitations and Suggestions for Further Research

The research provided concrete results and gave important directions for research in the field of leadership and related work engagement and innovativeness. We did not include employee surveys in the research that would further illuminate their attitudes toward work engagement and innovativeness.

For further research, we propose a more in-depth case study that additionally includes an examination of organizational structure and key work processes that support innovation. In addition, we propose to examine three or four examples of comparable highly innovative organizations to achieve greater generalization of the findings.

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Conceptualization, N.V. and M.M.; Methodology, N.V. and M.M.; Validation, M.M. and D.M.; Formal analysis, N.V.; Investigation, N.V.; Resources, N.V.; Data curation, N.V.; Original draft preparation, N.V. and M.M.; Review and editing, M.M. and D.M.; Supervision, M.M. and D.M.

CONFLICTS OF INTEREST

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