







involvement top management, funds constraints, lack of education and training for all involved and affected parties, demand unpredictability and lack of time (production is always prioritized) main downsides which are deemed as obstacles to applying lean.

**d. Analysis of application of 5s, 6s and 7s.**

According to [14] 5S is a valuable technique to establish productivity in organizations and spreads out a plan and can enhance communication, aids workers to be efficient, create attributes to reduce stoppages, delivery times, stock, Defects and related expenses. 5S system is a viable to enhance wellbeing and safety standards, environmental performance. [16] Says 5S is referred to as method for improvement of company's processes, transformation and training and upskilling Staff. 5S is furthermore regarded as an industrial custom that recognizes an organization from the others According to the Japanese organizations, 5S have two mechanisms, a high level of supervision and structural system with complexity meaning and it interprets to perfect performance and the other one is management provision tools position, although 5S is housekeeping practice, for clean and hygienic workplace, it supports total productivity enhancement in workplace. 5S system is one of the foremost known in industrial and business environment and there are few findings of its appropriation in organizations.

[17] Describe the extension of 5S Lean methodology, the 6S Lean Methodology, as a technique that is team-oriented tool. This concept can be applied to attain the specified results within the manufacturing plant. This tool provides continuous improvement in each department implemented on and promotes safety awareness. The main issue of the manufacturing industry is to most extreme utilization of assets and labor with less injuries. The main aim of 6S technology is to maximise utilization of all assets and gets the greatest output from all the resources. This technology settles all drawbacks and issues come within the work environment. This System increases the work productivity of plant as well as the quality and safety of the plant. This system helps the manufacturing industry to realize better quality, safe working environment as well as better customer fulfillment. This method can work as a group work within the organization. The 6S Lean Methodology can be utilized in any organization to improve the performance desired. This technique is around the world prevalent within the modern time. We are able to get maximum output from all resources by utilizing 6S innovation in our work environment. Use of this Method can reduce the 80 to 90% time in material handling and tool searching in the manufacturing plant or workplace. This Methodology gives quick response to every problem and resolves the problem very quickly at the workplace. The Essential idea to extent 5S lean methodology to 6s Lean methodology was to create safety awareness and reduce injuries in working environments

The recent addition of 7S to the 6s framework is to enhance team consistent cohesion, disposal of the waste in visual management and safety awareness. 5S, 6S and 7S are essential instruments of an organization in the working environment States. [16], [16] Further details that the visual management centers on the setting items, components or machinery at particular area with appropriate visible identification. With 5S organisations constantly improves the working environment by classification of materials and tools and arranging material and tools, intensive cleaning, standardization and maintaining the 4<sup>th</sup> S by compiling work instructions or SOPs to the workforces. The 6<sup>th</sup> S focuses on eliminating majority of accidents at the workplace after implementation of 6S method. The Lean 7S is the latest methodology which comprises of the seven phases namely Sort, set in order, Shine, Standardize, Sustain or Self Discipline, Safety and Spirit (team Spirit). The Essential idea of the methodology is the add to the other six Ss the principles of cooperation and cohesion from top down and up top in the Organisational hierarchy.

*Table 1 is the discussion on Lean 7S pillars, expected outcome, and action requires.* According to Joshi [16] Lean, 7S Methodology is a tool implemented by organization at the workplace to eliminate or eradicate Waste, Discrepancy, Fatigue of workforce increase safety awareness and team work etc. The Lean 7s Methodology application consists of seven stages, sort and discard, set in order, deep cleaning and Shine, Standardise, Sustain, Safety and Spirit (team spirit). Respective stages constantly enhance the Key performance indicators of an organization by diminishing excesses time of searching for tools or items, waiting, transportation, motion, work in progress inventory, fostering the spirit of together we can do more and so on.

The author [18] further elaborates that the Lean 7s Methodology helps to reduce processing times, quantitatively and qualitatively contributes towards morale and drive of the workforce. [16] describes the quantifiable elements as searching, movement, idle time, processing time, delivery time, production frequency, throughput, quality, revenue

and client network and the qualitative elements as cleaner working environment, improved communiqué and high morale of the workforce.

<i>7S Pillars</i>			
<b>Concepts</b>	<b>Appearance</b>	<b>Action required</b>	<b>Expected outcome</b>
<b>Sort</b>	Sorting between unwanted or non-value-added items	Identify areas that require 7S to be implemented. Take photos of before the implementation	Improved work flow, increased floor space and avoiding unnecessary clutter
<b>Set in order</b>	Organizing and setting items for quick and easy access	Arranging and identifying items for easy retrieval	Easy access and error proofing, reduction in idle time, safe working space
<b>Shine</b>	Cleaning and removing dirt, stains, dust, etc. with the use of cleaning machines and materials	Take photos before implementation, clean and tidy up the designated area. Take photos after implementation.	Avoid accidents, cleaner and healthier working environment.
<b>Standardize</b>	Regulating and making it an organizational culture for arranging and instilling cleanliness habits and maintaining it	Formulating the 7S methodology as standard operating procedure for all employees.	Work will be simplified with less errors. Standardization of work tasks.
<b>Sustain</b>	This requires self-discipline with an assurance to maintain orderliness	Check and evaluate processes initiated during the 4S phase. Evaluated the effectiveness and continual improvement.	Conformance to workplace policies and procedures.
<b>Safety</b>	Keeping and maintaining a safe working environment, free from hazards visible risks	Safety instructions and safety signage. Identification of hazards and risks. Safety training for employees.	A decline in accidents and incidents. Safer working environment.
<b>Spirit/ Support</b>	Team work is the willingness to cooperate as part of a team	Supports to develop team work. Establishment of 7S team. Develop a spirited working environment.	Improved communication. Enhanced self-confidence. Top management commitment.

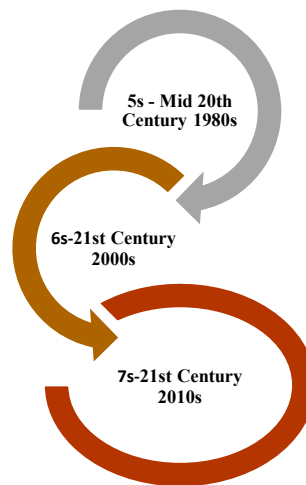
Source: Joshi 2015, Sukdeo 2017

***e. Evolution Lean 7S methodology: Lean 5S to Lean 7S methodology***

The 5S methodology was pioneered at the start of the 20<sup>th</sup> century by Takasi Osaka, with the objective to create a working environment of total quality and cleanliness, which included 5 pillars (sort, set in order, shine, standardize and sustain). Consequently, the five pillars of a visual workplace inspection were established [18]. The objective for enhancing productivity and efficiency is continual project for most companies. [18] established, that the 5S practices had obtained significant consideration in industrialist companies subsequently contributing to the unwanted materials and deficiencies eradication, eradicating workplace risks and hazards, thus enhanced productivity and efficiency.

6S methodology is the advanced extension, of the 5S methodology, invented and intended primarily for diminishing counts of accidents and injuries, waste eradication and optimize throughput production lines, to remove scrap and deficiencies as well. The lean 6S methodology is an unsophisticated technique intended at attaining an ergonomically sound working environment for workers. Thus, 6S applies the five pillars 5S methodology with added a sixth pillar for safety. 6S methodology has been deemed an underpinning action for discipline and seek involvement of senior personnel for it to be effective; it encourages a culture of continuous improvement and productivity states [18].

The 5S framework includes five phases which is; sort, set in order, shine, standardise and sustain. Safety formed the 6S phase and focused attention on safety throughout the previous five phases. Spirit forms the 7S phase wherein top management and employees cooperate as a team in order to promote a culture of continual improvement of the previous six phases. [17] Echoes that as leaders know the impact and influence of company culture and the significance of respect for employees, the need for 7<sup>th</sup> S becomes clear and makes sense, as it is important for overall Organisational performance. While most organizations have successfully implemented the traditional 5S and 6S method, several are recently opting to add Spirit the 7<sup>th</sup> S as an additional part to make clear the reliance on the people factor and the need to continually keep it in mind as other steps are undertaken. *Figure 1 shows the evolution from 5S to 7S.*



*Figure 1. Source: Researcher, 2019*

#### **IV CONCLUSION.**

With ever increasingly evolving business environment, intensified awareness and concerns of work environmental issues has prompted organisations to use various efficiency improvement tools. From the prior read publication works it is clear that one of the lean methodology tools does have significant positive impacts on organisations performance when effectively implemented. By understanding the results of the lean 5s and 6s in clear that the new Lean 7S Methodology can have positive outcome the organisation performance.

It is noticeable that the goal of 7S function is broad and diverse. When successfully applied, the work environment improves reduce waste in different forms, organize work areas, promotes hygiene as well as team cohesion, the complete gains of 7S cannot be envisioned in firms, if the obstructions related, completely understood, addressed and removed. The lean 7s methodology has become the base for any lean method to be applied. 7S methodology is a continuous improvement tool and should be constantly monitored and evaluated.

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## **Biography**

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A senior lecturer and Head of Department at the University of Johannesburg. She obtained a Masters in Quality from the Durban University of Technology and a PhD in Engineering Management from the University of Johannesburg. She is an upcoming young researcher in the field of total quality management and operations management. Her field of expertise also include quantitative analysis, quality management systems, quality auditing and risk assessment. She is a qualified Lead Auditor, proficient in ISO standards and certification. She is chairperson and director of the Society for Operations Management in Africa (SOMA), a senior member of the South African Society for Quality (SASQ) as well as the executive board member of the South African Quality Institute (SAQI).

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Quality Control and Production Supervisor at Automa Multi Styrene Pty (Ltd), Mr Mahlaha Holds a Baccalaureus Technology Degree in Operations Management from University of South Africa (UNISA) and an ISO9001:2015 Certificate from South African Quality Institute (SAQI), He has professional background in Quality and Production. The specific industries He has been exposed to, are Beverage Packaging in High Speed bottling Environment production lines, Plastic industry for a ball point manufacturing FMCG company, in an Injection moulding and High batch Production Assembly lines, He currently works in polystyrene product manufacturing company, Manufacturing a wide variety of packaging products for different industries, such as food and beverage, Medical and pharmaceutical, automotive and electronics as well as agriculture and household products.

### **V Mofokeng**

Quality Management Lecturer at the University of Johannesburg, he is also an Operations Management Doctoral candidate. Mr Mofokeng has accumulated many years of experience in various roles as a small medium enterprises (SME) quality specialist in local economic development (LED) projects in the mining, manufacturing and construction sector. He has been responsible for overseeing SME's quality management systems in community development



projects by service providers within the required framework. His community engagement projects include coaching existing SMEs in his home town Virginia, on customer research and customer engagement and also linking them to the Free State Department of Small Business and Tourism for opportunities and training workshops.