

## *Lean Techniques in Remote Working*

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**Abstract** -- *The actual situation (COVID-19) had forced a lot of people and companies to acquire remote working as their new work style. The objectives purposed of this project are make working from home a comfortable way of work to people, reduce the different types of wastes, ensure quality and safety during working from home and help people to adapt faster to this new work environment by introducing lean techniques. In order to achieve objectives in this research was used a mixed method methodology to combine the best of both qualitative and quantitative methodologies with the purpose of get and analyze the data the best way possible. This research showed that using 5s lean technique is an effective way to eliminate the common wastes, and by using it makes the implementation and the manage of this type of working more comfortable and more/equal efficient than when working normally.*

### **INTRODUCTION**

“The COVID-19 health emergency has profoundly changed working life. To minimize physical contact among individuals and prevent new infections, many companies implemented “mobile working” or “home working” or “remote working”, a form of carrying out a job without specific place of work restrictions, with the possible use of technological tools” [1]. Lean principles are a tool to improve and make much better different process when doing something. Work from home right now is a daily situation, in which people face a lot of wastes/problems, like working more than when they were not remotely, internet issues, home problems etc. Applying lean techniques during working from home will help a lot of people life and sole problems during this new working environment, by using them wastes are reduced making more comfortable, simple and equal or

more effective than when working normal. Remote working has a lot of benefits that all can take advantage and being honest this work environment comes to stay for a lot of time. “The scientific literature on remote work has already extensively illustrated some possible benefits of this arrangement, finding positive results with respect, for instance, to job satisfaction, job performance, organizational commitment or work–family conflict. Nevertheless, remote working has been observed to also accomplish negative results, such as professional isolation, a reduced possibility of obtaining promotions, the breakdown of professional relationships, as well as an increase in family–work conflict” [2]. The purpose of eliminating wastes in remote working in this project will be based on 5s that is one of the most popular lean techniques and have the advantage that is very easy to introduce in all types of environments and with a lot of effectiveness. This simple method is a huge waste reducer.

### **METHODOLOGY**

In order to achieve objectives in this research we will be using a mixed method methodology to combine the best of both qualitative and quantitative methodologies with the purpose get and analyze the data the best way possible. At first, we collect literature/information about the theme with the use articles/studies that focus on prioritizing lean techniques, how to use them and that show us the world of remote working. Then we got survey method for collecting data, the first part is about collecting data using surveys which contains specific questions that will let us identify the different types wastes when working remotely. This will be divided in two parts (two surveys) pre and post survey questions, the pre survey purpose is to get data about the wastes that people are facing

and the knowledge that they have about lean techniques, after that the surveyed will implement lean techniques “5s” during a period of two weeks for then answer the post survey in which it’s going to be measured the difference between working remotely before and after using lean techniques. This data will be analyzed through graphics and statistics which are going to show us the numerical data, and understand what wastes affect more than others, see if lean techniques are a good way to eliminate them and how lean techniques affects remote working environment.

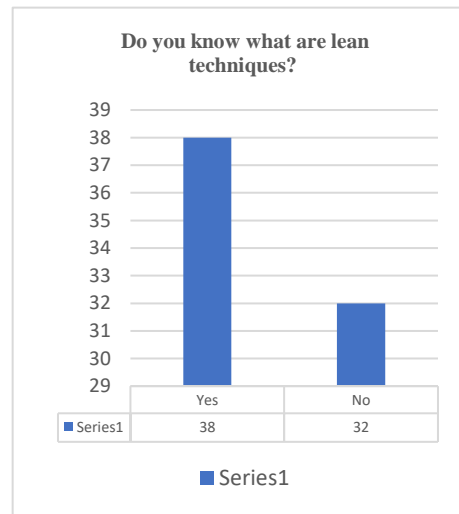
and information that isn’t effectively communicated or well understood. Network is a crucial thing that affect remote workers, establish a good network in home is definitively one of the most important things. Otherwise motivation of the worker it’s important because this influence in its production and how performs the job.

**Pre- survey**

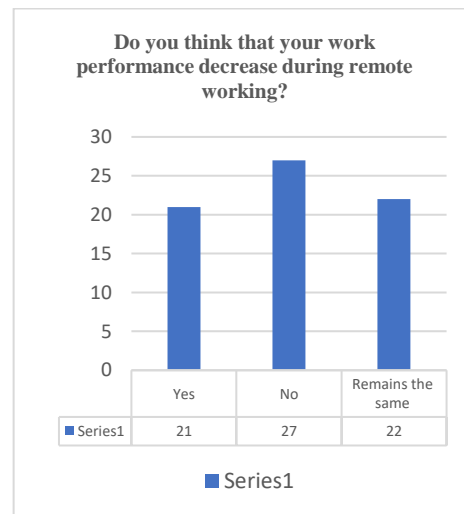
A total of 70 people were surveyed during this research. The following figures show the results of the pre-survey.

**RESULTS AND DISCUSSION**

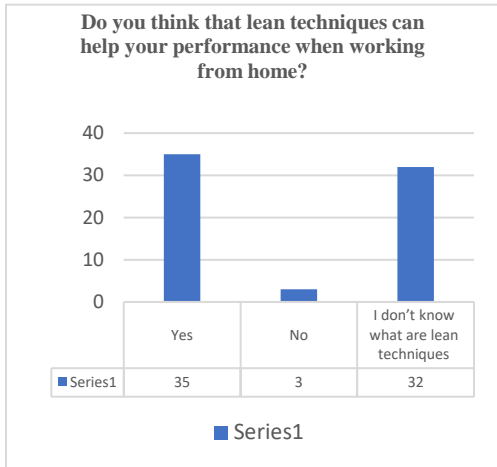
The most common wastes founded in this research about remote working are over-processing, waiting, movement, inventory, transportation, overproduction, defects, network and motivation. When working from home, over-processing can be in the form of approval layers for minor decisions or brief reports. A common problem encountered by remote workers is the need to enter the same data in several systems. This is an over treatment which can often be resolved through systems integration and organization. Waiting is another example of problems that appears when we work remotely. The waste of waiting occurs whenever a process is waiting for inputs or information from another source. “When remote working, this waste appear so much more because you don’t have the resources close, when talking of resources we refer about people (for a signature, help, approval, etc...), tools and other It can take the form of waiting for decisions, approvals, or work from a peer” [3]. “The usual flow of information and work that you experience in the office is probably quite different when working from home” [4]. On other hand we have movement, depending on the size of your house when you are working from home you would have to move through it to search for things and even goto the bathroom. Then we have defects, they take many forms. Defects can be bad data entry, spreadsheets that contain errors, software errors,



**Figure 1**  
**Do you Know what are Lean Techniques?**

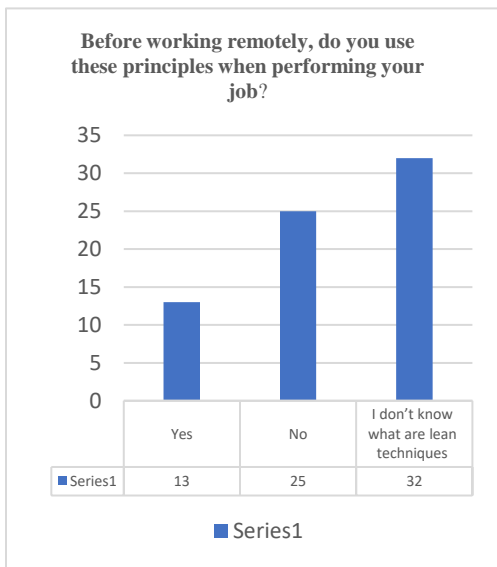


**Figure 2**  
**Do you think that your Work Performance Decrease during Remote Working?**



**Figure 3**

**Do you Think that Lean Techniques can Help your Performance when Working from Home?**



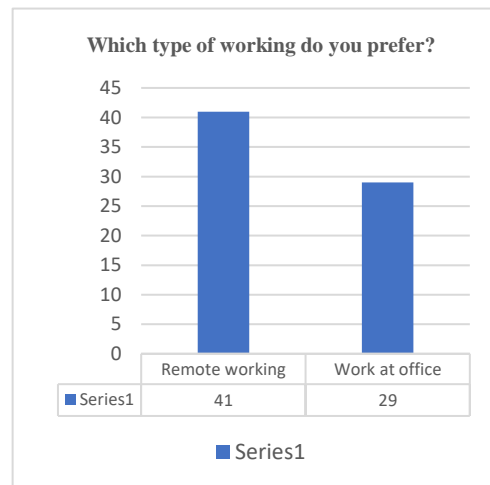
**Figure 4**

**Before Working Remotely, do you use these Principles when Performing your Job?**

The four first graphed questions (Figures 1 to 4) was to measure the knowledge that the surveyed have about lean techniques and if they applied them in some point when they work. The first graph show us that the majority of the interviewers knows what are lean techniques, but we can notice that a lot of the surveyed doesn't know about the techniques. With these results we can predict that the majority of them doesn't use lean techniques when working. The second question is focusing more in the actual work situation "remote work", we have a very variable results, 27 people told that

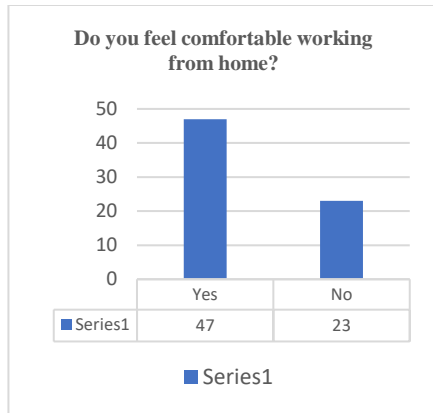
their performance have not been affected, then we have that for 22 people remains the same performance as when working at office and finally 21 people see that their performance have decrease during new type of work . Although the results show that the majority have not been affected, we have a considerable amount of people that thinks they performance decrease during remote working. Knowing this we can notice that remote working causes a huge change in their daily work. In the other two graphs (Figures 3 and 4) shows the lack of knowledge about lean techniques.

Figures 5 to 8, measured specifically two things that are, how the interviewers feel working remotely and if they know about one of the most common and important lean techniques "5s". We can know with these results, that the people interviewed feels better working from home, and that they don't use 5s technique before or during this new work environment. Remote working has a lot of good aspects and more when it's about to spend quality time, because working from home gives the opportunity to spend more time with family and manage so much things better than working at an office. The zero knowledge about 5s means that common wastes should be there, and a great use of this technique will be very helpful. Lean techniques are an essential tool for eliminating wastes.

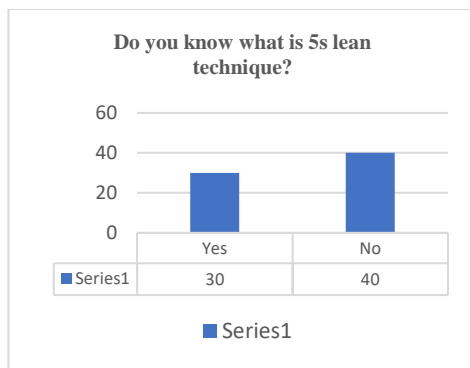


**Figure 5**

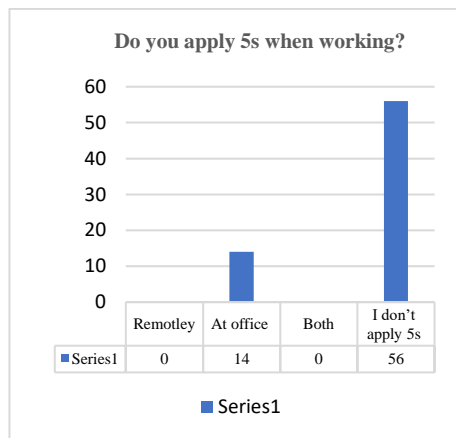
**Which Type of Working do you Prefer?**



**Figure 6**  
**Do you Feel Comfortable Working from Home?**



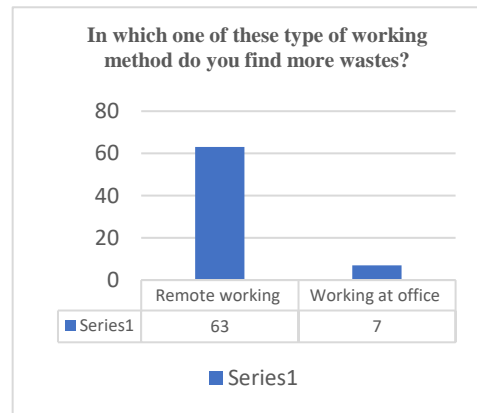
**Figure 7**  
**Do you know what is 5s Lean Technique?**



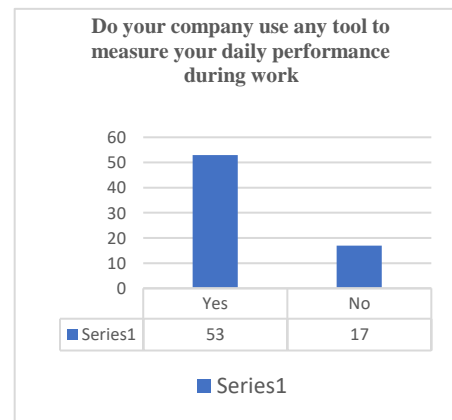
**Figure 8**  
**Do you Apply 5s when Working?**

Figures 9 to 10, measure how interviewers feels about wastes when working remotely compared when working at office. Viewing the graphs, we can notice with a drastically difference that 63 of 70 surveyed answer that find more wastes when working remotely. This means that this have

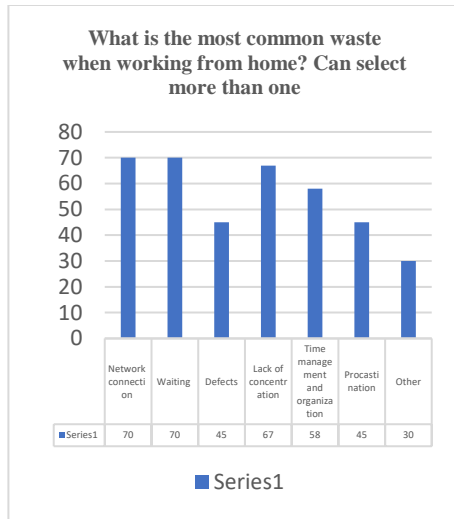
to be reduced and give an excellent opportunity for lean techniques to eliminate wastes. On other hand according with the graph we can see that the interviewers are daily measured during work, so this means that the performance is very valuable for them. Wastes are a daily thing when working, this graph want to define the most common type of wastes that our interviewers face daily. As results in Figure 11 all the interviewers face wastes with network connection and waiting, then we have lack of concentration followed by time management and organization, then defects and procrastination and the one with less results that is others. All these wastes can be managed with lean tools, but like we see previously they doesn't use lean when working remotely or at office.



**Figure 9**  
**In which one of these Types of Working Method do you Find more Wastes?**



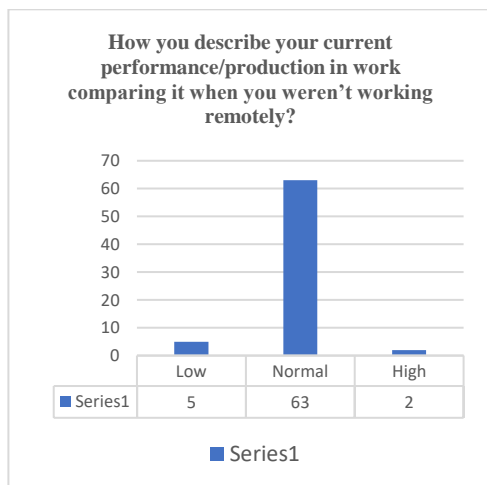
**Figure 10**  
**Do your Company Use any Tool to Measure your Daily Performance?**



**Figure 11**

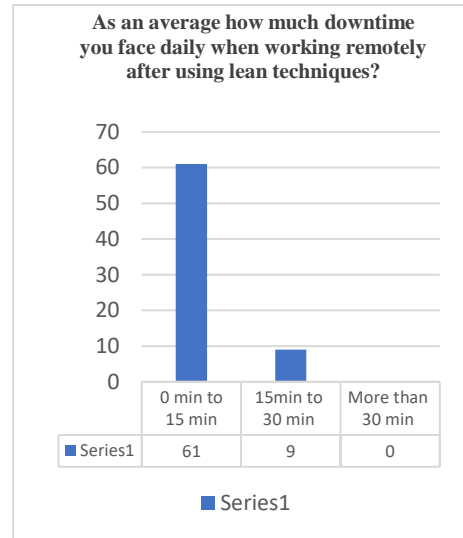
**What is the most Common Waste when Working from Home?**

In Figures 12 to 14, we get that the majority of the surveyed told that their performance is normal compared when they work at office, only 5 says that is lower and 2 said that is higher. Then in case of downtime we get that the majority pass through a downtime of 15-30 min during working, followed by more than 30 min and only 13 said that their downtime is in the interval of 0-15. This means that 57 of our surveyed face a downtime of more than 15 min when working. As part of this project we want to introduce lean techniques our surveyed, the graph shows us that all people surveyed accepts to introduce lean technique.



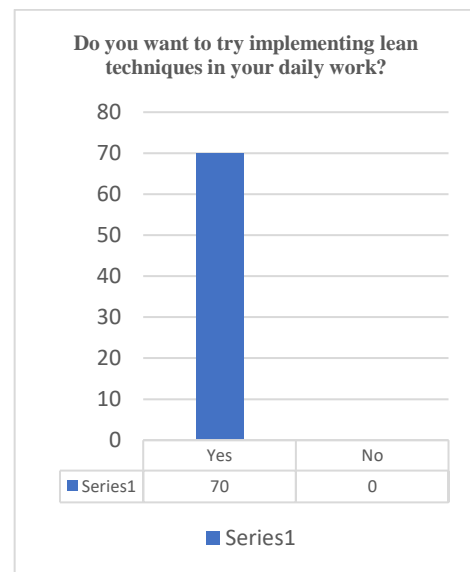
**Figure 12**

**How you Describe your Current Performance/Production in Work Comparing it when you weren't Working Remotely?**



**Figure 13**

**As an Average how much Downtime you Face Daily when Working Remotely?**

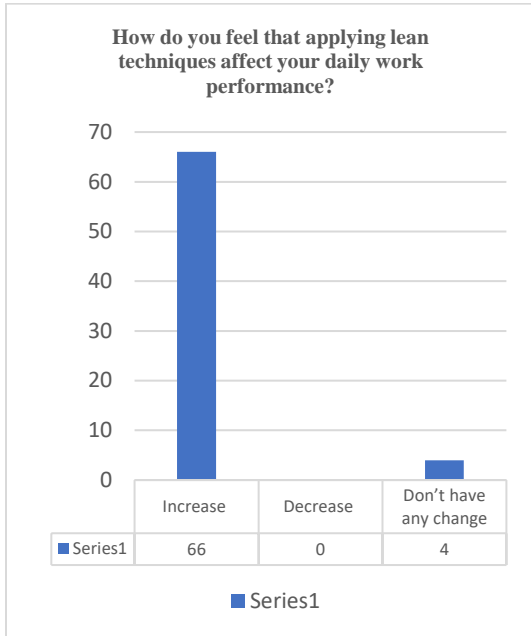


**Figure 14**

**Do you want to Try Implementing Lean Techniques in your Daily Work?**

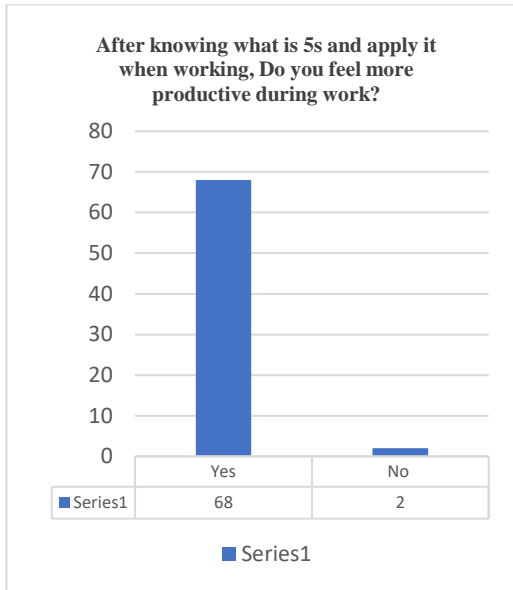
After using lean techniques these results were graphed, in the Figure 15 we can see that 66-person told that their performance increase, that show that lean technique has a positive effect. On other hand the Figure 16 shows that 68 feels more productive when using lean techniques. This means that lean techniques implementation has visible good results. Then Figure 17 shows that all surveyed told that lean techniques were useful for eliminating wastes. This is good because eliminate wastes is the

principal purpose of lean and if all surveyed see waste elimination means that lean techniques were useful. In the other graph (Figure 18) results, all participants told that will continue to use lean techniques when working.



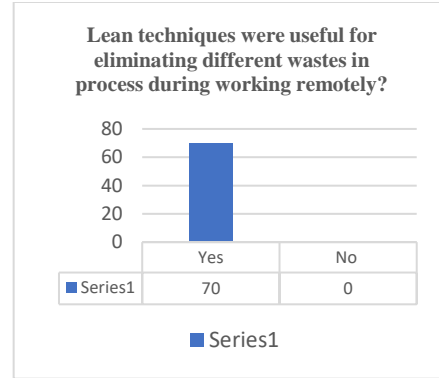
**Figure 15**

**How do you Feel that Applying Lean Techniques Affect your Daily Work Performance?**



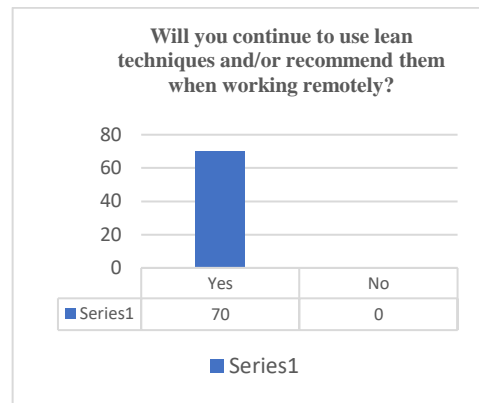
**Figure 16**

**After knowing what is 5s and Apply it when Working**



**Figure 17**

**Lean Techniques were Useful for Eliminating Different Wastes in Process during Working Remotely**



**Figure 18**

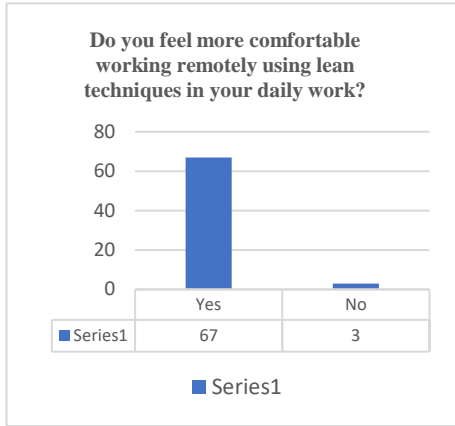
**Will you Continue to use Lean Techniques and/or Recommended them when Working Remotely?**

### Post-survey

After all the participants said that they are going to implement 5s lean techniques, a survey was made to see the results. Post-survey results are: The results in the Figure 19 shows that 67 of the surveyed feels comfortable using lean techniques during working remotely. Although three persons don't feel comfortable using the techniques 96% of the surveyed told that feels comfortable which are excellent results that demonstrate the easy management of these techniques when working. Then the Figure 20 is about the performance after using lean techniques, 57 surveyed describe their performance higher and 13 describe it equal and 0 told lower, these results shows that in case of performance lean techniques had a 81% of effectiveness, causing an increase in their

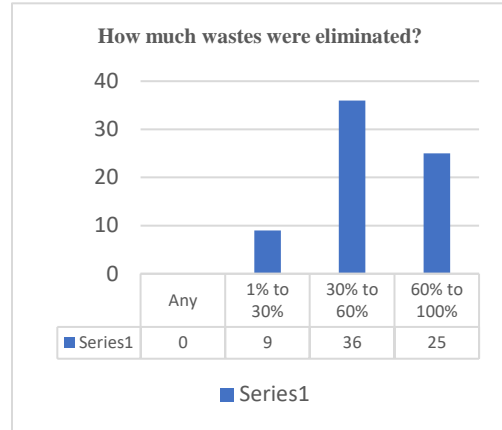
performance and only a 19% that doesn't feel difference.

23, we get that 68 of the 70 participants told that lean techniques were useful during work.



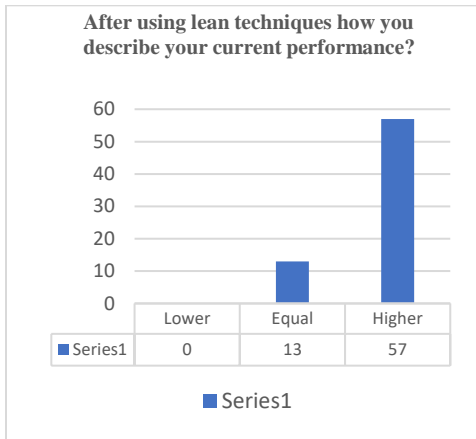
**Figure 19**

**Do you Feel More Comfortable Working Remotely Using Lean Techniques in your Daily Work?**



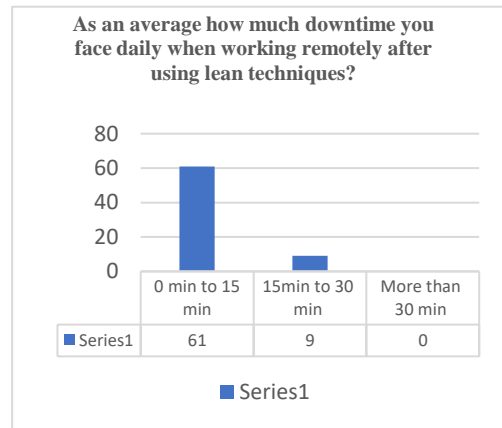
**Figure 21**

**How much Wastes were Eliminated?**



**Figure 20**

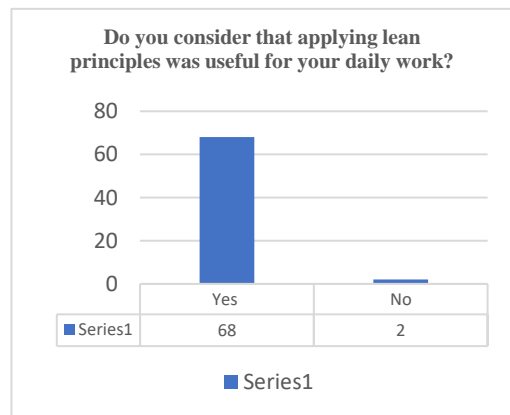
**After using Lean Techniques, How you Describe your Current Performance?**



**Figure 22**

**As an Average how much Downtime you Face Daily when Working Remotely after using Lean Techniques?**

In case of waste elimination measure the Figure 21 shows that all surveyed achieved to eliminate wastes, 9 of them told that eliminate 1% to 30% of their wastes, 25 a 60% to 100% and 36 a 30% to 60%. These results are very good because all of them achieve the purpose of using lean techniques and this means that lean techniques were useful for eliminate wastes when working remotely. The graphed results on Figure 22 show us as first that the downtime was considerable reduced in almost of the participants to the interval of 0 min - 15 min 61 and only 5 stayed in the interval of 15 min to 30, but the 30 or more interval was eliminated, which are excellent results. Then Figure



**Figure 23**

**Do you Consider that Applying Lean Principles was Useful for you Daily Work?**

## CONCLUSION

“The Coronavirus crisis has disrupted lives nearly everyone in the world at this point. It has caused us to change how we interact and how we go about living our daily lives. It also has changed how we work. Community lockdowns and shelter in place directives have resulted in a sudden shift to virtual work-from-home environments for many businesses and organizations. While work-from-home is not a new concept, the rapid transition to fully virtual companies is unsettling with the potential to create inefficiencies and undesirable outcomes if not managed carefully” [1]. As we know the principal objective of this research was to know if lean techniques are useful for working at home. Due the recent situation a lot of workers are working remote right now and wastes are always there. During research was found remote working common wastes following lean principles are over-processing, defects, waiting, network and human potential. Lean techniques are definitively useful for eliminating those common wastes mentioned before. This is because the principal purpose of lean is to eliminate wastes during process, when over-processing appears lean want that you focus on the work requirements from the standpoint of the customer. In case of defects lean want that Firstly find the most frequent defect and focus on it, then design a process to detect deviations/problems for avoiding errors during process. After that redesign the process to eliminate defects and standardize work to ensure a consistent and trusted process in which defects are eliminate much as possible. Waiting is another common waste and lean manage it by “designing processes to ensure continuous flow or single piece flow, leveling out the workload by using standardized work instructions, and developing flexible multi-skilled workers who can quickly adjust in the work demands” [5]. When we are working remotely network is one of the most essential things, but how leans can help here, well lean method will suggest that when selecting network you have to do a design of which type of network do you need,

including the size of the house, how many people will be connected, if you will need to download huge packages. In case that the company provide to you is way much easier, because all the mentioned above is done by the company.

As part of this research for prove the capability of lean techniques during remote working we put them on practice. First we did a survey which purpose was to measure the people knowledge about lean techniques, if they apply them, how they feel about them and know if they have knowledge about 5s that is a principal lean technique and is the one that we implement for two weeks with our surveyed. The results were graphed for pre and post survey like we can saw above. The pre survey purpose was to know about how the knowledge of our participants about lean techniques is, their current performance and to know the most common type of waste that they manage daily when remote working. The results show that the majority of them don't use lean techniques when working remotely and that they face wastes that generates downtimes when working, in case of performance the majority told that they accomplish (their performance haven't be affected), but 21 of 70 participants told that see decrease in their performance. On other hand we have that because the majority don't use lean technique, it gives a huge opportunity to see if lean techniques are a good tool for increasing performance. For this research the principal technique used and showed to our participant was 5s, this is because this tool is practically the base of lean and is very easy to integrate in remote working. The results of the post survey were excellent. They are according with what we expect when introducing lean techniques in remote working. We got in the graphed results that the majority of participants saw an increase in their performance after using 5s lean technique in their work. They saw elimination of the wastes that they are facing daily making more comfortable and efficient their daily work. By eliminating these wastes using lean techniques the cause a decrease in downtime which is a very good results to and



prove that lean fits perfectly with making remote working more efficient and free of wastes.

Lean techniques were capable of eliminate wastes during remote working, making it a much efficient way of working. The principal mechanism used through research in the improvement of remote working efficiency was the 5s lean tool. This research contribute finding a way (using lean techniques) to eliminate the common wastes faced daily during remote working and avoid overworking in employees due to downtimes and making that the implementation and the manage of this type of working be more comfortable and more efficient or equal than when working normally.

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