

## Appendix B: Case study evidence supporting the changes made to the a priori PPMS Characteristics

This file provides supplementary information designed to complement the paper titled; "Process Performance Measurement System Characteristics: An Empirically Validated Framework", submitted to the 17<sup>th</sup> International Conference on Business Process Management (BPM 2019). The case study evidence supporting the results summarised in the main paper are presented here. The intension is to show a clear trial of evidence; capturing how each of the PPMS characteristics (C1- C38) identified from the literature instantiated (or not) with the case study data. This is covered in Section 1 to Section 38. First, the literature based definition (also used at the data collection stage) for each characteristic is presented [as (a)] and the supporting evidence from the case study data is presented thereafter [as (b)]. Quotations from case study respondents are presented with further interpretative explanations below. See Table B.1 for an outline of these respondents.

**Table B.1.** Outline of Respondents

	Role	Code given
<b>AMC</b>		
Manager Lean Enterprise - BPM centre of excellence	Is a middle-level managerial position. Reports to the Head at the BPM centre of excellence. Provide consultancy and advisory service to the plants in the cluster.	Respondent 1
Deputy General Manager – HR	Is a middle-level managerial position. Reports to the General Manager in the cluster. Involved in designing performance measures.	Respondent 2
Group Head of Finance	Is a middle-level managerial position. Reports to the Finance Director. Involved in designing performance measures.	Respondent 3
Management Accountant	Is a middle-level managerial position. Reports to the Group Head of Finance. Involved in designing performance measures.	Respondent 4
Operations Manager	Is a middle-level managerial position. Reports to the General Manager. Responsible for the entire operations in the plant.	Respondent 5
Production Control Unit Manager	Is a middle-level managerial position. Reports to the operations manager. Facilitates projects initiated in the plant and provide support from the lean and MIS side to the project champions.	Respondent 6
Head/ Manager Lean Enterprise	Is a middle-level managerial position. Reports to the operations manager. Responsible for driving all the projects that are conducted in the plant.	Respondent 7
Project Champion/Industrial Engineering Executive	Is an operational level managerial position. Reports to the Head/ Manager Lean Enterprise. Converting the traditionally seated modules into dancing modules is the main role. Handles the whole project – dancing module.	Respondent 8
Lean Implementation Executive	Is an operational level managerial position. Reports to the Head/ Manager Lean Enterprise. Facilitate the smooth functioning of the project whole project – dancing module.	Respondent 9
Sewing Machine Operator 1 – Team leader	Lowest level members in the plant. Responsible for the line with 20 sewing machine operators who executes the dancing module. Reports to the Supervisors in the production line.	Respondent 10
Sewing Machine Operator 2	Lowest level members in the plant. Involved in sewing operation and executes the dancing module.	Respondent 11
Sewing Machine Operator 3	Lowest level members in the plant. Involved in sewing operation and executes the dancing module.	Respondent 12
<b>TCC</b>		
Program Manager (Strategic Supply Chain Process)	Second layer position in the top management level in the organization. Functions from the BPM centre of excellence. Guide and facilitate the process improvement initiatives	Respondent 1

Improvements) <sup>1</sup>	taken place in the plants. Involved in designing performance measures.	
Plant Director	Second layer position in the top management level in the organization. Reports directly to the Senior Executive Director. Responsible for operations in three manufacturing plants. Involved in designing performance measures.	Respondent 2
Industrial Engineering Senior Manager <sup>2</sup>	Head of the plant and an upper middle-level position in the organization. Reports directly to the Plant director and also coordinates with the Industrial Engineering (IE) Director and the BPM centre of excellence. Responsible for the operations in one of the three manufacturing plants under the Plant director.	Respondent 3
Product and Process Senior Engineer	Lower middle level position and reports to Industrial Engineering Senior Manager. Support on the planning and execution of the improvements and operations in the plant.	Respondent 4
Product and Process Engineer	Lower middle level position and reports to Industrial Engineering Senior Manager. Coordinates between the factory floor level employees and the plant management	Respondent 5
IE & Lean Senior Executive	Lower middle level position and reports to Industrial Engineering Senior Manager. Coordinates between the factory floor level employees and the plant management	Respondent 6
Shift in-charge 1	Supervises the production floor employees and coordinates between them and the management of the plants.	Respondent 7
Shift in-charge 2	Supervises the production floor employees and coordinates between them and the management of the plants.	Respondent 8

### 1 C1 - Performance measures being clearly defined, with an explicit purpose

- (a) Literature-based definition for C1: Performance measures should be clearly defined, with an explicit purpose. This characteristic relates mainly to defining the improvement areas, performance objectives, performance criteria, measurement criteria/ formula, the key performance indicators (KPIs) etc.

(b) Case study results for C1

Both AMC and TCC agreed on having the characteristic C1. i.e. they agreed that at the point of designing the performance measures they should be clearly defined with an explicit purpose. For instance, at AMC they base the measures on the Hoshin Kanri<sup>3</sup> to make it clear according to the Respondent 6 (AMC): “... *clearly define measures basing the Hoshin. That is like our God. We do everything based on that. And it makes very easy for the corporate to manage all plants with the Hoshin ... Whatever the KPIs we use, we have them for a reason and we clearly define what it is and why they are introduced*”. They cascade down the strategic goals and objectives to the next levels based on the Hoshin. The KPIs are generated for each level based on that and measures are used to assess the level of achieving these KPIs. The behaviour of the measures is clearly defined as stated by Respondent 2 (AMC): “*we measured them on a scale from 1 to 5 (where 1 was poor and 5 was excellent) ... Some will be moving to the higher standard (to 4) by increasing 100 and the others will move to 4 by increasing 400. Different jobs (pattern makers, designers, sewing technicians, HR, Finance etc.) will have different standards. The standard is calculated as follows. i.e. Budget + 10% is 4; That level + another 10% is 5*”. Likewise, the measures are clearly defined.

Similarly, in TCC the three strategic objectives of the organization are cascaded down to the other levels through KPIs. According to the Respondent 1 (TCC), they develop a document called ‘index card’ with all the details of a measure which is confirming that they clearly define the measures upfront at TCC.

Thus, it is evident that the measures and the KPIs are clearly defined at these organizations and they consider that to be important. Further, when specific improvements to processes are initiated, both companies clearly define the measures relevant to those initiatives as evident from the statements such as: “*if we take my dancing module we expect to enhance productivity. From the planning point itself, we have identified and we have given what is expected and what they should measure*” - Respondent 8 (AMC); and “*Though we can’t measure, we defined the KPIs that we are going to introduce and how often we are going to monitor, who will monitor, who*

<sup>1</sup> Interviewed twice

<sup>2</sup> Interviewed twice

<sup>3</sup> “*The words ‘hoshin’ and ‘kanri’ mean direction and administration, respectively. Used together, they bring the meaning of ‘How do we manage our direction’ or ‘How do we make sure we go the right way’*” (Kanbanize, n.d.).

*will assess, who will review the progress etc. in detail*” - Respondent 4 (TCC); *“The measures will be defined in detail very clearly so that we know what we are measuring and how and for what objective they will be introduced. This is not easy but we take time and a lot of discussions are happening at this stage to make the measures/KPIs clear”* - Respondent 2 (TCC).

Also, TCC believes and the organization has experienced that process improvement initiatives fail when measures were not aligned with the process. An earlier attempt of a similar improvement initiative failed due to misaligned measures: *“The project failed earlier because the targets and the KPIs were not clear and were not in line with the actual processes in the operations”* - Respondent 6 (TCC). Therefore, *“in any project we do now, we try to define the correct KPIs and the measures. This helps a lot in improvement projects”* - Respondent 4 (TCC).

## **2 C2 - Performance measures being valid and reliable**

- (a) Literature-based definition for C2: Performance measures should be valid and reliable; the measures and the KPIs should measure the intended performance as precise as possible and recognize the true result of the process while maintaining consistency and accuracy of information.

- (b) Case study results for C2

From both the whole of organization perspective, as well as from the perspective of process improvement initiatives, both organizations believe that the validity and reliability of measures are important for the measures and the measurement results to be useful.

As evident from the statement of the - Respondent 7 (AMC): *“valid and reliable definitely yes. And measures and KPIs should measure the intended performance, yes. And be as precise as possible and recognise the true results, definitely yes. Otherwise what will happen is we will have measures we will measure with them, but the result we generate will be just some numbers with no value. Without true results, they will not be useful”*. Further as stated by - Respondent 8 (AMC): *“... measures should measure the intended performance and in an accurate manner. Then we can get to know the actual result of the initiative”* if not they will not be useful according to the Respondent 6 (AMC) (*“...Otherwise they will not be useful for us”*).

According to the Respondent 2 at TCC, they *“... try to use the most relevant, reliable and accurate information for the measures”*. And they ensure that the actual results are identified: *“we are concerned about having measures that correctly identify the actual results. That is important. Having measures to give us a clear and correct result on the activities”* - Respondent 3 (TCC). Thus it is evident that they consider this characteristic to be important; and that it already exists in their measurement system.

## **3 C3 - Performance measures being relevant**

- (a) Literature-based definition for C3: Performance measures should be relevant to the business process, the people who are accountable for the process; and the output of the process.

- (b) Case study results for C3

Both AMC and TCC mentioned the importance of measures being relevant to the process, people and output. They consider that it is also important to have relevant measures when initiating improvement initiatives.

As stated by the Respondent 8 (AMC): *“... performance measurements should be relevant to the process and people who carry out the process. And measure the output, so relevant to output as well”*. Through the Hoshin Kanri document, they map the strategies with the responsible parties together with relevant measures as stated by the Respondent 7 (AMC) *“Minimize employee grievances by improving employee satisfaction, developments, skills ...’ this is a strategy for the HR department. In that we look for LTO- labour turnover, absenteeism, maintaining budgeted headcount, direct to indirect ratio, 60 % carder improving... The operations managers responsible for each of these KPIs will try to achieve these somehow. They are in the HR or Quality etc.. Accountable person is mapped in this Hoshin table. The strategy, the KPIs, the accountable person, success level at the point of review etc. are mapped in this Hoshin”*.

At TCC they stated the relevancy of information in addition to having relevant measures for process improvement initiatives. For instance, from statements such as: *“... we make sure that the measures are relevant to the work they do”* - Respondent 2 (TCC); and *“... we defined the KPIs that we are going to introduce and how often we are going to monitor, who will monitor, who will be assessed, what parts of the process is assessed, who will review the progress etc. in detail”* - Respondent 4 (TCC), it is evident that TCC also ensure the relevancy of measures.

Also, performance measurements are relevant to the accountable person and measures facilitate to attach accountability to the tasks performed by employees as evident from statements such as: *“and the team leaders were made accountable for not meeting the targets and they had to give proper reasons for variations. All this pushed the process change further”* - Respondent 6 (TCC); *“this actually was not very easy to introduce. They did not like it. But because the shift in-charge were becoming accountable to the losses happening they*

*themselves took this seriously ... Even we get motivated to do something if it is measured and if we become accountable” - Respondent 4 (TCC); Introduction of new measures and the frequent recording of them – “is extra work but at the same time, you will not get blamed for other people’s faults. That is also good. We become the owners of this process during the shift and we try to do it well” - Respondent 5 (TCC)].*

Further, in AMC, they stated about exceptional situations where there are ambiguities in identifying ‘the responsible’ person for certain general measures. For instance, when the outcome will be a result of the actions of several parties: *“there are some ambiguous KPIs out there. When I take the stock holding of our RM stores, and there are two key people looking after that. One is production control unit (PCU) and the Rm stores. So the combination of both will reduce the stock, so at that time is the issue other than that, it’s more relevant, precise defined KPIs” - Respondent 7 (AMC).* But the respondent further mentioned that they take into account these facts when making decisions.

#### **4 C4 - Performance measures being simple, easy to understand and maintain**

- (a) Literature-based definition for C4: Performance measures should be simple to use/implement, easy to understand and maintain, comprehensive and meaningful to employees including decision makers.

- (b) Case study results for C4

Maintaining simple measures that are easily understandable and usable are considered important at AMC and TCC. At AMC, the measures are: *“clearly defined by corporate and then based on that the KPIs at each level for all levels are defined and monitored continuously with Talent2o. So it’s easy to understand and use” - Respondent 2 (AMC).* This is important at both the organization level as well as the at process improvement level as evident from the respondents. As evident from the statement of the - Respondent 8 (AMC): *“if we take my project, measures go to the team member level. And monitoring and KPIs will be done at the line by line level. The KPIs will go to a very low level. ... the TL (Team leader) and GL (Group leader) will do the measuring. Most of them do not have very high education backgrounds. So we should have simple equations and when they get complicated equations to measure they will not do it properly. So we can’t get that measurement”.* Also, AMC had changed the complex measures when the users faced difficulties in understanding and using them as evident from statements such as: *“... when we started this dancing module we had very complex equations. But eventually they omitted using them and they were disregarded. It is hard to teach them also” - Respondent 8 (AMC).*

Similarly having simple measures are considered helpful in the process improvement initiatives at TCC: *“... when the measures are simple to use and understand it is easy for the operational staff to use and also to introduce to the team Leaders to record the work ... if it is a measure hard to use and that takes a lot of time of the workers they will be reluctant to record continuously and accurately - Respondent 2 (TCC).* TCC respondents brought another view of simplicity. Simple measures need not be available at all levels of the organization. There can be complex measures at higher managerial levels depending on the level of education and understanding ability of the employees. Also, simple measures will not be the best for decision making sometimes. For instance, a respondent stated that *“when simple it is easy to understand. But we can’t always have only simple measures. we have conversions, we have to compare with other countries we have to be in line. it will be good to have simple measures from a user perspective. but from a managing perspective, it is not really a concern. we need accurate data that is useful. We anyway don’t give complex measures to workers. For work, they record we only give measures that are easy to understand. Otherwise, they will not do it and also will not do the work properly” - Respondent 3 (TCC).* In addition to this, keeping the measures simple had been challenging according to the - Respondent 1 (AMC): *“... this is very challenging. ... if you try to have one set of KPI’s and measures in a project, without compromising the objectives of the respective function or the BU (Business unit), it’s challenging”.*

#### **5 C5 - Continuously monitor performance**

- (a) Literature-based definition for C5: Performance measures should continuously monitor performance. Mainly the process performance data and related KPIs should be monitored in order to maintain the momentum of the progress.

- (b) Case study results for C5

Both companies stated the importance of continuous monitoring of performance. It is important to monitor the performance of the process improvement initiatives continuously because: *“... improvement projects (are done) with some expectation. So we have to always see whether we are meeting them or not” - Respondent 6 (AMC).* Further, in trying to put the improvement initiatives on track and meet the expectations, the current state needs to be identified and due to that they continuously measure. As stated by - Respondent 7 (AMC), *“... we look at the current state and see where we want to go. i.e. the expected target and then look at the gap between them*

and make the action plan to achieve that expected levels. And we measure against that action plan". Therefore they divide the annual plans into months, monthly plans into weeks and weekly plans into days etc. to get precise measures on the current achievement levels of performance required. And then they measure them: "Then we split the monthly plan into 4 weekly plans. In the weekly plan we commit to the resources, say 100 changeovers, 10 moulds will be confirmed etc. Then we check continuously whether those planned number of changeovers had happened or not..." - Respondent 1 (TCC); and "... now our main challenge and our main focus is to monitor them ... weekly, monthly, bi-weekly and see the behaviour, what other things we need to do to improve that. So, likewise, we need to take care of the KPI and do the needful" - Respondent 7 (AMC).

Both companies believe that employees follow the guidelines related to process improvement initiatives because they are measured continuously. This is evident from statements such as: "if we are not measured from the beginning then we do not have any reason to follow any method. Targets are given and the control that comes through the measures make us work according to the plans of the management. Without measures, this cannot be controlled ... after some time most of us will be out of the track, if not measured. To work towards plans of management there should be measures" - Respondent 10 (AMC); and "We were monitoring and was keeping it 'hot hot' to make it happen somehow ... Measures should also happen continuously in shifts not weekly" - Respondent 3 (TCC).

Further, both companies agree that continuous monitoring facilitates continuous improvements as evident from statements such as: "if not we can't get a result. To drive towards a result, we should measure from the point of implementation. And continue to measure throughout" - Respondent 8 (AMC); and "we continuously measure the performance, record them, analyse them and search for root causes for the issues that we trace when analysing. That is how we continuously improve the processes in the plant" - Respondent 2 (TCC).

## **C6 - Few performance measures**

- (a) Literature-based definition for C6: The set of performance measures used should be few, but complete and critical and non-redundant.
- (b) Case study results for C6

Mixed views are there with the respondents related to having few measures while being complete and critical. A number was not recommended by any respondent but generally, at the top level there was a lesser number of measures and when cascading to lower levels in the hierarchy the number had increased. For instance, as stated by the - Respondent 3 (TCC): "all these KPIs are cascading down from the top. As I said earlier there are three main KPIs and then that goes to the strategic level and then to operations. In operation plants, the number of KPIs will be higher than at the strategic level. In IE there are KPIs, in Safety there are KPIs, in operations, there will be KPIs. So there will be a lot of KPIs". The - Respondent 1 (TCC) states that: "at the BU level, at the top level, we mainly measure these three. So when you cascade down to the next levels in the, let's say in the functional execution level, you have the big list again. And when you go to the down detailed operation, you have a big list again". The high or low number of measures depends on the circumstances and instead of considering the number of measures used they consider on having the key/important measures as stated by the - Respondent 2 (TCC): "we only use the key measures. But I cannot say it is few. We try to have all the important measures. Then we can take correct decisions on the projects".

With the complexity faced by having many measures at the organizational level, AMC is attempting to control the number of measures throughout the organization and also for those related to process improvement initiatives. During the introduction of a new performance measurement system in 2013 they defined many measures including all possible measures. However, due to the complexity in handling them all, they have decided to reduce them to only five goals in later periods as stated by the - Respondent 2 (AMC): "Then a director had about 16 and then when it is cascaded down it become 40+. Then we learnt. So now only a few broad goals are set and the action plan is detailed. 5 goals and the action plan is broken into small pieces of how achieving and measuring them". Also as stated by another respondent they prefer to have a lesser number of measures: "I think now when we take our HOSHIN our strategy formulation thing, so there are 30-40 KPIs. Actually, it takes a long time to evaluate them. I think it is good, but when we actually consider the reviewing process that will take much more time and difficult to review. Because of that, the review process might be a problem" - Respondent 7 (AMC).

When the process improvements are considered, they also create all the required measures. For instance, in the Dancing module, there are 17 standards and 4 other measures ["the TL starts to monitor - Downtime, absenteeism, standard hours per head, and incentives per head. The dancing module team will monitor the 17 standards" - Respondent 8 (AMC)]. Again this is similar to the view that TCC had where they consider the number of measures to be dependent on the circumstances. According to the requirement of the process improvement initiatives, they design measures; despite the fact they try to reduce the number of measures at the overall organizational level.

Further, even though they believe that having fewer measures is better and less complex, they cannot drop the measures to a lesser number as evident from statements such as: *“but in our context, the problem is now management want everything to set as KPIs. I think that might be a problem”* - Respondent 7 (AMC) and *“everything we do we measure. We don’t try to balance leading and lagging KPIs. We take the KPI that serve our purpose”* - Respondent 6 (AMC).

## 7 C7 - Performance measures continuously updated

- (a) Literature-based definition for C7: Performance measures should be continuously updated with regard to internal and external changes and re-evaluated and changed/re-prioritized on an ongoing basis to meet the changing requirements and maintain alignment.

- (b) Case study results for C7

Both AMC and TCC continuously update their measures in response to their needs. They were more explicit on the changes taking place within the organizations as a result of process improvement initiatives.

When process improvements are initiated both organizations have introduced new measures. As per the AMC respondents: *“we always try to use measures in the improvements that we do. So if there are no measures that can measure the targets of the improvement we create measures as appropriate ... Whenever we don’t have matching KPIs we make sure that we introduce new KPIs. And we remove certain KPIs when they are not value adding”* - Respondent 6 (AMC) and *“... we have changed several KPIs, rather than using the same KPIs on seated models, we have changed a few KPI measures when we convert to dancing”* - Respondent 7 (AMC). For instance, at AMC, they have introduced 17 standards and 4 measures with the introduction of the dancing module. Also, changes to measures occur when the expectations from introducing a measure is met in process improvement initiatives [*“so once the expectations are inculcated to the practices through the current measures, then we can change the measures towards another expectation”* - Respondent 6 (AMC)]. Similarly practice exist at TCC as evident from the statement of the Respondent 4 (TCC): *“if we do not have measures for a project that we introduce, then we introduce new measures and make ways to control the results”* and the Respondent 2 (TCC): *“whenever we see that there are no measures for a certain critical task we introduce new measures ... Also when we do these projects the activities that we do change, and the attached measures become redundant, then also we put new KPIs. So when a change is necessary we change”*.

In addition, respondents mentioned the following two facts: The AMC respondents stated that when changing the measures it should be done in a transparent manner and not manipulate results. *“If a KPI is changed we record the reasons for the change and we make sure that it is not to manipulate the results. We change KPIs with good faith and to facilitate our continuous improvements”* Respondent 6 (AMC). TCC respondents mentioned that the wrong behaviour can be promoted with inappropriate KPIs. This is taken into account when deciding to change the KPIs. For instance, as stated by Respondent 1 (TCC): *“The wrong behaviour in the plant is created with the wrong KPIs. The behaviour of the plant has to be adjusted with the complete idea about the overall impact that they make. But they don’t understand that overall impact”*.

## 8 C8 - Establishing performance targets or goals with research

- (a) Literature-based definition for C8: Establishing targets or goals for performance measures should be based on research, rather than on arbitrary/ uninformed numbers. Realistic measures will improve acceptance.

- (b) Case study results for C8

Both organizations did not do any formal scientific research or academic research in establishing targets or goals for performance measures and they do not believe that it is necessary to conduct such kind of research to set targets for measures of the process improvement initiatives. But some amount of analysis had taken place in deciding the target levels; and customer demand, market requirements etc. have been taken into consideration in deciding the targets and goals. Therefore, it is considered that this characteristic exists in both organizations.

For instance, in AMC, the targets/goals for performance measures were developed based on the requirements of the initiative and the customer requirements, competition etc. which created the need for the improvement initiative, as evident from statements such as: *“it is a requirement of customer demand. So if we can produce with 1% reject and 1% repair, and the quality required % is 98, so to my knowledge the 98% came like that. ...based on some facts”* - Respondent 7 (AMC). Similar situation existed at TCC and as per the Respondent 8 (TCC): *“the targets for the measures will be based on the requirements we have. It may be from the strategic goals, (which are) created based on competition, customer needs”* and as stated by the Respondent 1 (TCC): *“if we set targets that are not realistic, then we can’t take the change forward. When unreachable, unrealistic targets are set employees get frustrated and the change will fail. That is why it is important to set the targets and goals for these processes with some rational base”*. Further, at TCC their past experience and measurement

results were considered when setting targets for measures. As stated by the respondents they mainly “*base the targets on experience. But most of the time they are realistic. With the experience we have, we can decide that. It is not just a gut feeling. Everyone cannot say that. But with the experience we can*” - Respondent 3 (TCC). Thus they are concerned on setting the targets with some rationale.

In addition, they also analyse performance results in setting targets after they have implemented the initiatives as evident from statements such as; “*... we have a process called PDCA - plan, do, check, act. ... the Check part is about the measures and Act part is how you come up with the improvement initiatives or something like that, ... in this PDCA part, we take a lot of time for the P, like for the planning. So we analyse data, we go by facts and we present them to the teams and we then make decisions on targets*” Respondent 1 (TCC)

## 9 C9 - Performance measures having an all-inclusive/ balanced/ multi-dimensional set of measures

- (a) Literature-based definition for C9: Performance measures should contain an all-inclusive/ balanced/ multi-dimensional set of measures; e.g. a combination of outcome and process measures; KPIs and measures for both: leading and lagging indicators; internal and external indicators; and efficiency and effectiveness related indicators.

- (b) Case study results for C9

To have a complete idea on the results generated through process improvement initiatives organizations should use multi-dimensional measures as evident from respondents from both organizations. As stated by the Respondent 1 (TCC) and evident from the documentary evidence provided, TCC bases the KPIs on five pillars: business performance, financial performance, customer focus, process excellence and people engagement. Thus they have measures covering all these aspects. They have these multi-dimensional measures to assess the success of the improvement initiatives as stated by the Respondent 8 (AMC): “*Otherwise, we cannot measure the success. We might miss one part. So we should ensure that we cover all aspects*”.

Both AMC and TCC consider leading and lagging measures are important to control the improvement initiatives. For example, they say: “*these are the main two things. Leading and lagging. So every project when we finalize our KPIs, we first think what are the leading KPIs and what are the lagging KPIs. This is the result. So when our chairman comes he needs this. He knows if we do this (i.e. Leading), automatically this comes ... then the KPIs should be developed related to these man, machine, material and methods. Leading and lagging*” - Respondent 7 (AMC). But at the same time, it is a challenging task to define leading and lagging measures as per the respondents: “*when you define these leading, lagging indicators it's taking time, so it's very difficult, challenging as well*” - Respondent 1 (TCC).

As evident from the respondents in both organizations, due to the complexity of the processes, there should be multi-dimensional measures. For instance, the two statements listed below illustrate the complexity in the processes and the need for measures to be multi-dimensional: “*we are both machine oriented and also process oriented. Therefore we have to measure in many aspects ... Any business will have goals. For us, we have goals related to production. In addition, we have goals related to getting the product through a process with people. So there is product, process and people. We measure all this and also we try to link everything together*” - Respondent 6 (AMC) and “*how it is linked is in two ways. One is the conversion cost. When the service efficiency and effectiveness reduce the Conversion cost is directly affected. Changeover time is high means that cost is high there. Taking a lot of manpower for changeovers is again cost is high. Not releasing the mould within the lead time will make the tyre delayed and reduce the tonnage. Lead time and CC makes issues in this (for xxx). That is the main part that is there with the plant ... All these will be assessed at different stages. We have to have a 360-degree view*” Respondent 1 (TCC).

Also, it was interesting to note that they take lagging and leading similar to the meaning of quantitative and qualitative measures; which is acceptable (This is discussed as a separate characteristic in C11. But as mentioned in the discussion section C9 and C11 need to be combined and taken as a single characteristic). For instance, the following two statements confirm that they give the same meaning for both: “*we have financial and non-financial KPIs. We call them leading and lagging KPIs*” - Respondent 6 (AMC). “*These are the ones that we monitor as ‘results’. We call as lagging KPIs or also now we call them as the quantitative. ... Before these we have to talk about the qualitative measures or the leading KPIs that helps to change the behaviour of the team members*” - Respondent 7 (AMC).

## **10 C10 – Performance measures having both long-term and short-term views**

- (a) Literature-based definition for C10: Performance measures should take both long-term and short-term views into account.
- (b) Case study results for C10

Both short term and long term targets and goals of the process improvement initiatives are measured by AMC and TCC. In the short term, there are daily, weekly, monthly targets that need to be measured and the progress towards the long term goals are also reviewed.

For instance, the Respondent 8 (AMC) stated that *“we measure both short term and long term. Day to day operations as well as the progress in achieving weekly, monthly, annual and long term goals are measured and reviewed. For the projects also it is the same. We measure in the short term and long term”*. They believe that with short term measures they are able to comply with the short term expectations of the process improvement initiatives, which later lead to achieving the long term targets and goals: *“... for daily things we mainly consider that as leading KPIs. So that will help to improve our lagging KPIs. ... So daily things also need to be monitored. If we monitor that, we will achieve our lagging KPI, that's how we think”* - Respondent 7 (AMC).

TCC also measure the short term and long term targets. Further, they believe that for improvement initiatives to sustain in the long run, the short term measures need to be used more frequently at the beginning after implementing the initiative. This is evident from statements such as: *“using the measures we measure the achievement of the long term goals and the short term objectives. For projects, we should look at the short term impact more regularly so that it can continue in the long run”* - Respondent 2 (TCC) and *“we have developed measures to monitor in the short term and also in the long term. We need short term measures to keep the processes on track and then when we take the project to a certain level the measures might change and the perspectives that we need to look at it will change. i.e. long term. Both will influence the sustainability of the project”* - Respondent 3 (TCC).

## **11 C11 - Performance measures having both Financial, non-financial/ Objective, subjective/ quantitative, qualitative performance measures**

- (a) Literature-based definition for C11: Performance measures should be available to cover both Financial, non-financial/ Objective, subjective/ quantitative, qualitative performance measures. Most literature sources recommended the use of both types together to give a complete view of the performance.
- (b) Case study results for C11

Both financial and non-financial measures are used in measuring process improvement initiatives at AMC and TCC as evident from the interviews. E.g.: *“We had both qualitative and quantitative measures. We looked at the quality of work as well. By merely sending the moulds through the expectations will not be fulfilled. We assessed the quality of the moulds, the number of break down etc. together with the quantitative aspects. Then it is easy to sort issues and do the work continuously”* - Respondent 6 (TCC). They consider both to be important and they use both because they need to get a complete picture: *“... with only financial measures you sometimes won't be able to get a complete picture to manage the changes. It is to get a complete picture. We have to look from different sides to get a complete idea”* - Respondent 3 (TCC). The existence of both is important to ensure that the KPIs are met with acceptable and ethical behaviour as evident from statements such as: *“We call the quantitative – KRA – Key Results Area. Qualitative we call as Baseline. For baseline we have included leadership aspects, training. We are asked to put those because they might achieve the KPIs with bad attitudes – by forcing people, scolding them etc. For us to control that we get the liberty from these”* - Respondent 2 (AMC).

In process improvement initiatives the non-financial aspects are measured from the start as they are influencing the sustainability of the initiatives: *“The non-financial ones we have to measure from implementation itself. If for instance moral drops it makes a major impact. The financial ones will start showing results in the continuation stage. And we continuously monitor both to ensure smooth continuation”* - Respondent 8 (AMC).

Also, it is evident that when they refer to financial and non-financial, they have an underlying assumption of having a multi-dimensional view on performance. For instance statements such as: *“we look from all possible angles and then we decide on measures and KPIs. We have financial and non-financial measures in projects. We try to make it complete as possible so that we don't face any issues in continuing the change”* - Respondent 5 (TCC); *“we have financial and non-financial. We measure from all perspectives. We look at the process from many different sides to get the idea of how it is happening and why some issues arise. When you don't have a complete set of information from all sides you will not be able to get to the proper track when there is a problem”* - Respondent 8 (TCC) refers to a multi-dimensional state when they refer to financial and non-financial.



## 12 C12 - Use of trend and ratio based performance measures

- (a) Literature-based definition for C12: Performance measures should include trend and ratio based performance measures, focusing on identifying the improving trends rather than snapshots and to calculate ratios rather than absolute numbers through measures.
- (b) Case study results for C12

The use of trend and ratio based performance results are used in both organizations. For instance, Respondent 1 (AMC) stated that: *“mostly the results are visualized in ratios or trends or as comparative figures. Also as you might have seen around, a lot of colour coding and smiley faces are used to make them easy to understand”*.

In addition, respondents in both organizations stated that they prefer ratios and trends when compared to absolute numbers when measuring and presenting results of process improvement initiatives. For instance, Respondent 8 (AMC) stated that, *“more than numbers we think it is good to see them in graphs. ... we have the highest turnover in April because they take the bonus and leave. If we do not monitor the deviation through trend and identify the period when this rate high. ... the real problem would not be visible”*. The Respondent 7 (AMC) had a similar view: *“if we draw a trend line it's more visualized rather than putting a number ... Now when we take a few months of our labour T/O we can clearly see there is a huge deviation in January and May. Now those are the months we normally pay our bonuses. Once they get the bonus, they leave. So without having the trend line ... we can't understand our problem. And sometimes, after coming A/L results also some people leave. Definitely, we need to use trends and ratios”*.

Further, with the statements they make referring to percentages, ratios and trends when providing examples during the interviews it became obvious that both organizations use trends and ratios in relation to performance measurements in the process improvement initiatives [E.g.: *“at that time the efficiency was always above 90% but with the issues in mould we couldn't achieve the target 95% KPI”* and *“Labour utilization was in 22%”* - Respondent 3 (TCC)]. It was mentioned that they remove exceptional conditions when creating trends for decision-making purposes: *“... we look at the trends and ratios mostly, but when you look at trends and ratios there are some exceptions, like ... some trends, for example, if we look at the distribution part, ... like if you consider particular horizon, 1 yr horizon we might not consider whole 1 yr horizon of the trend, there are some obvious skipping points that we have in that particular horizon. Like say, in the month of April, or in the month of December, and in the month of January as well. So we know that all our distribution and all supply chain slow down. So we don't consider that period in the horizon to make a trend, so we generally we adjust the horizon and look at the trend, with our experience and understanding”* - Respondent 1 (TCC).

## 13 C13 - Performance measures considering organizational strategy

- (a) Literature-based definition for C13: Performance measures should change dynamically and be consistent or coherent with the organizational strategy to support strategy realization. Thereby measures can be implemented as a means of articulating strategy, monitoring business results and communicating the organizational strategy.
- (b) Case study results for C13

The need for the performance measurements to be aligned with the organization strategy is accepted by respondents in both organizations.

The projects/ improvement initiatives etc. are done to meet the strategic objectives as stated by the Respondent 7 (AMC): *“from the Hoshin we get the goals for the functions and the goals of the projects done for processes are also linked to it when trying to achieve the Hoshin”*. And when the process improvements are planned they ensure that they are linked to the organizational strategy as stated by Respondent 1 (TCC): *“in the project, when we define the project mandate and the charter, we make sure that all of the objectives and the measures really align with our organisation's strategy. So this is now the organisation's strategy, it triggers from here”*. Then the measures are used to monitor the progress of these improvement initiatives towards these goals.

At TCC, the overall strategic vision is divided into operation plans and communicated to the lower levels through KPIs. The process improvement initiatives are linked to these strategies and thereby the process performance measures are also linked to the organizational strategy as evident from statements such as: *“these are 3-year visions. From that 1-year operation plan is extracted. Say if it is cost reduction, we should identify from which projects a particular true north KPI will be achieved. Those are high-level KPIs”* - Respondent 3 (TCC). Similarly as stated by the AMC respondents, the strategic vision/goals are cascaded down to the lower levels using performance measures. For instance: *“strategy is the starting point for the Hoshin and then it will flow down to each level through the measurements designed for each level”* - Respondent 2 (AMC) and *“I think that KPIs bring the strategy to the lower levels in the organization. Again when the strategies change they will be reflected on the lower levels through the changes done on KPIs”* - Respondent 8 (AMC). Further, they ensure that the process improvement initiatives are linked to the strategy for the sustainability of them as stated by the Respondent 8 (AMC): *“when the projects are linked to the strategy it will have an influence in the long term... sustainability”*.

The contribution of process improvement initiatives to achieve the strategic goals is monitored through the process performance measures (in this case - customer experience, customer experience and operational efficiency) as evident from statements such as: *“how are you improving the customer experience, how are you improving the business growth and how you increasing the operational efficiency. Likewise, whatever we do, we have to make sure that all the initiatives fully align with one of these or all of these. Then we measure the progress of the initiatives against these objectives. If we meet them or on the path of meeting them, then there is no problem. If not we adjust ... So we have the alignment from top to bottom”* - Respondent 1 (TCC).

#### **14 C14 - Performance measures linked to targets, goals, and objectives**

- (a) Literature-based definition for C14: Performance measures should be linked to targets, goals, and objectives and be mutually supportive and consistent/ congruent/ and aligned with the business's operating goals, objectives and targets.

- (b) Case study results for C14

At AMC, the strategic goals are cascaded to the lower levels in the group and they become the base for extracting the targets, as stated by the - Respondent 7 (AMC): *“We get the Hoshin. And that is the direction. That is coming from the holdings level. Then it is cascaded down to the Intimates level and from there to the SBU level (i.e. strategic business unit) ... In each of these levels, we have an action plan. That becomes the target that needs to be achieved and we measure against it”*. Similarly, at TCC, based on the organization strategy the targets and goals for the different organizational levels are extracted. *“We define the objectives for the divisions and targets based on the strategic goals. Then we cascade them down to the operational level. They will get the index cards that clearly explain the KPIs”* - Respondent 2 (TCC).

Further, in meeting the given targets, they initiate process improvement initiatives: *“... in meeting these targets we have to improve the processes. So we do improvement projects to meet the targets and they will ultimately allow meeting the organization strategy”* - Respondent 6 (AMC). Then these processes are monitored to ensure that targets are achieved as expected as stated by the Respondent 3 (TCC): *“we tried to reduce changing time from 70 minutes to 30 minutes and we monitored the achievement of this target very closely”*.

Thus the need for the performance measurements to be linked to targets, goals, and objectives is accepted by respondents in both organizations. This C14 and C13 can be linked together.

#### **15 C15 - Performance measures linked to critical success factors**

- (a) Literature-based definition for C15: Performance measures should be linked to critical success factors and key business drivers and take into account the most important organizational factors influencing the productivity of the different processes.

- (b) Case study results for C15

Both AMC and TCC consider critical success factors to be important in process improvement initiatives as evident from statements such as: *“through a project, we change something that we have. So we have to consider the critical success factors. From the planning stage itself, it is important”* - Respondent 8 (AMC). They consider it to be important for various reasons. For instance, when the efforts made on the improvement initiatives are very costly to the organizations they are concerned about measuring the critical success factors related to those initiatives [e.g. - *“We have to think about what things are critical for a project to be successful. It may be the skill, it may be the machines used it can be anything. When we plan projects we think about critical success factors. What is critical for the success of a project. We do these projects with a lot of testing. They are not taken from the shelf and applied. We spend a huge cost in planning and doing these conversions. So we are concerned. Then we plan and put measures whenever applicable to measure these critical success factors”* - Respondent 7 (AMC) and *“We don't consider that when designing measures for all projects we do. But I think it is important to consider critical success factors for projects with very high investments and that is hard to initiate etc. But for this project we have not considered”* - Respondent 3 (TCC)].

Also when designing measures for complex projects critical success factors are taken into account [e.g.: *“... honestly critical success factors we know it's very important but for every project, we don't precisely define these critical success factors. This particular project, I don't have it ... but I would say complex projects, we define the critical success”* - Respondent 1 (TCC)].

Also, it was evident that the critical success factors of certain improvement initiatives may change due to changes in geographical locations: *“But when we take the planning stage itself this should be considered and it will change even with the geographical area. For example, if we take the dancing module, the team members in this area are taller than in some other distance areas. Therefore the standard height of the machines should be different in the different areas and this needs to be considered from the planning stage itself”* - Respondent 8 (AMC).

Thus it is evident that both organizations measure the critical success factors only when process improvement initiatives are costly and complex.

#### **16 C16 - Considering stakeholder needs when designing performance measures**

- (a) Literature-based definition for C16: Performance measures should take into account the stakeholders' (such as: customers, employees, shareholders, suppliers etc.) needs when developing performance measures. The measures should be reviewed and accepted to ensure their buy-in. The adoption can be increased by designing KPIs carefully with the involvement of the process stakeholders.
- (b) Case study results for C16

In both organizations, performance measures related to the whole of the organization is designed with the involvement of many parties as evidenced with statements such as: *"we took people from different positions like executives, managers, GMs, Directors and together we designed the: system and format"* - Respondent 2 (AMC). Similarly, the measurements related to the process improvement initiatives are also designed with the involvement of the employees (the parties who actually perform the activities in the process) and statements such as: *"We take time and lot of discussions with employees are happening at this stage to make the measures/KPIs clear ... We get the staff from all levels when defining the measures"* - Respondent 2 (TCC) and *"the KPIs that we need to include are collectively designed with the teams. Then they feel that it is their KPI, and they take ownership for them. If we give the KPI without their involvement, then it won't help for the KPI driven culture. Then they work towards those KPIs and try to deliver"* - Respondent 3 (TCC) are examples.

The needs of shareholders and customers become reasons for such improvement initiatives and meeting their needs is ensured through measurements [e.g.: *"If we do not achieve the expected efficiency targets, then that means we may not be able to deliver on time. And that hits the customer. So we do all these measures to secure the customer. We change the measures if needed to tighten the controls and we then try to deliver on time, 100% quality and with low cost"* - Respondent 9 (AMC)].

In addition, all related stakeholders are considered when designing the overall performance measures and these will sometimes influence the individual process improvement initiatives as well [*"Mostly we consider all our stakeholders. Shareholders, Customers, governmental bodies, suppliers, employees, other plants we have measures related to all. Shareholders – guide the directions; Related to Customers – For the given standards we align the KPIs; Government bodies – Number of working hours, weekend work, and compliance issues ... Individual project will have its own stakeholders. Sometimes a client account is not directly linked. But when you take all the improvements together it will influence a client account"* - Respondent 6 (AMC)].

#### **17 C17 - Performance measures should track the past and present performance to set targets for the future**

- (a) Literature-based definition for C17: Performance measures should track the past and present performance to set targets for the future. This will enable the provision of information about past performance and facilitate future planning of the processes.
- (b) Case study results for C17

In process improvement initiatives there is no past, therefore, the measurements start after the initiative is implemented as evident from statements such as: *"we track the performance real-time, then and thereafter we start the project. Then we take decisions for the future based on that. When there are issues we sort them. We do changes and we try to be on track"* - Respondent 3 (TCC).

According to the respondents in both AMC and TCC, they measure the current situation of the process improvement initiatives and based on the performance information generated they do further improvements (as discussed in C 35 also) E.g.: *"we have nothing to measure in the past until we start. After implementation this will influence the continuation and CA part in the PDCA will use this results"* - Respondent 1 (TCC); *"we measure the current performance and for issues we get, we do problem-solving and Kaizens. So at that stage, we think about future"* - Respondent 7 (AMC) and *"When we take a project, to measure the success of the project we have to monitor with the past records. That will be done from the implementation stage and will influence the continuation as well ... we set targets for the future on how much efficiency we should maintain"* - Respondent 8 (AMC).

Thus both organizations consider this characteristic to be important and they have it in their measurement system. The only difference is they cannot measure anything about the past of the process improvement initiatives.

### 18 C18 - Performance measures linked with the rewards system

- (a) Literature-based definition for C18: Performance measures should be linked to the rewards/ incentive system to motivate employees to accept the introduced changes. The link between the rewarding mechanism and the performance results generated from the measurement system should be transparent.
- (b) Case study results for C18

Both AMC and TCC use monetary as well as non- monetary incentives to motivate employees to accept and continue the changes introduced through the process improvement initiatives.

At AMC, they provide the opportunity for career progression for talented performers who perform well in the dancing module and as well as in other work. This motivates the team members to follow guidelines and corporate with the changes introduced. As stated by the - Respondent 2 (AMC): *“with the career progression team member become a team leader and then a GL (group leader). Those two are staff levels. When they become team leaders they get an allowance based on the overall performance in the team”*. Similarly at TCC, the team leaders are appointed from the floor level employees to motivate them towards accepting the changes introduced. Based on the corporation given on improvement initiatives and performance, team leaders are appointed from the floor level employees itself. This is done with the expectation of getting the support from similar other employees who seek opportunities for growth in future as stated by the - Respondent 3 (TCC): *“Some of them do not have a good education background but they have good expert knowledge with 25 to 20 years. And this appointment to TL will motivate them. ... They have a value when appointed from them”*.

Based on performance the employees are getting rewards in both organizations. As stated by the - Respondent 6 (AMC): *“the increments, bonus, promotions all are linked to the KPIs. Executives and also the team members in the production floor both groups can progress in their career. All that is based on the KPIs”*. Thus performance measures are playing an important role in linking the rewards system with the performance results. Also, they have motivated employees towards the changes using monetary incentives; by linking the activities and results of the improvement initiatives with the incentives as evident from statements such as: *we monitor several KPIs from different aspects. Each person will get KPIs. Here the KPIs relevant to the team members will play a role. ... They will get measured against that KPI. The KPI measured related to team members is incentives per head. When they ... can increase the production by standing, then they will definitely do it. Because the person who takes 20,000 can then take home 25,000 they will accept the challenge”* - Respondent 7 (AMC); and *“Yes.. all employees have an individual operating plan. They are assessed based on that. Then when it comes to projects, we give some additional focus on incentives. When we do projects, we link some incentive and introduce it at the beginning. That is a kick start. Then employees tend to favour the projects than when there is no tangible benefit”* - Respondent 1 (TCC).

From statements such as: *“We have taken the incentives per head to make a behavioural change and make the members stand willingly”* - Respondent 9 (AMC) and *“the incentives attached to the module were also another reason here (for accepting the dancing module). There is a win-win situation here where the company is gaining as well as the operators are also gaining”* - Respondent 5 (AMC), it is understood that by linking rewards to the performance through the measures creates a benefit to the organization as well as the individual employees. And they believe a lot in measures and states that: *“what measured gets done. So when measured, the projects can be promoted. Also when it has a reward the promotion is easy”* - Respondent 6 (AMC) and *“The changed measures, continuous monitoring and reviewing, incentives given made this project continue”* - Respondent 2 (TCC).

In addition to these beliefs of the management, the employees also understand that their pay can be increased when they perform and meet the KPIs [e.g. *“We are even compensated related to the performance. If we don't work well we get a lesser pay. If work well more pay.. have you seen the Rs 5000 note that is displayed on top of each line..? we get that if all of us in the line complete the targets in the month. So we move here and there and help the ones that are creating stock in the line and somehow try to send the OUT number properly on time. If no one measured our IN and OUT then nothing will happen on time”* - Respondent 12 (AMC) and *“Our incentive system changed. We could earn better and higher incentives by working hard”* - Respondent 8 (TCC).

### 19 C19 - Performance measures integrated with process execution

- (a) Literature-based definition for C19: Performance measures should be integrated with process execution and connected to the KPI and the steps in the processes.
- (b) Case study results for C19

An important fact about performance measurements and process improvement initiatives is that if the process is not linked to measures then the continuation or the sustainability of the process improvement initiative is at a risk. Especially due to past experience on the failure of a similar project at TCC they identified the importance of these measures in improvement initiatives. As per the respondents: *“... the centre together with consultants designed the project with the middle and senior manager level staff ... The KPIs were set but they couldn't be achieved because there was no link to the actual work performed and the KPI base ... the project failed earlier*

because the targets and the KPIs were not clear and were not in line with the actual processes in the operations” - Respondent 6 (TCC). In this initial attempt, they could not define the measures as they did not have the exact process defined as evident from the statement of the - Respondent 1 (TCC): *“the KPIs could not be defined because you don’t know from where to measure. It was like a fundamental issue that we had”*.

Similarly, AMC also assumes the importance of linking measures to process [*“It (measures) should be linked to the steps. Otherwise, the process might get deviated from the expected performance. And this is important in the long run in continuation”* - Respondent 8 (AMC)] and try to gather process-related performance information as stated by the - Respondent 6 (AMC): *“when we directly get the process performance information then we can see the effect. When we take the functional performance, divisional performance or Talent2o we only see how we meet the Hoshin requirements. Not how much successful we are in the projects”*.

Also in developing measures for process improvement initiatives, a top to bottom approach is not recommended by the respondents. As stated by the - Respondent 3 (TCC): *“a top to bottom approach will not work ... Without knowing the current situation of the process you can’t put KPIs. You should be clear about - from where to where the process goes”*. With this understanding, at AMC and TCC they have developed measures for the different steps in the process that is improved as evident from statements such as: *“there are measures for the activities in the process and we have introduced them when we introduced the module. So from the start we are measuring them”* - Respondent 7 (AMC); *“when the projects are initiated we develop measures according to the action plan”* - Respondent 6 (AMC); *“for each and every step in the process we have measuring KPIs. We have to show the progress because we get together as a team and we plan for 3 months or 6 months and then we have to execute and show the progress”* - Respondent 3 (TCC); and *“when we are doing improvements to the processes we should have measures that go in line with the process activities ... After doing the mapping and identifying the activities we were clear on where we should focus on. And also on where we should really measure”* - Respondent 6 (TCC).

Thus it is evident that both organizations have integrated the performance measures with process execution and connected to the KPI and the process steps.

## **20 C20 - Performance measures consider the organization as a whole**

- (a) Literature-based definition for C20: Performance measures should consider the organization as a whole, to minimize conflict. i.e. to minimize sub-optimization among the sub-groups/ divisions/ processes within the organization and achieve benefits from an overall company perspective. The design should recognize the trade-offs between different performance dimensions.
- (b) Case study results for C20

Both AMC and TCC consider the organization as a whole and as separate processes and functions at different points according to the decision that they are taking based on the information. Also, they consider the interconnection between the processes and functions when measuring performance. For instance, according to the - Respondent 8 at AMC: *“in the dancing module efficiency is the main KPI. For it to drive, there are other things like work in the cutting, downtime should be measured, that needs to be linked. All these processes should be aligned because the final result is a link of all these. So we have to consider all that in the measures and monitoring KPIs”*. Similarly as stated by a TCC respondent: *“At the corporate level, there is a separate managing team. They are called “Business process and management framework team”. They will analyse. They will take together the business processes and will look at the link with the KPIs and do the overall monitoring”* - Respondent 1 (TCC).

At AMC when they refer to the ‘whole’ organization they referred to the ‘dock to dock time’. There are measures to consider this whole aspect of ‘dock to dock time’ as well as measures for the individual process improvements that are initiated to reduce the dock to dock time. The two statements listed below illustrate this further: *“there should be an interconnection. When we talk about the whole concept we are talking about the dock to dock. That means when RM comes to our warehouse and we ship to the customer so we All try to reduce the dock to dock. So that's one common KPI. But apart from that, several projects are there. Now, dancing is one thing, so TL-GL is there, BIQ is there, supplier integration is there. All of them are trying to contribute to reducing the dock to dock. That's our man KPI. So we have individual measures and KPIs for each process separately and as a whole”* - Respondent 7 (AMC) and *“we were able to roll out this into all the 80 lines but the efficiency has not improved in all the lines. Therefore the goals are not met sometimes. This is because not only standing up can increase productivity, other aspects such as machines fit to support, skill, quality, operations, ecosystem etc. should support the achievement of the goals. so we have to measure and monitor all these aspects. This is a matter of time and it is a journey”* - Respondent 5 (AMC). With these types of statements, it is evident that they consider all the processes as a whole. Similarly, at TCC, they mentioned that they *“consider the organization as a whole when cascading the strategic vision throughout the company. Measures are also linked to these objectives and targets”* - Respondent 2 (TCC). And they have attempted to develop separate measures for processes and to the whole plant: *“we have measures separately for processes and also high-level measures for the whole plant. That facilitates monitoring the overall achievements and also*

*monitoring and controlling the contributions of each process” - Respondent 3 (TCC) and even though they still have certain issues of the silo thinking they believe that it is important to take an overall view that is combining all processes and functions as evident from statements such as: “what is profitable in the Sri Lankan operation will not be beneficial to the whole group. Sometimes making a loss on some division can bring the total profits up. So it is not only the impact to Sri Lanka that we should consider but to the whole group” - Respondent 4 (TCC).*

Also TCC indicate that not considering the overall impact of measures and KPIs will promote wrong behaviours that are not beneficial to the organization. Thus they attempt to minimize such KPIs and to consider the overall impact through new improvement initiatives [e.g.: *“The mould team looked for the loss separately and the production team looked for the loss separately and the overall target could not be achieved ... So we should not measure individually, we should look at the process together” - Respondent 3 (TCC); “the wrong behaviour in the plant is created with the wrong KPIs. The behaviour of the plant has to be adjusted with the complete idea about the overall impact that they make. But they don’t understand that overall impact ... They like to maintain a good conversion cost. So they don’t like to change. But we need to check these needs for change and implement changes” - Respondent 1 (TCC) and “one project in the delivery commitment project that the centre is trying to is to put all these information flows into one system that each of us see the impact we make on the whole organization” - Respondent 4 (TCC)].*

Accordingly, it is evident that both organizations consider the organization as a whole to minimize conflict.

## **21 C21 - Focus on processes and integration of functions**

- (a) Literature-based definition for C21: Performance measures should focus on processes and integration of functions. The measurement systems consider processes as well as the whole organization or organizational units for measurements. The cross-functional issues should be addressed. Further, measures of one process should be integrated with other processes and functions within the organization both vertically and horizontally.

- (b) Case study results for C21

In both organizations they have a mix of functional performance measures and process focused measures and they consider the cross-functional impact. As stated by the - Respondent 6 (AMC): *“in the company, we have the Talent2o (the PMS) separately. In the plants, the functions are inside the processes. We have standards and KPIs for functions and processes both”*. As further stated by the Respondent 7 (AMC), *“it cannot be clearly separated as process or functional. We have standards and KPIs related to both functions and processes. From the Hoshin we get the goals for the functions and the goals of the projects done for processes are also linked to it when trying to achieve the Hoshin. So we have both aspects considered together”*. As indicated by the respondents at TCC it is challenging to balance the measures for functions and processes and get those two aspects together into a single platform. As stated by the Respondent 1 (TCC): *“if you try to have one set of KPI's and measures in a project, without compromising the objectives of the respective function or the BU, it's challenging. Because our organisation is not that much, you know, it's still the silo thinking we have, so it's very difficult for us, and it's very challenging I would say. Challenging, when we try to get them on board together for a common goal”*.

Both AMC and TCC attempt to view the impact of processes on other processes and the impact of functions on other functions together to obtain a complete view before and during process improvement initiatives, as evident from statements such as: *“when we talk about the dancing module, it mainly focused on the production. Apart from that, there are other KPIs we have for the whole but when it comes to dancing, we need support from raw material. The raw material support we measure on RM, PCU etc. ... machine support our IE team is there. ... To give them methods support, our technical team is there. So we measure technical support ... And people support will give by the HR team. So likewise, they are similar combined functions that we measure separately and see the impact together” - Respondent 7 (AMC); and “before we implement or go live situations ... we have the process integration validation. So we get all together and we ask them to run through all the validation, the process integration” - Respondent 1 (TCC).*

Therefore, it can be concluded that both AMC and TCC, focus on processes and integration of functions.

## 22 C22 - Users having control over performance they are measured

- (a) Literature-based definition for C22: Users of the measures should have control over the performance measure by which they are measured. But the possibility for manipulations to the PPMS system, data or data collection process should be kept at a minimal level, to maintain the credibility of the information generated through the PPMS.
- (b) Case study results for C22

At AMC and TCC they ensure that the measures used are measuring tasks/activities that the employee is responsible for and any tasks/activities that the employee do not have control is not measured under his/her KPIs. As stated by the Respondent 9 (AMC): *"we are measured on what we are responsible for. Everywhere it's like that. Even the team members are monitored for their individual targets hourly, daily and then as a line together daily, weekly etc."*. Similarly as stated by the Respondent 3 (TCC), *"to a major extent we can control. As the department heads, we agree to the planned targets given from the top. At the beginning of the year, we get these. When working towards them, if we identify that we are not in control of these, we can discuss with our superior. Then he will get the support from the other supporting/involved teams/departments"*.

Also at AMC, they have a model called 'RACI model', where for each activity in an action plan they have allocated employees who are responsible, accountable, be consulted and be informed. As stated by the Respondent 7 (AMC): *"there are people who should be responsible, some should be accountable, some should be consulted, some should be informed. So, there is a responsible person for getting a task done and they have control over that task which they are measured on"*. And they believe that it is important to measure the employees only for the tasks they are responsible for, as evident from statements such as: *"If the workers or anyone is measured for what they are not really responsible or for something they do not have control, that doesn't make sense. Whatever the effort they put they cannot control the result. Then they get demotivated and frustrated and the projects will not get the acceptance we want"* - Respondent 2 (TCC). But sometimes there are issues in having a 100% responsible person for certain measures and results: *"I work in a place where the final result is given out. The issues get highlighted at this point. And everything is monitored by my KPIs. For instance, say a line didn't get properly cut materials and on that day the line did not perform well. But the efficiency is measured through my KPIs. So I have been responsible for what is not under my control. Maybe the issues had happened with the supplier, not even from our plant. But still, I am responsible at the end of the month when efficiency is monitored"* - Respondent 6 (TCC). But as they analyse the results at the review meetings, the real causes for deviations are identified and solved and the employees are not penalized for things beyond their control.

As stated by both AMC and TCC the opportunity for manipulations is maintained at a minimum level due to regular reporting cycles and reviews. This is evident from statements such as: *"we report and review the results of projects at the plant level regularly. This ensures that even the mistakes that happen are rectified before continuing and necessary corrective actions are taken to minimize discrepancies"* - Respondent 2 (TCC); *"can be done at one level. But at the next level, the supervisor will check the records. There can be intentional errors or unintentional errors. So the superior will check and get involved to show the most accurate information to the next level. Attempts made to adjust and show erroneous results can only survive for a limited period"* - Respondent 3 (TCC); and *"No they can't manipulate. We make the results visible for all levels. Each line see their performance, each division sees their performance, the managers see the overall performance. The TL, GL have responsibility for targets. Then we review all these regularly. So if they manipulate it cannot be continued for long"* - Respondent 6 (AMC).

Thus this characteristic exists in the measurement systems of both AMC and TCC.

## 23 C23- Performance measures should be applied consistently throughout all levels of the organization

- (a) Literature-based definition for C23: Performance measures should be applied consistently throughout all levels of the organization and be part of a closed management loop. The corporate and business strategies should be translated consistently to all levels of the organization (strategic, tactical and operational). All relevant activities, functions, and departments along the process should be considered and measured at the individual or team level.
- (b) Case study results for C23

Once the strategic goals are set, they are cascaded down to the lower level. In order to ensure the achievement of these cascaded strategies, the performance is monitored at all levels. The application of performance measures at all levels consistently is evident in both organizations.

For instance, the TCC respondents made statements such as: *"all these KPIs are cascading down from the top. As I said earlier there are three main KPIs and then that goes to the strategic level and then to operations. In operation plants, the number of KPIs will be higher than at the strategic level. In IE there are KPIs, in Safety there are KPIs, in operations, there will be KPIs. So there will be a lot of KPIs"* - Respondent 3 (TCC) and *"we define and measure. This is the initiating point. Then it will come down. After the index card is made and defined, the next step is the annual operating plan. 3 years, 5 years strategic road map is there. That will be*

*cascaded down. And will be broken down into years and see what is the operating plan in one financial year. ... that operating plan comes, the objectives and KPIs that were in the top will be cascaded down to the lower levels operating plan and KPIs are coming to the business ... The same KPI will not come to lower levels as it is most of the time. It can come down as a PI or may be sometimes as the same KPI as it is. Then we measure these at all levels” - Respondent 1 (TCC). Similarly, from the following statements of the AMC respondents, it is evident that the measures are applied consistently at all levels: “I get goals as the head in my department. Then according to them, I set goals to my staff. For instance, I tell her (xxx): in the dancing you should hit this much of efficiency, have this much hit on the conversion plan etc.” - Respondent 7 (AMC); “in this, we have WHAT, HOW and HOW MUCH OF HOW... what - means the policies, How - is the strategies and HMOH - is the KPIs. For everyone in this structure, there is a matrix. Cascading down...” - Respondent 7 (AMC); and “We go through all the processes and see where we are in achieving the vision. We monitor everything. KPIs will cascade down and everyone will be measured” - Respondent 6 (AMC).*

Also at TCC, they have a mechanism of communicating the issues identified through performance measures throughout these levels according to its severity as evident from the statement: “There is a feedback loop. In each management framework if we have any cascaded thing that we have to cascade to the next level. They take notes. We have appointed representatives on the shop floor. We have team leaders. They take notes from the shop floor and brief to the next level. That is the group team leaders (GTL). They will discuss together. When it is time to the GTL also to escalate to the next level it goes to the SI (Shift in charge). They discuss together. If they have certain things to escalate, it goes to the production manager, from there to the Plant director and then to the Production executive director and to the higher level VPs” - Respondent 1 (TCC).

Therefore, it is evident that performance measures are applied consistently throughout all levels of the organization in the measurement systems of both AMC and TCC.

## **24 C24 - Performance measures should be cost effective to use**

- (a) Literature-based definition for C24: Performance measures should be cost effective to use. The benefits created for the organization through the results generated by the performance measures should outweigh the cost of gathering information/data to generate those results.

- (b) Case study results for C24

Both AMC and TCC do not calculate the cost-effectiveness of their measurement system related to the improvement initiatives being studied nor with the overall PMS and its benefits to the overall organization. They measure all aspects that they consider to be important in the improvement initiatives. But both organizations are attempting to introduce more efficient and effective ways of capturing and generating process performance data. They believe that measurements are important despite the cost they incur, but take actions to minimize the costs.

As evident from the following statements both AMC and TCC do not assess the cost of having measures but they consider measures to be important: “we don't calculate that (cost of having PPMS) cost. But I think measures are important and without measuring we can't take this forward” - Respondent 3 (TCC); “we should not think about the cost as long as it gives a benefit ... Even the projects (improvement initiatives) we cannot manage unless we know what is the current status, how is it compared to the previous method, how is it compared to the previous week or month or the standard etc.” - Respondent 2 (TCC); “cost-effectiveness of measures is not measured. We assume that it is essential to measure and we cannot think of looking at the trade-offs there. Whatever we need we will assess” - Respondent 1 (AMC) and “we are not concerned about cost efficiency. We measure. And we think it is worth measuring. We have developed the systems in a way that we get the necessary information to do the measurements and control the projects in the direction we expect” - Respondent 6 (AMC).

Despite trying to be cost effective both AMC and TCC are trying to implement measurement systems that can gather useful/effective performance data. Though these attempts increase the short term costs it will have a long term impact on the cost-effectiveness to the organizations. For instance, at TCC they are trying to streamline the information flow of the entire business, because they view that the current system is not supporting the needs and with this the cost-effectiveness of the PPMS will improve in future [as stated by the - Respondent 1 (TCC): “... even though we have the measures, the KPI's in place, since we don't have the systems ready, the data ready, a single source to use it, it's very difficult and it's costly too. ... currently we have different teams within each function to generate data and report”]. Therefore, as a solution for that, they are investing in a new “big 42 million dollars project” according to the Respondent 1 (TCC). Similarly, there is a requirement for real-time performance data at AMC for problem-solving in the processes and they have provided tabs to employees in production lines to capture real-time data of the production lines to gather the necessary information as stated by the - Respondent 7 (AMC): “the problem is, we have a lot of reporting data but when it comes to, problem-solving it's very difficult to find the data. So that's a problem for us. So now we are thinking of it and we want to



have some sort of mechanism to solve this. That's why we introduced the tabs". This makes a long term impact even though it is costlier at the beginning.

As stated by the Respondent 3 at (AMC) these decisions on new investments for PPMS are also influenced by the chairman's views: "*Chairman's focus changes. At the time I joined here he was talking about autonomation. ... Thereafter, it became innovation. Now it is digitization*".

Thus, both AMC and TCC are attempting to create cost-effective measurement systems and they are investing more in process performance measures expecting longer term benefits.

## **25 C25 - Use of automatically collected data and the existing sources of data**

- (a) Literature-based definition for C25: Performance measures should extensively use automatically collected data and the existing sources of data to maintain the cost of having performance measurements at a minimum level. The output from some existing system can be used, or a new method with minimal investment should be considered before moving to much costlier options.

(b) Case study results for C25

Even though both organizations have implemented SAP systems they have not linked it with the process with the functionalities that can cater to assess each and every improvement initiatives taking place. They attempt to extract all possible data from the SAP system and other available manual reporting mechanisms. But both AMC and TCC do not have mechanisms to completely extract and use automatically collected data related to the processes. At TCC they are trying to implement a system to get the information about the process performance straightaway from the system through a new project (as stated in C24 also), as stated by the Respondent 1 (TCC): "*rather than we ask people to download data and make analysis in excel etc. we try to straightaway get from the system (after implementing this new system)*". At AMC also with the increasing needs for problem-solving during the continuation of the dancing module (and other ongoing improvement initiatives) they cannot extract required process related information from the commonly available system. Therefore, they have altered the existing methods to suit the process improvement initiatives they conduct as stated by the Respondent 8 (AMC): "*we try to modify the existing data gathering methods before introducing new ones most of the time. That is easy for people to grasp or pick-up also. But it is not feasible always. We have to design measures and data collecting methods in line with the changes we do. In my case with the dancing module we introduced measures and also new data was collected related to them*". Also, they have introduced a separate mechanism to gather data on performance as stated by Respondent 7 (AMC): "*we have a separate team of 4 employees to gather information, called 'industrial information team'. Also within each department, there is a team to collect data for problem-solving*". Further, he stated that "*I think now we are talking about digital LEAN, we want to digitalise a lot of things and when it comes to communication flow we try to digitalise. So through using those tabs, we can easily get all details to this monitor, so likewise we try to do digitalisation to get all the data*". Overall, when the existing performance measurement system cannot provide the expected performance related information to manage process improvement initiatives, the organizations are investing in new performance measurement systems to cater to the needs of the process improvement initiatives.

Thus, both AMC and TCC are attempting to use the existing performance measurement systems whenever possible and move to more advanced methods when necessity arises.

## **26 C26 - Training employees on performance measurement related aspects**

- (a) Literature-based definition for C26: Employees should be formally trained on: using performance measures and analytical techniques for the generation of expected performance information. Training and infrastructure needed to perform the tasks (such as gathering data, analysis, interpreting, disseminating etc.) more effectively should be provided.

(b) Case study results for C26

Both organizations consider the importance of informing the employees about the importance of performance measures and about the changed/introduced measures with process improvement initiatives, as evident from statements such as: "*it is important to inform the employees about the changes done to measures and new measures that we introduce with the projects*" - Respondent 8 (AMC) and "*we tell them that we have issues and we need to introduce ways to measure. We make them feel the need for measurements by showing the issues we have*" - Respondent 3 (TCC). But they do not have any specific training for using performance measures that are introduced with process improvement initiatives. The measures are introduced at the time the improvement initiatives are introduced as evident through statements such as: "*we were told about the new method, why it is done, how the monitoring and recording should be done etc.*" - Respondent 7 (TCC) and "*... they tell us about the controls and measures and how we should record our performance in the books and sheets*" - Respondent 11 (AMC).

As stated by the Respondent 7 (AMC) the floor level employees will only handle simple measurements and reporting methods and therefore they do not provide training on measurements: *“the analytical part is done by the management when it comes to problem-solving and reviewing it is the management. But to draw that, they are simple ones. no need to have training”*. At TCC, *“all the employees have to make sure that they understand the measures and they respect the measures and we follow our operation based on that”* - Respondent 1 (TCC). So they guide them on the use of performance measures in the process improvement initiatives: *“we guide them on the use at the beginning but if it is a measure hard to use and that takes a lot of time of the workers they will be reluctant to record continuously and accurately”* - Respondent 2 (TCC).

Accordingly, it is evident that both organizations do not formally train their employees on using performance measures and analytical techniques; they learn about measurements while they work (on the job) as they are informed about the changes arising to the performance measures with the process improvement initiatives.

## **27 C27 - Consistency of reporting overtime**

- (a) Literature-based definition for C27: Performance measures should maintain consistency over time and in reporting. This will facilitate maintaining the reliability of the system.

- (b) Case study results for C27

Both organizations maintain consistency in process performance measures and also they measure regularly (C5) and report regularly (C31).

As stated by respondents at AMC, they do not change the measures frequently and they change only when there is a requirement. [E.g.: *“we don’t change the measures frequently. We change only when there is an actual need. So the measures are consistent. And we measure daily, weekly, monthly so on”* - Respondent 7 (AMC) and *“... sometimes we cannot continue the same measure over time. We change them with arising needs”* - Respondent 8 (AMC)]. *“Yes we cannot have ad-hoc measures and we can’t change the measures whenever we want without any reason. ... These will give credibility to the measures”* - Respondent 1 (AMC).

Similar understanding exists at TCC regarding consistency of measures: *“we have consistency in measurements. Once we introduce or change the measures we consistently use them until we think that there is a requirement to change. Reporting is also consistent with the management framework. We change when we need a different view”* - Respondent 3 (TCC) and *“we have the management framework ready and we have the measures they are also very consistent. We use exactly the same measures every day in respect to management framework, where we have a consistency showing the reporting data”* - Respondent 1 (TCC)]. Further, they regularly report and review the results generated on the process performance measures as evident from statements such as: *“we measure daily and present to the management weekly”* - Respondent 3 (TCC) and *“we discuss the results regularly”* - Respondent 7 (AMC).

Further according to the respondents, consistency in measures facilitate decision making: *“When the measures are consistent, then we can go for decision making. Without data, we cannot go for accurate decision making and it will influence the continuation of the project”* - Respondent 8 (AMC).

Thus it is evident that both organizations maintain consistency in measures used for process improvement initiatives.

## **28 C28 - Use of visuals in providing feedback**

- (a) Literature-based definition for C28: Performance measures should visually (e.g. through graphs) present the results of the performance being measured to the users as visuals can make more impact than numbers.

- (b) Case study results for C28

Visuals make it easy for all interested parties to understand the performance results. When the employees fill the charts and graphs manually they see their performance together with other groups. According to the respondents, this motivates the employees to work towards their targets and also they get to know their actual performance levels against targets [E.g.: *“Another good thing was we had boards that they filled manually. So everyone sees the performance of each other ... we have to use the measures in a way that will influence the workers. Now say if we just had records of what is done inside books we will not get anything. But we make them count on their work and make them put on a board. This has a major influence”* - Respondent 4 (TCC); *“We made their performance visible in front of their production lines related to aspects such as – SQDCM. ... Now they do not like to be seated even if the company ask them to be seated, because they saw the difference through experience and also through the information presented in front of their lines”* - Respondent 5 (AMC) and *“Now we are used to them. It is good to have them. We see how we work and as a team, we try to improve if we are slow”* - Respondent 11 (AMC)].

As stated by the AMC respondents messages can be effectively communicated through visuals rather than by reports and lengthy discussions. For instance, Respondent 7 (AMC) states that: *“Now you can see there are*

*GREEN faces and RED faces over there.. if you go there without looking/reading deeply you can say whether the KPI is OK or NOT OK... that is the purpose of a visual". "With this everything is visible and easy to understand. So we can sort the problems quickly and easily to meet the targets" - Respondent 10 (AMC).*

Also, AMC staff had studied visuals and how to effectively use visuals. This knowledge is used at AMC: *"the visual should talk to us. Visuals are a separate subject. I learnt a lot about visuals when I visited Japan to study about visuals. ... To what extent it supports the material flow is depicted in these visuals. We studied a lot about visuals with different projects and we do a lot with visuals. ... Now we are focusing more on visual" - Respondent 7 (AMC).* A similar view was taken by the TCC respondents and they also explained the importance of visuals as follows: *"The amount you feel about something when I just explain is about 10% but when I show in graphs and charts like this are different. If I show a video that is more effective because I might not be able to convey the exact message through words sometimes. Similarly, the amount that employees feel and grasp the expected levels and nature of performance that we expect will increase when moving from just one to one discussions to 2D representations to 3D representations/videos" - Respondent 3 (TCC).* *"As you can see everywhere we use visuals. When we show information through graphs charts or pictures it is easy to identify where we are and how we are heading towards the targets. We show the performance everywhere. It is easy to get a quick idea of the performance in this way" - Respondent 3 (TCC).*

And also it was evident that both organizations use visuals extensively [E.g.: *"All like visual. If you go to plant, where we keep visuals.. that people understand easily, rather than go by the data, numbers"* - Respondent 1 (TCC); *"Also most of our meetings are real-time meetings with graphs rather than lengthy powerpoint slides"* - Respondent 6 (AMC)]. Therefore it can be concluded that this characteristic exists in the process performance measurement system of both organizations.

## **29 C29 - Provide fast and timely feedback**

- (a) Literature-based definition for C29: Performance measures should provide fast and timely feedback. The right information should be provided to the right people at the right/ necessary time (timely and fast feedback), to ensure its value for decision making is not lost.

- (b) Case study results for C29

Fast and timely feedback is provided at AMC to the relevant parties on time to continue to operations smoothly as stated by the respondents. For example, - Respondent 2 (AMC) stated that: *"You can't stay for a week to give feedback, then the lines can't work. Then and there you measure and give feedback in the lines"*. Further, they have 'Gemba' reviews that facilitate problem-solving and provision of fast and accurate feedback to the employee. As stated by the Respondent 6 (AMC): *"We have these- we go to the real place to see the progress. The comments, solutions and guidelines are provided on the spot in these reviews. In most projects, we do this to minimize issues at the start of projects. This is very useful in getting the consent of workers. If they face problems with new systems they will be reluctant to continue. But when they see the support they are satisfied and we can get the projects to move forward"*. Also, they provide spot feedback on KPIs to employees in addition to the regular review meetings as stated by the Respondent 6 (AMC): *"Then we monitor the related KPIs and give feedback. There are KPI meetings and also we have on the spot feedback also. The KPI meetings are weekly and monthly with different levels"*.

The TCC respondents also held similar views on fast and timely feedback. From the following statements, it was evident that they also measure and provide speedy feedback: *"we measure and we use that information then and there. They will be sent to the parties who are responsible and who need them to decide future action plans"* - Respondent 1 (TCC) and *"we don't hold for many months and discuss the past performance. We review regularly with the responsible party"* - Respondent 2 (TCC). Even in between shifts they discuss the performance related results as stated by the Respondent 3 (TCC): *"online by the supervisor, then and there. We get the information and we discuss any issues daily or when the shift changes"* and the Respondent 4 (TCC) who stated: *"They see whether they are meeting the target or not instantly when they see the boards. Then they look for problems and they fix it and try to get to the targets"*. Further, they discuss results to identify further developments to the processes: *"whatever we assess we use. Whether there are deviations or not we discuss the results with the relevant party and we try to be within the plan and also improve to the next level possible"* - Respondent 6 (TCC).

Thus, both AMC and TCC monitor performance and provide feedback to the employees quickly before the value of information expires and also before it is too late to do any changes to the activities.

### 30 C30 - Provide accurate feedback

- (a) Literature-based definition for C30: Performance measures should provide accurate feedback that provides a transparent representation of the situation to ensure the credibility of the measures and their results.
- (b) Case study results for C30

At AMC they believe that the feedback should be accurate and it is important for decision making: *“the measures should show an accurate picture of the process measured. Otherwise, we cannot make correct decisions. And I think at all levels from implementation to continuation it is important because if we do not get the right feedback at the implementation then the continuation is difficult”* - Respondent 8 (AMC). Further AMC takes a broad view on accuracy and transparency. They try to be transparent about the measures as well as the results and the measures. As evident from the statement of the - Respondent 7 (AMC): *“I think it is important to have transparency about the measure first and then have the ability to monitor and give out the actual result on a particular task accurately ... if I take rolled up FTT (First time through) - one quality measure ... There are three types of audits, they do at the quality. So multiplication of those three is rolled up FTT. So knowing those things also important; new people coming into the business ... don't know how to calculate ... So basically we try to refresh; every 6 months we have a discussion of the calculation of the KPIs. Otherwise, the people are refreshing and they don't know how to calculate these. So transparency is very important”*

Similarly, at TCC, they consider the accuracy of feedback to be important in their projects as evident from statements such as: *“We should always think about the projects more carefully. How it will influence us needs to be made clear. Otherwise, it is a waste of money, time, efforts and even the good name. So we should try to have the most suitable measures for projects that will give us the proper results about the project”* - Respondent 4 (TCC) and *“we try to use the most relevant, reliable and accurate information for the measures. In a project this ensures that the true results are visible about the change”* - Respondent 2 (TCC). But this accuracy has been a challenge to TCC due to the issues that they have in gathering process related data as stated by the Respondent 1 (TCC): *“This is a challenge, because of the data quality. But we somehow try to get the data validated and make sure that we use the right data for the measures and also the right data for the IOP evaluation tasks. Otherwise, you sometimes penalise the results”*.

Both AMC and TCC are concerned about the accuracy of the feedback as evident from the above statements. They maintain transparency in the measures and quality of data used for measures to ensure the accuracy of feedback.

### 31 C31 - Reports should be made in a simple, frequent and regular manner

- (a) Literature-based definition for C31: Reports generated should be made in a simple, frequent and regular manner, available constantly for review/ use, and not used as a replacement for review meetings.
- (b) Case study results for C31

At AMC and TCC, they try to make the reports used in review meetings simple as stated by the Respondent 7 (AMC) *“we have A3 thinking. Now earlier when we had a management review, there were 50-60 slides. Now every project we review, 1 A3 or 1 paper, ... everything ... contains in that paper. So that should be simple”* and the Respondent 1 (TCC) who states: *“we generate simple reports and we have very simple reporting lines, reporting mechanism. And it's simple for us to review as well, and we have a dedicated team to do that”*.

This simple feedback and reporting methods used at AMC had facilitated the users to identify their level of performance easily and take corrective actions as evident from statements such as: *“Otherwise as a leader, I may not be able to identify the problems. But now with this everything is visible and easy to understand. So we can sort the problems quickly and easily to meet the targets”* - Respondent 10 (AMC) and *“Now we are used to them. It is good to have them. We see how we work and as a team, we try to improve if we are slow”* - Respondent 11 (AMC).

Also, it was evident that they ensure conducting review meetings regularly to review these reports to ensure the process improvement initiatives are functioning as expected: *“Yes we do. We have meetings regularly and we discuss the results regularly. Otherwise, it's hard to manage and take the project forward”* - Respondent 7 (AMC); *“also we report and review the results of projects at the plant level regularly”* - Respondent 2 (TCC) and *“The top management review the KPIs, there are KPI reviews monthly. In the plant they review the KPIs daily”* - Respondent 3 (TCC).

Therefore, it is evident that this characteristic is available in the process performance measurement systems of both organizations. Further, the part ‘not used as a replacement for review meetings’ in the explanation given above was not mentioned by any respondent but always they mentioned that they review the generated reports. Therefore C31 can be extended by adding a ‘reviewing’ part to the explanation as follows: ‘Reports should be made in a simple, frequent and regular manner, available constantly for review/ use, and be reviewed constantly’.

### 32 C32 - Map the individual contributions to the overall achievements

- (a) Literature-based definition for C32: Performance measures should map the individual contributions to the overall achievements. i.e. performance information related to the individual employees, groups and departments against the overall organization's performance should be mapped, and communicated to all levels in the organization. Visibility, traceability, and transparency of the contributions will enable staff to understand how their decisions and activities influence the entire business and will encourage employee empowerment.
- (b) Case study results for C32

At AMC they map the performance at the production line level and not at individual team member level as stated by the respondents: *"not at the team member level. But at a line level, we do (measures). As divisions we do. But we can get the break-up anytime if we need from the system"* - Respondent 6 (AMC); and *"we can't map at the team member level but we do at the line level"* - Respondent 7 (AMC). Initial measuring will occur at line level and thereafter for the overall performance, they will be aggregated as stated by the Respondent 8 (AMC): *"we monitor all the lines that dance at a macro level, the line by line monitoring will be done by the TL and GL. They will monitor their own line. Later all these will be added up to take the overall performance and we inform them how they have contributed"*. The ability to map the individual line contribution to overall performance provide transparency on process performance and will uncover hidden issues that are otherwise covered by the performance of other processes as stated by the Respondent 8 (AMC): *"this should be there. Then all the processes that are linked become visible. Sometimes due to one process, issues in other processes might be covered. So transparency is important"*.

TCC also consider the mapping of individual performance to the overall performance to be important and they practice that. An individual operating plan (IOP) is available to each and every employee and the performance is measured against that and communicated to the employees: *"all employees in our organisation, all 12,000, they, each one has their IOP, we call it IOP. So the performance measure happens, based on that"* - Respondent 1 (TCC).

TCC make the individual/divisional results visualized and inform the impact that they make on the entire process as evident from statements such as: *"they didn't know that this much of a production loss occur because of them. Without knowing that they will not get pressured to give the mould on time"* - Respondent 3 (TCC); *"we make all these details visible to all in the floor. So they also see how efficient their work is"* - Respondent 4 (TCC). By doing this the employees see how they contribute to the success as well as failure in the operations and they get committed to working well in the improvement initiatives as evident from statements such as: *"... we saw how we contribute to the whole plant. That was important. And also we felt we are doing something important and if we don't work well the whole plant is getting affected. Now we see our value to the plant"* - Respondent 8 (TCC). Similarly, at AMC they also visualize the performance in front of the sewing lines on aspects such as SQDCM for the team members to understand their performance against the expected levels: *"in front of each line there is this board as you saw. It explains the SQDCM levels"* - Respondent 7 (AMC). Then the employees are motivated to work towards the expected targets as evident from statements such as: *"it is good to have them. We see how we work and as a team, we try to improve if we are slow"* - Respondent 11 (AMC).

According to the above statements, it can be concluded that this characteristic is available in both organizations.

### 33 C33 - Provision of comprehensive information to users

- (a) Literature-based definition for C33: Performance measures should provide comprehensive information to users with easily identifiable and useful relationships between the activities measured. For instance to -recognize the strengths and weaknesses of the implemented strategy, provide early warning signals to prevent errors; report on deviations and diagnose causes for the current situation or any deviations, provide new insights, be able to identify cause-and-effect relationships among measures, relationships between performance drivers and performance outcomes, and between leading and lagging indicators; and help identify mistakes and facilitate future initiatives.
- (b) Case study results for C33

As stated by the Respondent 2 (TCC), they have SAP system implemented and therefore they are able to generate comprehensive information. With comprehensive information generated related to the processes it had been easy for them to *recognize the strengths and weaknesses of the implemented strategies*, and the impact of the changes made in processes. With that they were able to convince the management to financially support the improvement initiative to continue it, as stated by the Respondent 3 (TCC): *"so we thought we should do something and we did 5S and had several workshops and drew this brought this to a certain standard where the management is convinced. We showed the results and convinced the management"* and the Respondent 4 (TCC): *"we used the measures to show the management that we are making results from this at the end"*.

Similarly, at AMC, they identify the strengths and weaknesses of the process improvement initiatives before and after initiating them: *“normally when we identify our strategies, we need to identify our strengths and weakness, not only for people, process and ... everything before. So we can use the performance data to do that. Then when we get the results we identify the strengths and weaknesses of the new project and take decisions to ensure sustainability of it”* - Respondent 7 (AMC).

TCC had been able to locate reasons for *deviations and diagnose causes for the current situation or any deviations* with performance measures as evident from statements such as: *“... was able to identify relationships - IE wanted to find the issue, more people were there but the actual effective work hours seemed to be 2-3 hrs from 12 hrs a day”* - Respondent 3 (TCC).

AMC is concerned about the link *between leading and lagging indicators* and often ensure that they maintain the correct leading KPIs as stated by the Respondent 8 (AMC). *“... we look for the relationship between the leading and lagging indicator as I told you earlier also. We always try to have the correct leading KPIs, so that we know we reach the lagging automatically”*.

Also through the measures, they had been able to: *identify mistakes and facilitate future initiatives* and get the current initiatives on track [E.g.: *“We base the action plans on the performance information. We get information from various dimensions at various time intervals. This is useful for what we do and when put the projects to the track”* - Respondent 3 (TCC) and *“It is important to know the strengths and weaknesses from the beginning. Then you can take the corrective actions to the process ... we have to align the projects from the start. So it is important at the implementation mainly. Countermeasures can be developed based on this information”* - Respondent 8 (AMC)].

Therefore it is evident that this characteristic exists in both organizations in measuring the performance of process improvement initiatives.

### **34 C34 - Enable consistent benchmarking/ comparisons**

- (a) Literature-based definition for C34: Performance measurement results should enable consistent benchmarking/ comparisons to ensure the appropriateness of the internal standards and encourage continuous improvement. Also, organizations should re-evaluate the criteria used for comparisons or benchmarking to maintain currency and effectiveness.

- (b) Case study results for C34

At AMC they have internally set benchmarks and they compare the performance results of the process improvement initiatives against them and once they reach certain standards they conduct improvement to the set standards as evident from statements such as: *“after we define our PDCA level, i.e. problem-solving level and the standard, definitely the standard should go up. So that should go up through small small Kaizens. So that all helps to, improve our status quo. So we definitely need them, our thinking is challenging the status quo, improve the process, standard, again improve the process, standard, if deviates, problem-solving”* - Respondent 7 (AMC) and *“we set benchmarks. Then we set the KPIs. We focus on continuously improving towards them. We do coaching on how to think about the next level. If we face issues in going to the next level we do problem-solving”* - Respondent 6 (AMC). Further, it is evident that a similar practice exists at TCC according to the responses such as: *“we compare with internal information. Past performance, before and after results, standards set etc. not with the competitor information. Most of the time for these specific projects we don't get even industry standards. So it is mostly the internal information only”* - Respondent 2 (TCC) and *“we do not give these results out. So we also do not get similar information from any competitor. But we compare the trend in our results, and try to keep the momentum”* - Respondent 3 (TCC).

As it was evident from the interviews, both AMC and TCC can only compare and benchmark the performance results related to general objectives and tasks against external standards. But the specific performance data on process improvement initiatives cannot be compared with competitors or any external information as they do not have such information available. For instance, they stated that: *“we do that, mainly for the three objectives that I said. The customer experience - for that we use market surveys for the customer experience, with others like our competitors. And the growth we compare with our competitors and the operating efficiency also we compare with our main competitors, and we always keep one step ahead to make sure that we take the market lead”* - Respondent 1 (TCC) and *“we can only compare the results of the business. We do not compare the process improvements with other organizations, because we can't do that. We don't have comparative data. We can compare the projects with the previous week, month, quarter etc.”* - Respondent 5 (AMC)

The characteristics do not specify whether benchmarking and comparison should happen with internal or external sources. According to the interviews, it was evident that the process improvement initiatives are compared and benchmarked using internal information and not with external standards or benchmarks. But benchmarking and comparisons are conducted using the results of the process performance measures.

### 35 C35 - Focus on improvements

- (a) Literature-based definition for C35: Performance measurement results should focus on improvements and inspire and permit employees to monitor, control and further improve the processes. Support organizational learning and be an incentive for further improvements. Also, measures should facilitate and ensure that the achievements gained through improvement initiatives are maintained in the long term.
- (b) Case study results for C35

TCC follow management by KPI approach where they set the goals and measures at the beginning of improvement initiatives and then after implementing they regularly check the progress through measures to find root causes for any issues they face. Then they introduce further improvements and develop countermeasures as stated by the Respondent 1 (TCC). Further as stated by the Respondent 2 (TCC): *“We do a comparison of our results periodically and benchmark against the standards that we define and also with industry standards. This is helpful in continuous improvements ... Then we see what the root cause is and then address the issues accordingly. Maybe this is not a problem of the employee; it may be an issue in the system. Then we improve the system”*.

Similarly, at AMC, the proposed targets for improvement initiatives in the plants are followed up to improve continuously as evident from the following statement - *“we take minutes in the review meetings. And sometimes there are suggestions of what can be done to improve things. For example in the dancing conversion, how many are converted, what the impact etc. they will ask for feedback ... Then there is a target that is there for January. By about end January they ask us whether they have met that or what is the update. The minutes will be followed up”* - Respondent 4 (AMC). In addition at the plant level they do problem-solving with the data gathered and improve the processes more, as stated by Respondent 7 (AMC): *“then we can do problem-solving if we identify the reasons behind this gap. We continuously monitor this gap and do problem-solving until the gap is removed or brought to the minimum possible ... Data and information is very important. We monitor them and with their behaviour, we do problem-solving.*

Further, when conducting improvement initiatives at AMC they set a standard at the beginning and once it is reached they will standardize that and set a higher target as shown in Figure 7.3 and as evident from statements such as: *“when we do an improvement and this standard goes up to here. Then we have to put a lever – called standard. We need to standardize this. Otherwise comes again here ... our current state should be here. Again if we do an improvement it comes here and again we need to standard. It comes down we need to do problem-solving. So it is like a journey continuous improvement”* - Respondent 7 (AMC) and *“we set targets, then we measure, when we meet it we make it standardized and set improved targets. We keep improving the processes and for that, we need measures”* - Respondent 6 (AMC).

Similarly, TCC continuously improves the processes by stretching the targets as evident from responses such as: *“... reaching these KPIs means we need to go for the next level. When the confidence is gained we have to move forward”* - Respondent 3 (TCC) and *“this project is running for about 2 years and we have been able to continuously reduce the losses. But still, there are losses that we are continuously trying to reduce. Once we meet KPIs we tighten the KPI to a higher level. Such targets have been met and we have been continuously improving this ... still, we are continuously improving the process with the information that we generate about activities”* - Respondent 6 (TCC).

Also, TCC has a suggestion culture. With the results of the performance measures the employees identify the issues in the process and suggest new improvements through cards and these are taken into practice with the agreement of all employees, as stated by the Respondent 3 (TCC): *“we get cards from all three shifts mentioning about improvement opportunities. When all 3 shifts agree we do those changes suggested to the process”*. At AMC they coach the employees towards problem-solving and encourage continuous improvements as evident from statements such as: *“we set benchmarks. Then we set the KPIs. We focus on continuously improving towards them. We do coaching on how to think about the next level. If we face issues in going to the next level, we do problem-solving”* - Respondent 6 (AMC).

Therefore it is evident that this characteristic exists in both AMC and TCC. i.e. they focus on further improving the processes using the process performance measurement results to ensure the continuation of the improvement initiatives. Also, they have built a culture that facilitates continuous improvements within their organizations.

### 36 C36 - Provide information for actionable results

- (a) Literature-based definition for C36: Performance measurement results should provide information for actionable results. Remedial action should be indicated by the measurement results, so measures can become a guide for corrective actions to be taken.
- (b) Case study results for C36

Both AMC and TCC use the PDCA cycle and they try to get directions for actions to be taken from the performance results. In the PDCA, ‘checking’ is done through measures. And adjustments are done based on

that. That adjusted process will be checked and adjusted again using measures. The practice they have is evident from the following statements: *“as I said to you in our A3 there are 4 quadrants. One is what, the second is why, how and check and adjust. In check and adjust there are bar charts, pie charts, stem charts; So that way we know if the result is going good and whether our actions taken are right. But if that goes the wrong way, we know something wrong with planning and there should be a change and that we need to do a change. So were-look at our action plan that was, we looked at, who, what, why and when, again and change”* - Respondent 7 (AMC); *“again that is PDCA and then for continuation. When there is a deviation we take action. Check and Adjust”* - Respondent 1 (TCC) and *“Yes from measurement results we should be able to identify where the problem is. Then we can take actions to solve it”* - Respondent 3 (TCC). Visuals have facilitated this further as evident from the statement: *“If it is NOT OK. What are the things you have done for it, also should be visible... (is that also available in that?) That is what we say now. Till recently we didn't have that. We just had visuals and we don't look at it. But now we do”* - Respondent 7 (AMC).

Even though they use the PDCA cycle and make use of the performance data in their process improvements still they face issues in gathering the necessary performance data as evident from the statement: *“But there the problem-solving information is not available and generated properly for problem-solving. We get reporting data but not the problem-solving data. So when we try to improve the problem solving we always consider how the data capturing system should be improved, for problem-solving”* - Respondent 7 (AMC).

As evident from the above statements, both AMC and TCC use the PDCA (Plan, Do, Check Adjust) cycle in process improvement initiatives. The results generated through the process performance measurements are used at the 'Check' stage to assess the current state and identify the problematic areas or any opportunity for further improvement. Thus this characteristic is available in the process performance measurement system in both these organizations.

### **37 C37 - Provide information for informed decision making, management, control and planning**

- (a) Literature-based definition for C37: Performance measurement results should provide information for informed decision making, management, control and planning, and be a basis for performance management by facilitating planning, assessing, controlling, predicting future performance, etc.

- (b) Case study results for C37

It is important to know the current state to make decisions. As stated by a respondent: *“Without knowing how we are performing we will not know whether it is good or bad or whether there is a need for improvement”* - Respondent 6 (TCC). At AMC they have used process performance results for decision making, management, control and planning as evident from the interviews. AMC respondents made statements such as: *“measures anyway influence the control and management of the projects. So we measure and we define the measures that are needed to identify the progress of the project. Everything we do we measure ... We control the progress of the process through measures”* - Respondent 6 (AMC); *“Mainly monitoring is done with KPIs and standards. This is done to monitor the current performance and the expected levels of performance and then to take any corrective actions to the problems that hinder the achievement of the targets/KPIs”* - Respondent 5 (AMC). Also, they use performance results for daily decision making as stated by the Respondent 6 (AMC): *“we use performance information for daily decision making. It is important for continuous production flow. Also for problem-solving. We do all these to reduce the opportunity cost and maintain revenue, maintain cash flow”*.

TCC also used the performance information for similar purposes as stated by the respondents: *“... That is why we have measures. We need to make decisions, plan, implement the plans and then measure them to see whether we are on the plan or whether we need adjustments. For that control we want measures. Similar to what we discussed in the tyre moulding project. We planned it with the issues we saw in results, and then we put it on track with measures”* - Respondent 3 (TCC); *“... We take decisions based on measures. Then we implement the decisions. We track them with measures. We see whether we are doing well or not. That is we Check. Then when necessary we adjust... i.e. we control. PDCA. So it's everywhere. we make decisions, plan, control, manage and the measures are used in all this”* - Respondent 1 (TCC).

Also, both organizations use process performance information for prioritizing the processes for improvements as evident from the following statements: *“We identify the areas to be focused with these comparisons and to present at review meetings”* - Respondent 6 (TCC); *“To prioritize...We actually identify and prioritize the processes by the results we get through the measures”* - Respondent 4 (TCC) and *“Results of one project will influence the planning of another project. For instance, we look at moral related measures when selecting lines for converting to dancing – LTO, absenteeism. Then we selected the modules (Lines) where the moral is high. Because these projects expect a high cultural change”* - Respondent 8 (AMC).

Further, the employees at TCC felt that they are controlled with measures in the improvement initiatives: *“We feel that we are controlled than earlier because of these new ways of measurements”* - Respondent 4 (TCC).

Therefore it is evident that the results generated through the process performance measures are used for decision making and management, controlling and planning of process improvement initiatives in both organizations.



### 38 C38 - Performance measures should not be used as a weapon/ tool for punishment

- (a) Literature-based definition for C38: Performance measurement results should not be used as a weapon/ tool for punishment. Measures should not be used only as an accountability tool and use to blame the employees and make them answerable to performance deviations only. They should monitor the behaviour of employees in a positive manner.
- (b) Case study results for C38

At AMC when employees are not performing well they do problem-solving and try to get them into the expected levels. They take it as an improvement opportunity as stated by the Respondent 8 (AMC): *“we have to take it as an improvement opportunity not to punish. When doing a project we expect that there will be a drop in performance at the implementation stage. But at the continuation, we have to show results. So if results are not shown continuously, then we look into that situation in detail. If it is a problem with the person then we look for the need for training etc.”*. Also when there are issues related to employees behaviours that affect the processes and other employees they will not remove or take any negative action against them, but they will try to train and adjust that behaviour into a positive level. For example, as stated by the Respondent 7 (AMC): *“... if the performance goes wrong, we need to understand what knowledge we need to improve that person ... say some person's people management is not good, so, therefore ... the people working under him, might need changeovers, might leave etc.. So through that KPI we can see there's a problem with that person, so we can give some training or coaching or guiding, whatever. So I think that should be not to punish, that should improve people and the processes”*.

Similarly, at TCC when they identify deviations of the performance of the employees through performance measures, they will train them to work at the expected level. As stated by respondents at TCC: *“if it is an issue in the expert knowledge in the process ... we discuss with them and guide them and try to get them aligned with the expectations”* - Respondent 3 (TCC). Also, as stated by the Respondent 1 (TCC): *“as it is very much linked with our incentives so ... people automatically adjust to follow that and make it happen. But we don't use it as a weapon, like lay off people or transfer people, we don't do that. We take ... all simple or single opportunities that we can improve our people help them to develop and use them correctively in the operation. So that's how we do it, but we don't use as a weapon, like in many cases”*.

Thus both AMC and TCC do not use process performance results as a weapon or a tool for punishments. They use it to identify improvement opportunities.