Analysis and Evaluation of KPI's for Calibration Laboratory

Dace Arina

| **Author**
Dace Arina	
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This thesis work is research-oriented with qualitative research method used. The objective of the study was to analyse and evaluate existing key performance indicators for the calibration laboratory of the thesis commissioning company and identify whether there is a need for new set of KPI's to be introduced to the calibration laboratory.

The commissioner is XYZ's calibration laboratory. XYZ provides versatile testing and inspection services besides calibration and there was a need for current set of KPI's to be reconsidered.

This was research-oriented thesis where qualitative research method was used. Conducting interviews with key management figures of the thesis commissioning company. It was done do gain detailed and deepened understand of the KPI's that are measured in the thesis commissioning company on the company level and department (calibration) level.

Theoretical framework was built to help the author to gain deeper understanding on the performance management and particularly on key performance indicators. Theoretical framework helped as a guide throughout the research, from creating the interview question to analysing the results.

Key management members from financial department and calibration laboratory where interviewed with opened type questions on the subject. Findings and data collected from the research were analysed and based on the results concluded on the research problem and suggested on KPI's that could be introduced in the calibration laboratory and how performance could be enhanced.

| **Keywords**
Performance management, Key performance indicators, KPI's, project management |
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1 Introduction

Commissioning company's name due to the request and privacy reasons will be named as XYZ in the thesis work.

Thesis research subject has been commissioned by the XYZ calibration laboratory. That is because of the demand for the current set of KPI's to be reconsidered. The reasoning behind that is because the current set are designed to service a broader set of business lines. Based on the opinion of the Calibration Laboratory's product line manager, calibration laboratory requires tailored set of KPI's because of their specific line of business.

1.1 Commissioner

Commissioner is the world's leading inspection, testing, verification and certification company. It was established Switzerland in year 1978 and started as a grain inspection house.

XYZ have been operating in Finland since 1924. They have offices and laboratories in Helsinki, Kotka Rauma, Tampere and Tuusula, headquarters are located in Helsinki. Providing diverse inspection, testing, verification and certification services for product and process management for industries like oil, gas and chemicals, consumer goods testing, environment, industrial manufacturing, automotive, minerals, governments and institutions and system and services certification.

Calibration laboratory is located in Helsinki headquarter premises and is part of the inspection services. Calibration laboratory's team consist of six permanently working engineers, one temporary engineer who comes in the laboratory when called in to help to manage the work load, and two management members of product line manager and coordinator.

Instrument calibration is one of the primary processes that is used to maintain instrument accuracy. Calibration is a process of configuring an instrument to provide a result for a sample within an acceptable range. Calibration procedure differs from another for every variety of meters and instruments. Calibration certificate with the results of the testing performed is provided to the customer after testing has been executed.

1.2   Objectives and Questions

Empirical part of the thesis is focused on identifying the current situation by evaluating if the key performance indicators that are set by the XYZ management team are relevant to the calibration laboratory. The effectiveness is measured by identifying KPI in the right area of work such as delivery time and costs. The objective is to improve efficiency and productivity of the services provided by the calibration laboratory and to increase sales growth and profit.

Description of KPI's, what they are, what significant role it plays in the business entity. What are the key factors that play a role when considering the thesis commissioning company's needs and demands? Especially, because of the specific service they are providing.

It is important to analyze and evaluate the current set of KPI's whether they are adequate because KPI's provide evidence and information that is required to make faster and better decisions. To improve productivity and work efficiency of the calibration laboratory. The correct set of performance measures allow to learn what is working and not working quickly and act accordingly by decision making on the results gained. Whether the calibration laboratory's measured performances are aligned with the company's strategy and goals.

1.3   Research method

In order to do the research on the performance management, qualitative research method is going to be used. Questions on set KPI's and their monitoring within the company are going to be asked to the key management figures. These in-depth interviews will show how does the management see the KPI's, their values and what they are. The aim is to interview five key management figures to receive enough valuable and trustworthy data in order to do the analysis on the findings and reliable conclusions.

The data collected will be analysed and based on the outcome, recommendations and suggestions will be provided on the current set of KPI's and their improvement.

1.3.1 Qualitative research method

Qualitative research method is being used to conduct the research. In-depth open questions are being asked to the key management roles. This method has been chosen because it doesn't only show what people think but also allows them to explain why they think that way. This method allows further questioning based on their responses to the opened questions. It allows the interviewer also to understand their motivation and feelings when responding.

Qualitative research involves collecting and analysing non-numerical data to understand concepts, opinions, or experiences. It can be used to gather in-depth insights into problem or generate new ideas for research. (P.Bhandari, 2020)

Interviews are being held in order to find out how the performances are being measured on the organisational and department level, what are the KPI's and by whom they are set to gain a clearer understand how it is affecting work and how relevant they are to the particular line of business.

There are two stakeholders involved when conducting the research. The head of the calibration laboratory and the head of financial department of the XYZ. Interviews were held face-to-face separately with each person asking open questions in a discussion like manner.

1.3.2 Interview questions

Are performances or progress measured and if so how? Are there organisation wide measurements of the performance, or department or individual? How are they affecting daily work, how does one know if they are performing enough? Are there KPI's that are set specifically for the Calibration laboratory? By whom are the KPI's set? To understand by who were the KPIs set, has it happened locally in Finland or have been decided upon in the headquarters in Switzerland. How are the KPI's monitored? There are several sub questions about the interviewees' role when setting the KPI's, if they are having any influential power. Is there something they would like to change or add in their opinion? And when discussing and considering data, how reliable it is.

These are crucial questions that have been answered from two parties in order to gain understanding of how the financial department and the calibration views these matters to be able to analyse if calibration laboratory need their own specific group of KPI's.

Senior Controller (Finances) and Product line manager (Calibration) have been interviewed for this research.

2   Performance Management

Performance management is defined as doing all that is required to continuously improve performance of every employee in relation to his/her role, team and the entire organization in the context of the short and long term goals of the organization. (Performance Management: Toward Organizational Excellence, 2016, 1)

One of the most often used definitions is that of Armstrong (2009): 'Performance Management is a systematic process for improving organizational performance by developing the performance of individuals and teams.' One of the reasons this definition has proved so popular is because at its heart is the crucial issue of the link between the performance of an organization's human resources and the achievement of organization goals. The sector, structure, size, culture, strategy and leadership of the organization will all influence the nature of performance management. (Performance Management, 2014, 2)

C.M.Cadwell defines performance management as proactive partnership between employees and management that helps employees perform at their best and align their contributions with the goals, values, and initiatives of the organization. (Performance Management, 2002, Chapter 1)

The simple concept of performance management is that great performance. whether on the stage or by an agency, whether by an individual or by a team is very unlikely to happen on its own. In many definitions of the term management include references to the attempts to bring the use of resources to result in the achievement of goals. (Performance Measurement and Performance Management, 2005, 508)

Lawler's (2003, p.396) has claimed that:
Virtually every organization has a performance management system that is expected to accomplish number of important objectives with respect to human capital management. (Performance Measurement and Performance Management, 2005, 511)

L.Ashdown in her book on Performance Management points out on how competitive advantage comes out not only through results, where knowledge and service are the key, but also through behavior that employees demonstrate when carrying out their roles. If employer is to encourage effective performance at their workplace, focus should not be only on what employees do but also how they do it.

As described by C.M.Cadwell on performance management, performance tend to get better, it improve if it's managed. Managed performance involves setting clear goals, diving ongoing feedback, and coaching employees to be successful. Employees get better results when they know management takes interest in them and what they are doing. Employees know whether management is interested in them when talked to about what they are expected to deliver and whether they are providing it. Using systematic approach to performance also helps improve results. Performance can't be managed by accident. (Performance Management, 2002, Chapter 1)

There needs to be a clear idea on what needs to be achieved. Needs to be established clear criteria with provision for success. The key question of what outcomes are to be expected once performance management process has been implemented. Clear goals are essential if evaluating impact of performance management.

Performance management system is a key tool to transforming people's talent and motivation into a strategic business advantage.

Performance management is a continuous process of identifying, measuring, and developing the performance of individuals and teams and aligning their performance with the strategic goals of the organization. It is ongoing process of setting goals and objectives, observing performance, and giving and receiving ongoing coaching and feedback. Performance management requires that managers link employees' activities and outputs with the organization's goals. It helps the organization to gain competitive advantage because performance management creates a direct link between employee and team performance and organizational goals and makes the employees' contributions to the organization explicit. (Performance Management For Dummies, 2019, Chapter 1)

Effective performance management should include:
- employees understanding what is required from them; results and behaviors;
- understanding how employees are contributing to the goals of the organization;
- employees are motivated to perform;
- to ensure that employees have the skills and ability to deliver required performance levels;
- that employees are receiving support to help achieving what's expected from them;
- employees receiving feedback on their performance;
- and that they are rewarded appropriately to their contribution.

(Performance Management, 2014, 7)

Whether projects succeed depends on doing many things right, each of which must operate as a close-knit system, supporting each other in order to deliver successful project.

Classes of success drivers:
1. Planning. Needs to be planned, scheduled, budgeted, and the description of the work that needs to be performed, and the order I which the work should be performed.
2. Execution. Once the work is defined and the required order established, execution of the work can take place.
3. Performance Management. Meanwhile the work is being performed, the progress against the plan needs to be measured. Measurements should be tangible, not just opinions. The best tangible evidence is confirmation that planned outcome of each work actually occurred at the planned time for the planned budget. (Performance-Based Project Management, 2014)

G.B. Alleman in his book on performance-based management describes five principles that are stated as questions that should be answered by every project manager.
1. Where are we going?
2. How are we going to get there?
3. Do we have everything we need?
4. What impediments will be encountered, and will they be removed?
5. How the progress is going to be measured?

These principles can be applied to any projects in any business or technical domain.

To increase the probability of success it is not enough to measure progress alone. Progress against the plan should be measured. There should be defined progress that should be reached on a defined period of performance. There should be set targets in four measures to have a successful project: effectiveness, performance, key performance parameters, technical performance. (Performance-Based Project Management, 2014)

Performance management helps top management to achieve strategic business objectives. Performance management links the goals of individuals with the goals of their teams, which in turn are connected with the goals of the entire organization. It is also a useful tool for the management for providing useful information used in making administrative decisions about employees. Including decisions on salary adjustments, promotions, employee retention or termination, recognition of the top individual performance, identification of high-potential employees, identification of poor performers, layoffs and merit increases. (Performance Management For Dummies, 2019, Chapter 2)

2.1 Measuring Performance

Monitoring performance requires having specific performance measures. If you can't measure it, you can't manage it. Even employees are expected to self-manage their performance, there has to be some standard against which performance is measured. The process of monitoring performance is made up of three related activities:

- Measuring performance;
- Gathering performance data;
- Observing employee performance.

Performance measurement allows organizations and its people to determine whether or not they are on track and how they are achieving stated goals and objectives. (Performance Management, 2002, Chapter 4)

There are two types of systems that are used to evaluate competencies: comparative systems and absolute systems. Comparative systems base the measurement on comparing employees with one other. Absolute systems base the measurement on comparing employees with prespecified performance standard. (Performance Management For Dummies, 2019, Chapter 10)

Productivity measures are frequently operationalised in terms of ratios of individual output to individual input. (Business Performance Measurement and Management, 2014, 1)

2.1.1 Key result indicators

Many companies have been working with the wrong measures. That is due to the fact that incorrect key performance indicators have been chosen to be monitored. There are four types of performance measures. Key result indicators, result indicators, performance indicators and key performance indicators. KPI's make up a measurement system of how projects are progressing towards set targets. The goal of the measurement system is to help to improve effectiveness and efficiency. (Project Management Metrics, 2017, 122)

Key result indicators are telling if the actions taken are heading in the right direction. However, they are not telling what to do in order to improve the results, that actions need to be taken.

KRI's include customer satisfaction, net profit before tax, profitability of customers, employee satisfaction and return on capital employed. KRI's have been often mistaken for KPI's. Key result indicators provide an ideal reporting information to those who are not involved in day to day management. They have profound impact on reporting that leads to separation of performance measures into those impacting governance and those impacting management.

KRI's usually cover longer periods of time than KPI's. Mostly they are renewed on monthly or quarterly basis. Which is contrary to KPI's that are renewed on weekly or daily basis. (Key Performance Indicators, 2007, 3)

2.1.2 Performance and result indicators

Even though the performance indicators are important, they are not the key to the business. The performance indicators help teams to align themselves with their organisations' strategy. The indicators are not financial and are shown with the KPI's for each organization.

Result indicators on the other hand are all financially summarised activity. All financial performance measures are result indicators.

2.1.3 Key performance indicators

According to Wayne W.Eckerson a KPI is a metric measuring how well the organisation or individual performs an operational, tactical or strategic activity that is critical for the current and future success of the organisation. (Project Management Metrics, KPIs, and Dashboards; A Guide to Measuring and Monitoring Project Performance, 2017, 122)

KEY is a major contributor to the success or failure of the project. A KPI metric is therefore only "key" when it can make or break the project.
PERFORMANCE is a metric that can be measured, quantified, adjusted and controlled. The metric must be controllable to improve performance.
INDICATOR is a reasonable representation of present and future performance. (Project Management Metrics, KPIs, and Dashboards; A Guide to Measuring and Monitoring Project Performance, 2017, 128)

KPI's are tools to measure how organisations or individuals are performing towards set goals and targets. Based on these measurements the strategic decisions can be made for the future success. KPI's are the tellers of what to do to increase the performance dramatically.

Key performance indicators enable managers to continuously learn and improve. (Beyond Performance Management 2012, 298)

The reason why KPI's have become so powerful is because of the insight they can give of how the company is doing. What gets measured, gets managed. They are crucial for performance management, however, can strengthen employees moral and personal growth as well.

Organisation's culture and values are important for performance. Support and motivation should be the driving force. Tracking KPIs is one of the ways how to acknowledge employee's input and hard work. That provides a secure feeling of accountability and responsibility. It gives the sense of ownership of their own work and contribution to the team.

KPI's are agreed upon already beforehand and they are reflection of critical success factors of the projects. I think it is important to point out that KPIs are not performance targets. Their purpose is to measure items that are directly relevant to the performance. The goal is to provide information on controllable factors in order to be able to make an appropriate decision that would lead to a positive outcome.

KPIs are useful tools for assistance in order to create the right objectives to get closer to the set goal, however, it will not show the right course of action that has to take place for the achievements.

The ultimate purpose of KPI is to identify what needs to be done to improve performance and keep the strategy on track. If measurements are made over short time blocks, then the team can react quickly to correct mistakes. KPIs are quantifiable measures that are agreed upon beforehand that reflect critical success factors of the organization or project. They measure progress toward organizational goals and strategic importance. It is waste of time selecting and then tracking KPIs that cannot be controlled.
KPIs help users reduce uncertainty in order to make better decisions. KPIs lead to proactive project management.

The purpose of a KPI is to track performance measures that track changes toward a target. (Project Management Metrics, 2017, 127)

2.1.4 Implementation of the key performance indicators

Performance management and KPIs are closely knitted. Implementing effective KPI selection process is essential to ensure the measurement of relevant actions.

Organizations evaluate performances all the time, whether explicitly or implicitly. It is because organizations cannot be successful in accomplishing its goals if the performance of its employees is not measured in some way. (Performance Management for Dummies, 2019, Chapter 11)

It needs to be assessed whether employee's actions are aligned with the company's strategy. This is how KPIs are used for performance management. By using KPIs to measure employees' actions and goals, it is possible to establish a direct connection between the different critical key factors needed for reaching the goals in the line with the company strategy. This helps to make sure that employees in the team do what they are supposed to do, and how and what they do are linked to the company's success. (2016, KPI Management Solutions)

It requires an establishment of effective partnership among management, local employee representatives, unions representing organisation's employees, employees, major customers and major suppliers. That means mutual understanding among all the stakeholders about the need for change and how it is going to be implemented. To involve and include organisation's key customers and suppliers for the notion of partnership. It is essential that business objectives are communicated well across the company in order of the employees to be aware and know for what KPIs they are responsible for. (Key Performance Indicators, 2007, 85)

As it was pointed out in the book of Key Performance Indicators by D. Parmenter, communication among the key players for the future development is crucial. If a company is not satisfied with their suppliers and would like to improve certain aspects, why not visit them and have a discussion about the things that could be improved. The same goes with major customers. It might be a very crucial and important step for improvement to ask them what should be measured in order to manage better their services or products. That would give a better understanding of what is important to them, what they value.

There are several requirements for successful improvement of performance. It requires company's employee's empowerment, especially those who are in the operational front line. Effective communication is a foundation stone. Getting them involved on assessing what are the situations that are negatively impacting KPIs.

For KPI's to be genuinely useful there needs to be target assigned to each one. A KPI without a target is useless because it's the target that puts the indicator into context and allows to know where we are in relation to where we want to be. (Key Performance Indicators For Dummies, 2015, Chapter 2)

Many are using the SMART rule for defining the KPI's. KPI needs to be Specific, very clear on what it measures. Focused performance targets or business purpose. There can't be several interpretations for it. KPI needs to be Measurable to be able to define the standard. So that actual value can be compared to the target value. KPI can be expressed quantitively. It also needs to be Achievable because there is no point to set something that will never be obtained. This can be very discouraging for the team members if needing to aim for a goal that is impossible to reach. Relevance is needed when setting a KPI. It needs to give a deeper insight into the performance of the measured entity in order to achieve the strategy. Timely meaning of the KPI is crucial. There needs to be time frame in which it needs to be achieved. (Project Management, 2013, 124 and Target Applications Limited in a Quick guide to KPI's, 2017)

2.2   Data Reliability

Performance management cannot exist without performance analytics. It is a collection of performance data, usually in the form of performance ratings. Those rating are collected from all relevant performance touchpoints, which include supervisors, peers, direct repots, self, and customers, as well as employee performance monitoring systems that are involved in collecting the data. (Performance Management For Dummies, 2019, Chapter 11)

When looking at the KPI's data should be industry-specific. Even though average data is a good start, it only points out in the general direction. KPI's studied should be industry-specific. (PlantServices, 2015)

Managers are able to respond only to the information they receive. They are unlikely to be able to assess the information and act accordingly in cases where information is coming in slowly and data is not helpful. Managers are able to respond fast with making the right decisions when insightful data is coming in frequently and fast.

Relevance is the most important attribute of any report. (Beyond Performance Management, 323)

It is important that reliability and maintenance professionals focus daily on the short-term KPI's in order to drive the behaviour and culture changes that is needed in an organisation. And monitoring long-term trends will show whether daily activities are having the desired effect on the performance highlighting where adjustments are required. (Prometheus Group, 2020)

It is difficult to create KPIs that accurately measure and activity. Sometimes, unforeseen variables influence measures. (Project Management Metrics, KPIs and Dashboards: A Guide to Measuring and Monitoring Project Performance, 132)

Data integrity is the degree to which one can trust the data being shown in a report or graph. Measures with high integrity are those where data are gathered by a third party with no vested interest in manipulating the numbers to show better performance. For instance, an audit by an outside company may have more data integrity than quality measures a department tracks internally. (Pocket Guide to Performance Management, 2009, 7)

4 Findings

Current set of KPIs for XYZ are set by the managing director and management team in Finland. Both stakeholders that took part in the qualitative research have partial influential power when deciding on what should be measured. Product line manager of calibration has had an influential power and took part in the decision-making process when current set of KPIs where decided upon on performances that should be measured.

The head of financial department had been part of the company for the last couple of years, therefore hasn't had any influenceable power on decision making about KPI's. However, as mentioned by her that suggestions on improvements are always welcome by the management team.

4.1 MIKKI information system

Data information system called MIKKI has been created within the calibration laboratory. It is a database where all the information is stored of calibration laboratory's devices and their customer instruments. MKKI is an important information system tool that's being used constantly by the calibration laboratories team and logistics personnel of the XYZ.

This system is being used starting from the moment customers' device is being delivered to the XYZ warehouse. Logistics personnel adds it to the particular engineers work queue depending on instruments type. There are different types that require different kind of calibration. Each engineer is a specialist in their field.

Engineers of the CAL laboratory can monitor their work queue, record hours they have been spending on calibration and add notes of the specifics of the work or instrument. The work number that is generated when adding the instrument to the work queue is also then the certificate number. Certificate is the end result of the calibration service that the customers receive on the current status of their instruments. Most common is that the calibration interval is 12 months. Meaning that the largest part of instruments are being calibrated every year. That means most are returning customers with the same devices that are being sent in for calibration yearly. CAL laboratory has very strong returning customer base.

4.2 XYZ's Key Performance Indicators

The Table 1 below shows what are the KPI's set for XYZ laboratories.

Utilisation Rate	Billing Rate	Knowledge development per unit	Offer Rate	Completion Rate vs Budgeted
Orders in Progress	Orders	Delivery reliability	New Orders (EUR)	Work in Progress (WIP)

Table 1 (see Appendix 3 with original in Finnish)

Not all of the above mentioned KPI's are applied to the calibration laboratory. CAL laboratory measures billing rate, delivery reliability and work in progress.

Billing rate is monitored very closely. When the engineer arrives at the XYZ premises, he/she logs in. All the hours that have been spent on any given instrument are recorded in the information system. Afterwards they are turned in the actual billing hours. This applies also to the calibration engineers. CAL engineers record their hours spent on each device in MIKKI.

Delivery reliability; standard delivery time is 14 days, or 10 working days. It is monitored from the moment customer device is delivered to the XYZ warehouse and registered in MIKKI till the moment when the service has been provided and instrument is sent back to the customer.

Promised service delivery time for the calibration laboratory is 10 working days from the moment device is being delivered at the XYZ facility. Information about the instrument that has been delivered to the storage is being recorded in the database. There are different instrument types and each engineer is a specialist in their field. Also calibration time can vary depending on the instrument type. And monthly performance can be measured and monitored for each engineer individually.

Each engineer records the hours that they have spent on calibrating each individual device.

Delivery reliability every month is being monitored for the calibration laboratory. Efficiency can be compared with other testing departments in the company per each month. It can

be seen in the monthly laboratory meetings, how has calibration laboratory's performance been against the other departments in XYZ.

WIP (work in progress) report is handed in at the end of each month to the financial department about the work that has not be invoiced but has been finished. Every department of the company is handing in WIP report to the finaces.

Performance is not really measured on the revenue level. It is about what has been budgeted and forecasted and if those goals have been reached. Then there is local contribution that is calculated on each department.

Annual incentive plan (AIP) is a measurement that is set to in order to reach targets. When a certain level is reached then a suitable amount of AIP is received. This measurement is annually based. Taking care of cost levels and keeping the promised delivery date is a daily measurement.

There are no specific KPI's that would have been set particularly for the calibration laboratory from the financial point of view.

KPI's are set by the management team and managing director. It's a yearly set forecast for the upcoming year. Forecast is done each May and September. The recent set of KPI's were introduced by the group in the September of 2019. The upcoming year is budgeted +12 in the September.

Knowledge development per unit is not recorded in the calibration laboratory. There is another information system (PISKI) in which testing engineers are recording their hours. They always should spend 7,5h a day and explain within the different categories on what they have spent their working day. That also includes their personal development, like trainings, courses taken, etc.

Offer rate as well is not being monitored in the calibration laboratory. What is being monitored is what is already in the house, on the shelves and entered in the engineers work queue. At the moment, there is no tool yet in the laboratory with what the future income works could be monitored.

KPI of Orders in progress by the opinion of the product line manager of the calibration is the most useful for salespeople and project managers. They are able to monitor sales results and act accordingly by making appropriate decisions. This KPI is not measured in the calibration laboratory.

Completion rate versus budgeted in not measured in the calibration laboratory.

5 Analysis and Conclusion

Stakeholders involved in the research have been chosen to have gain understanding KPI's in the company from different angles. Both of the sources are professionals in their field of a wide knowledge and deep understanding about the topic.

When analysing the KPI's and the results of the interviews there is a clear view how the financial management of the company views the key figures and requirements and if they are being achieved and how the calibration laboratory views them.

CRS (consumer and retail services) is a big part of the revenue creation and calibration laboratory is just one part of that. From the financial stand point there are no explicit KPI's that would have been set for the calibration laboratory. The total revenue shows for the whole CRS group in Finland, not on a department level to the group. From the financial stand point there are no explicit KPI's that would have been set for the calibration laboratory. Therefore, would not be a real need for the calibration laboratory to have a specifically set of KPI's for them.

The results show that the most important ones from the both stand points are delivery promise. Both interviewees did express how important it is to "keep the customer happy". And also the billing rate, however, those KPI's are more to compare the departments on their performance level.

Local contribution has been measured in total XYZ wise and is being reported to the XYZ Group. And also measured department wise within the XYZ in Finland. However, in the matter of revenue, calibration laboratory differs from other departments because revenue is not calculated on invoiced customers but also on the internal revenue. Reason for this is because CAL laboratory is serving other in-house laboratory needs for calibration.

For the XYZ Group reporting local contribution is being calculated from extracting local costs and overhead allocation from the total revenues. And when calculating local contribution for the internal reporting, total operating expenses are being extracted from the total revenues which generates operating income. From operating income allocated overhead and allocated indirect costs are extracted. Indirect allocated costs also include indirect costs as technical support and allocated sales.

Academic literature tells that KPI's should be measurement tools to performance towards the set goals. It is common for companies to easily mix them up with other key indicators thinking they are KPI's. This research has shown the similar pattern. Most of the indicators that were described by the head of finances are Key Result Indicators. Financially summarized activity, all financial measures are result indicators. These are the indicators that provide good reporting information. These are the ones that lead to separation of performance measures into those that would be impacting governance and those that would impact management.

Key result indicators usually report on longer period of time than KPI's. Mostly on monthly or quarterly basis just like it is with XYZ reporting. Whereas KPI's should be renewed on weekly or daily basis.

The most relevant KPI that is being measured and monitored in the calibration laboratory is delivery reliability. Standard delivery time is 10 working days from the moment device has arrived and put in the engineers work queue. These recordings go through MIKKI system. Also specifically agreed delivery terms are being taken into consideration. About those specific delivery promises logistics personnel is being informed, so, when the equipment is received, they are able to record accordingly in the system. This information is essential because from the system engineers are able to see when the promised deadline is.

5.1   Data and Data reliability

Data that is being entered in the systems is considered as reliable. However, the trustworthiness and how precis it is when reporting is every departments own responsibility. Since the interviewees are professionals of many years in their field, if professionally they would notice uncertainties, data would be double checked or questioned to the people responsible for it.

It is each employees' ethical responsibility to be honest and fair when reporting. Every calibration engineer reports hours in MIKKI on every device they calibrate. There are different type of instruments that have a standard minimum time that is required for calibration. Variations can differ widely, from around 1 hour till up to 7 hours per device. Of course, billing also depending on what kind of an instrument is being calibrated.

Every month there is a laboratory meeting where an efficiency percentage is being shown in the chart for each engineer. However, I would suggest that the reliability of these input

hours would be critically evaluated and monitored. There might be that a human factor plays a role when for instance an engineer is lagging behind schedule and not keeping up with the requirements for the delivery terms, engineer falsifies the numbers when recoding hours spent to make it look satisfactory in the reporting.

There have been cases when engineers entered data needed to be questioned. Engineer had entered certain number of hours for each of the instrument that was calibrated by the specialist. Everything looked reliable, the standard required hours entered for each device. However, when calculating the summery of the hours that were spent in one day exceeded 7,5 hours. Supervisor was able to check for how long the engineer was in the laboratory from the log-in records and they didn't add up with hours that were recorded spending on all the instruments on that day.

This causes issues about the data reliability and might get the calibration service that was provided to be questioned whether it was done according to the standards.

Another issue with the promised delivery date reliability is that in MIKKI when entering the arrival date it automatically calculates 14 days ahead showing in the system when is the promised delivery date. However, the system doesn't take in the consideration bank holidays that appear to be during work days. This is an important data reliability issue because in the reality engineers could be on official holidays but in the system works could in the queue could be running behind the promised delivery date. And at the end, their efficiency in the report could drop because of that.

Since the delivery reliability is such an important KPI that is being measured in the calibration laboratory, it should be developed further and monitored closely. There should be management team members that are monitoring closely engineers work queues and keeping up to date with the promised delivery dates. This is a metric that shows how well the resourcing is being managed.

As mentioned by the product line manager of calibration laboratory, he would really like to be able to get see the length of time that devices spent on the shelves. That would show what is the current situation of the workload. If there are too many works waiting in line to be done for too long, it means there is not enough work force and engineers are not able to handle the workload on promised delivery terms. Not enough work force. Or there could be situation other way around, when instruments are quickly calibrated from the moment they have been received. That means there is not enough work and engineers are able to test devices and send them back out to the customers in a very short period of time.

5.2   CAL laboratory's KPI's

Academic literature discusses need for KPI's and what are their purposes, what the service ought to be that they are supposed to service. As well that different stakeholders should be involved in the process. Even though the results of the research show that different management figures were involved when setting the KPI's, also for the CAL laboratory, however, analysis of the research show that there is not much involvement when discussing the results of measurements. And engineers of the calibration laboratory have not been taking part on deciding or being involved when creating the KPIs.

5.2.1   Delivery reliability

The main KPI for the CAL laboratory that gets to be measured is the delivery efficiency per each engineer. There is a staff laboratory meeting every month where also these measurements are being shown. That is when engineers get to see how efficient they have been in the previous month.

Employees should be informed of the importance of taking responsibility for their performance. Leaders at the top od the organization need to tell employees that they are responsible at all times for knowing what they will be evaluated on. Likewise, employees should know both their department's objectives and goals and the organization's objectives and goals.
Employees should take an active role when planning future development. Given that their career development is likely important to them, employees probably have a lot to say regarding the developmental paths they want to follow.
(Powerful Performance Management, 2013)

Calibration engineers should be more involved in the KPI process. It would be very useful if management would involve the team and get their opinion what should be measured and why? This would make the team feel more appreciated and part of the decision-making process. It would also result in higher efficiency because of these factors. Increase in motivation. But it would also bring fresh perspective and input from the inside. What are the values and key measures that engineers find important and most importantly why should they be measured?

What if there are too many customers complains coming in? Are customers satisfied with the service provided? Is work delivered on promised delivery time, etc. There could be a whole separate research done on this subject.

At the moment there is no real reward system based on the performance of the engineers. There is an opportunity for any person of the team reach out to the HR personnel and to the product line manager to suggest if any of the team members should be rewarded for doing a good job. That doesn't necessarily need to do anything with the performance but maybe if a person has done something extra or given some kind of a support to the team.

However, there is no incentive or reward as such that would be given based on the engineers' performance. Even after the monthly report.

One element that should be improved is that the KPI of delivery efficiency should be monitored at least weekly, or better twice a week. This data should be accessible by the engineers or visual publicly on the common screen in the laboratory. Specialists in this way would be up to date about their performance so far and would be able to still improve it. Of course, some might argue that it would bring extra stress for engineers if they are lagging behind. However, if management would communicate with the specialist why this is being measured and why it is important, what are the target goals and minimum requirements, that would increase performance of the engineers. Because when measuring KPI's also helps individuals to understand how they are performing in relation to strategic goals and objectives. It would be crucial to analyse the data received and act accordingly.

K.Harold in the book on Project Management Metrics mentions that companies need to empower individuals to act on the information in performance dashboards. This might seem obvious, but many organizations that deploy performance dashboards hamstring employees circumscribing the actions that they can take to meet goals. Companies with hierarchical cultures often have difficulty here, especially when dealing with frontline workers whose actions they have historically scripted. Performance dashboards require companies to replace scripts with guidelines that give users more leeway to make the right decisions. (Project Management Metrics, KPIs, and Dashboards: A Guide to Measuring and Monitoring Project Performance, 131)

I would recommend for the influenceable management members to establish at least monthly reward system. Engineer that would achieve the best performance receiving some type of a reward.

Peer comparisons can be powerful motivators, but how they are used is crucial to their effectiveness.

The power comes from the pride, passion, and peer pressure that teams feel. Each team knows who it compares itself with. But also maintaining the highest ethical standards. (Beyond Performance Management, 328)

Employees should be rewarded in a way that encourages them to continue performing at a high level. It is the best that employees are unable to predict when they will be rewarded. Leaders should use an intermittent schedule when giving employees rewards. (Powerful Performance Management, 2013)

Calibration laboratory has a monthly meeting on a department level. All the calibration engineers and management team of the laboratory are taking part in it. Every laboratory meeting starts with discussion on safety matters. Agenda is also full of many different topics concerning laboratory's functions. Most common approach in the meeting is to show and discuss the performance of the engineers at the end of these meetings. That is when each engineer is able to view their results, when they see their performance. There might be sometimes cases when there is not really enough time during these meeting to actually take a look at the results and discuss matters. Especially is some cases when scoreboard is showing extraordinary results.

I would suggest that meetings on reviewing engineer's performance are held more than once a month and they would be dedicated to reviewing and focusing on particularly on the performance measures.

Because performance management leaders play these paradoxical roles, it is helpful to separate the various meetings related to performance. Separating the meetings also minimizes the possibility of negative surprises. As well as, when these meeting are separated, it is easier to separate the discussion of rewards from discussion about future career development, which allows employees to give full attention to each issue, one at a time. (Performance Management For Dummies, 2019, Chapter 14)

It is also important what are the actual consequences of employees' performance measured. What happens to the employees as a result of performance?

In organizations, consequences often drive the wrong performance. Good performers are assigned more work and slackers are promoted to management. To be effective, conse-

quences must be powerful, personal, certain, and immediate. It is also important that consequences be clearly connected to specific accomplishments or job outcomes. (Pocket Guide to Performance Management, 2009, 6)

5.2.2 Offers vs Orders

The win rate of offers versus orders is not being measured in the calibration laboratory. It would allow to see what kind of calibration services are already sold in the future. Allowing to see what type of instrument calibration has been sold and for how much. It could help to act in situations when win rate is low by reconsidering the pricing and actively increasing sales activities.

Win rate is the number of closed opportunities that were won. (2020, InsightSquared) However, if this metric would be introduced in the calibration laboratory it would require presence of the sales team of the XYZ which has not been the case so far. Offer requests have been handled by management members of the calibration department but not by the sales department of the company. Active sales have not been implemented for the calibration laboratory.

It has been suggested that if win conversion rate is becoming part of the KPI that is being measured, such a metrics as average purchase value and average sales cycle length to be added to the KPI's measured. (2020, Geckoboard)

Or in the case where this KPI would not provide efficient enough information there would need to be metric that would allow to monitor future incoming orders. There would need to be a metric that allows to act when running short on sales and start selling actively assuring that engineer work queues won't be empty.

Also, the other way around, to be able to monitor and act accordingly when there is an overflow of work and engineers are overbooked. That would mean that engineers would fall back on the delivery promised date, breaking the promise made to the customer. A correctly chosen metric would allow to act accordingly on making a decision when adding to the work force would be necessary.

5.2.3   Knowledge per unit

As already previously discussed, this KPI is not being measured in the calibration labora-
tory. Product line manager in the interview mentioned how important it is for engineers to
develop their skills and knowledge of the industry and keep up with the technologies.

Reality is that engineers are constantly learning and developing their skills. For instance,
when there are new instrument types that customers have sent in for calibration. In some
cases, engineers have an opportunity to learn about the case and prepare for the calibra-
tion before the instrument arrives, however, in other cases customers send in their equip-
ment unannounced, which means that calibration per instrument will require more work
hours than expected. All the hours that have been spent on the instrument are being rec-
orded in MIKKI with explanation on quantity of hours, skills learned and what has been de-
veloped. Hours that have been spent on development naturally can't be billable.

Skill development in the industry is very important. Then I would like to raise a question,
why is it not measured as a KPI in the calibration laboratory? I would like to encourage
and recommend that this is empowered in the calibration laboratory. It is also understand-
able that those hours spent on the engineer's skill development can't be turned into billa-
ble hours, however, it is crucial for specialists to keep up with the competitive skills within
the industry. The more diverse capability is there to offer, the higher competitive ad-
vantage laboratory is going to have. Engineers need to be aware of the standard require-
ments for calibration, accredited calibration, etc. and be up-to-date with the changes and
news. The technologies and constantly developing industry require their constant skill im-
provement and learning.

If there would be KPI measuring knowledge in the calibration laboratory, it would encour-
age engineers to take more initiative into learning more new skills and develop on regular
basis their existing once.

Performance of any given individual or performer depends on the individual's compe-
tences to efficiently execute the various tasks assigned to him/her. The person's commit-
ment or motivation to do this is reflected in the effort he/she puts in and the organizational
support available to help him/her successfully carry out various functions. (Performance
Management: Toward Organizational Excellence, 2016, 54)

6 Summary

The objective of this research project was to answer the question whether XYZ's calibration laboratory needs their own specific set of KPI's. Meanwhile analysing and evaluating the existing ones. Throughout the research process I have been building relevant theoretical framework on performance management, on KPI's, their consistence and implementation. Also, at the beginning of the research giving a short introduction on the company, its background and line of business it is operating, and on the calibration laboratory.

When analysing and concluding on the results of the research I have given suggestions and recommendation for improvements and been critical on data reliability.

There have been two stakeholders interviewed for this research work. The head of calibration laboratory and head of finances. Results show different perspectives on subject of KPIs.

Findings of the research show that from the financial department stand point there is no need for introducing any new KPI's specifically set for the calibration laboratory. The reason behind is because they analyse only the financial data that they are receiving every month as a report. Those numbers from that data collected goes to the common "pot" of customer retail services. Financial department do not distinguish calibration laboratory's data separately. Therefore, the conclusion is that there would not be a need to introduce new set of KPI's.

However, when researching KPI's within the calibration laboratory different conclusion can be drown. Improvements on the existing delivery reliability. Monitoring performance on at least weekly basis. To keep up-to-date with the data reliability on at least weekly basis. Introduction of a score dashboard of the current efficiency results for each calibration engineer. Whether on the common screen in the calibration laboratory or in easily accessible place to make it easy for engineers to check on their results and act accordingly on their performance if they are not satisfied with the outcome at that point. Introduction of some sort of award system for the best performers would be advised.

Offers versus orders rate would be suggested to be measured. It would allow to make future planning and predictions on sales. Also, the quantity and type of equipment that is going to be delivered for calibration. It would allow to monitor and act upon on sales activities and workforce.

Knowledge per unit is the KPI that would be important for calibration laboratory. It is crucial for engineers to develop their skills and keep up-to-date with the technologies within the industry. Also, to increase their competitive advantage.

Calibration engineers should be made part of the process when deciding on the key performance indicators. Not only it would bring a perspective from theirs and wold be able to provide an input on the matter. It would help the management to establish a direct connection between the factors that are needed to reach company's goals. Are the calibration engineers' actions aligned with the XWZ's goals and strategy? As it is so important that company's goals and objectives are transparently communicated to the employees, are calibration aware of the KPIs they are responsible for and what is their role fulfilling them?

7   Reflections on own learning

When I started my employment with the XYZ in summer 2019, my first thought was to start negotiating what could be the possible research topic that employer would be needing for me to look at. Research problem was born already at the beginning of the autumn of 2019.

This thesis process showed me how learning plans and goals would need to be adjusted. I had set a strict deadline for this research to be done within several months before starting it. However, personal and work life makes their own adjustments. Where coming to an actual conclusion of the thesis work a year later. Things don't always go according to the plan.

I had planned that there would be five key members of the management team interviewed in order the get along with the research. Observations showed that some people were reluctant to discuss certain matters. And the importance to discuss with the ones that would be the most relevant for the research. From planned five interviews I ended up with having two. I really appreciate the cooperation and input from those members. They were valuable contributors to the research, and they did provide me with extra data or replying to additional questions that appeared later after the actual interviews.

My objectivity and ethical concern have crossed my mind when doing the research due to the fact that I am employed by the XYZ and working within the calibration laboratory. But on the other hand, I felt like it has been helping me since I have deeper understanding and knowledge of how the processes work within the company and the laboratory. And the possibility to access data that was required.

I had certain expectations and assumptions at the beginning of the process. Understanding I gained about how different KPI's are for the finances and what they measure for the calibration laboratory and what KPI's are being measured within calibration laboratory. I definitely liked having those "aha" moments.

The theoretical framework on the performance management is something I have found particularly interesting. Not only I have gained a lot of knowledge when working on thesis, but I definitely will continue learning more on the subject. Engineers' work efficiency, managing their work queues, developing and constantly improving skill level and their motivation to achieve goals set is something that calibration laboratory is dealing with on daily

basis. The more I have learned about the performance management, the more I understand the practical use for KPIs.

Sometimes is has been difficult to stay neutral when making judgment on suggestions and recommendations. Whenever I was doing that, I was thinking what is the theory behind it, why it would be a good idea to do it that way or the other way.

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Appendices

Appendix 1. Interview with the Product Line Manager, Calibration

1. Are performances measured? How? How do you measure your progress?

   In calibration laboratory we are measuring through put time, how long does it take from instrument arrives to when it leaves. We record hours spent on the instrument for any given job and we know how much we charge for the service so from that we can get money efficiency against our calculated average cost of one work hour.

   Progress does not get measured at the moment.

2. Are there organisation wide measurements of the performance? (or department, or individual?

   There are two levels, that every department gets measured against, but some of those are not applicable for the calibration lab. We measure different things, the inner level. So, there is the top level where everything gets measured and then there is that inner level where we see from MIKKI.

3. How do they affect daily work? How do you know when you are performing enough, or not? (or exceeding the expectations)

   There is that measure of bellow the line, how much money we actually produce for the group of SGS. Then there is the budget that we should be meeting. One other important measure is whether or not we can keep the delivery promise. 2 weeks or whatever the promise was for that particular job. There are a lot of things that are tracked that we don't' keep an eye on in the monthly lab meeting and things that are not applicable to the calibration lab. Laskutusaste which is followed very closely in the top hierarchy, laskutusaste means when an engineer enters the building they sign in on his/her kellokortti then when leaving signs out and that means that the engineer has been here for x hours and then we see ho many hours he or she record in MIKKI. Let's say they were in for 8 hours and they recorder 6 hours, to be spent on instruments, that shows how big of a percentage of your daily time here actually translates to billable hours.

4. What are the KPI's that are set, those that are concerning Calibration Laboratory (or relevant for that particular line of business)?

Osamisenkehitaminen, we don't track that in MIKKI, cause there is no real system for that testing engineers are recording their hours in system called PISKI. There are a lot of different categories. You should always achieve 7,5 hours with explanation how did you spent your day. So, also that the development personal development growth gets recorded.

How many offers have been made. But calibration doesn't use that. Jobs that have been entered in the system like in MIKKI we have job queue. We can see what we have on the shelf. But we don't see the future incoming yet for now. Because that is in the system we can't see here. Offers, the win rate of the offers, that is something that is of an interest for the sales guys. Then they can wonder why are we losing offers.

5. By whom are the KPI's set?

These are defined in strategy team. Which is made up of all the business leaders, sales guys and managing director here in Finland. And it's only for XYZ.

6. How are the KPI's monitored? (why are there these particular KPI's?) Would you change or add, develop any? What kind of a role do you play when KPI's are being set?(do you have any influenceable power) How is the data used and how reliable it is?

Why these particular, because money is everything and you want to maximise your money. I can see the reasoning behind all of these. They are telling how well are we using the most expensive resource we have. How well we are able to unitize the most expensive resource we have. Laskutusaste gives us sort of idea of how efficiently engineers use their day. The metric of how we develop ourselves if it's really low it means we are getting left behind on the competition field. You will need to be developing your skills constantly or you will die out.

Then those sales type of metrics, how much we are able to push out offers but for real, I have hard time understanding who uses that and for what? Tehtävissä tilauskanta most usable for sales guys and project managers to keep track of whether to push sales because of low number of new jobs coming in or are we low on manpower, do we need to start hiring people because we have so much

booked orders in, or man hours are not sufficient. Tilauskanta versus Tarjouskanta that's something that should be also here. How much offers we have against how many orders we have.

What I don't see here is the win rate. The % of the offers that we win, we can translate into orders. An the orders give us view for what's coming. We see what is already in and would see what orders are coming in.

Toimitusvarmuus, metric of how well we are getting the resourcing for these in these. Because if we fail in Toimitusvarmuus, it means that we fail in planning of how we use resources. We keep promising everything , we can do it, but if we can't, this gets too big against how many man hours we have available. Tilaukset in eur is for the finance team.

I was here when these KPI's were set. I was in the working group. But these are the general KPI's. Yes, I have a little bit of a say what they should be but more I have say on what the measure on the lab.

To paraphrase the previous managing director, data you can't trust is completely worthless. I agree in part if the data that is recorded is unreliable then what are you doing with these metrics, indicators? Our data is reliable on how much manager requires from his or her team. If we see that there is something wrong with the numbers that gets recorded, we need to just teach the team members to record the data better. But I'd say that there is relatively good reliability for what we can get from here.

Toimitusvarmuus that is so close to my heart. From the moment that the instrument arrives and is recorded in the system, it gets the automatic 2 weeks time but it does not take into account any week day holidays. Which should push the promised date forward. Unless the engineer when they record the actual end date, if they don't check whether or not for that period there were any weekday holidays, then that number is not as reliable as it should be. But then again it could be a management issue. We could argue that management should revise these numbers and not the engineers themselves.

Teaching people the correct way to record whatever is being recorded.

WIP kassa it's something that needs to be reported because of bookkeeping. I don't think it's a KPI but it's here because it's one of those reports that someone needs , so all the reports are in one place.

Toimitusvarmuus is about whether we can keep the delivery schedule. But I am also interested in how long did the instrument spent in our building. Arrival day-delivery day, how long that is. Toimitusvarmuus is not about how quick were we. And we know if an instrument x will take us 2 hours of work, ideally it will only be here for only one day. But if it's here for 5 days, it means we have queue. But if it's here only for one day, it means we are very low on Tehtävissä tilauskanta. We are just basically waiting for instrument to come in. I would like to see for us that we would be tracking this number. The shelf life on any given instrument. It would tell us how clogged up we are. How successful we are in sales.

Appendix 2. Interview with the Senior Controller, Finance

1. Are performances measured? How? How do you measure your progress?

   It is not really revenue level. And what had been budgeted and forecasted for revenue if that will matter realise. And calibration is a bit different from other businesses from that sense that there is also a lot of internal revenue. It is not just a customer invoicing that is creating revenue but I haven't found any how to measure that kind of internal revenue, that is a bit new concept for me in this business.

2. Are there organisation wide measurements of the performance? (or department, or individual?

   Then there is local contribution, how we calculate local contribution, I will send you a report from internal financial tool, so that you see what is included in that contribution level.

3. How do they affect daily work? How do you know when you are performing enough, or not? (or exceeding the expectations)

   One measurement is if you are entitled for annual incentive plan. That is set that you need to reach your targets on certain level to receive any AIP amounts. That is

annual one. Daily work side would be taking care of cost level, keep up on time with customers, it's important to keep customers happy.

4. What are the KPI's that are set, those that are concerning Calibration Laboratory (or relevant for that particular line of business)?

I don't know about explicit KPI's that would be set for calibration laboratory for financial point of view. Maybe it's inside the business more, that there are some specific one. But can't remember from financial side.

5. By whom are the KPI's set?

Financial KPI's are set by managing director and management team that, what is the expected performance level of the year. If there I needed an update for forecast then what is the adjusted level. Forecast is done each May and September. Last year group introduced a last set of KPI's in September. The coming year is budgeted +12. The bases are budgeted already in September. That is quite demanding right after the summer period. All the other projects going on.

KPI's being set, I mainly discuss with A and M, those parties. It's a bit of a mix, creating some suggestions what would be the correct level but in principal I am just giving suggestions and crunching numbers. Not so much really influencing results.

6. How are the KPI's monitored? (why are there these particular KPI's?) Would you change or add, develop any? What kind of a role do you play when KPI's are being set?(do you have any influenceable power) How is the data used and how reliable it is?

Data usage is, if think about calibration lab, is mostly used within Finland because CRS is such a big part of revenue creation that calibration is just one part of it. The total would show to the group as such, not really shown so much on a department level to the group.

Reliability is depended on everyone who is contributing to the figures, so we try to evaluate in finance team when we get the invoicing data and cost, cost invoices for each department. Based on our experience we might question if this is correct or

not but it's also part of the departments responsibility to take care of that validity of that data.

Appendix 3 XYZ Oy KPI's (in Finnish)