

Comparative Study between Automotive Service Dealers' Key Performance Indicators Based on Different Original Equipment Manufacturers Techniques

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ABSTRACT: This paper studies the different Key Performance Indicators (KPIs) that measure the performance of car service centers and dealers based on different techniques and from different Original Equipment Manufacturers' perspectives. The aim of this research is to conclude the best practice in applying service center key performance indicators (KPIs) within car service centers to measure the most accurate performance trends. In this study we focus on three main categories of Key Performance Indicators (KPIs): Operational, Financial and Customer Related Key Performance Indicators (KPIs) comparing different ways of calculations and conduct practical comparison of two car dealerships in order to highlight the importance of performance monitoring in highlighting gaps in the service processes and identify different types of waste to reach lean operations and forecast future results along with brand's trend.

KEYWORDS: KPIs (Key Performance Indicators), Service Standards, Operational Key Performance Indicators, Comparative Study and LEAN Services.

NOMENCLATURE:

KPI: Key Performance Indicator.

OEM: Original Equipment Manufacturer

RO: Repair Order

ROFR: Repair Order Fill Rate

UIO: Units in Operation

CPUS: Customer Paid Units Serviced

CSI: Customer Satisfaction Index

NPS: Net Promotor Score

I. INTRODUCTION

Performance monitoring is a gate leads to operations development, better performance, customer satisfaction and business sustainability because what we cannot measure, we cannot manage. Key Performance Indicators are always the point of concern to any service manager who seek better performance and higher profit. Depending on gross profit numbers cannot guarantee customer satisfaction or brand reputation which are pillars for business growth and sustainability. In Automotive Service sector the KPIs vary and have many categories, in this study we chose major Key Performance Indicators that must be monitored regularly to manage the car dealership successfully and detect any gap in the operation.

We categorized the Key Performance Indicators to three main categories (Fig.1): Operational KPIs (Workshop or Spare Parts related), Financial KPIs and Customer related KPIs. The three categories contain essential KPIs that assure smooth performance and lean processes. The Comparative study here takes two levels, the first one is to compare different techniques and perspectives to measure the same KPI and the objective here is reach the best practice. The second level is comparing the performance of two different car service centres based on their measured KPIs and develop guidelines how to use your Service Centre's KPIs in gaps definition, wastes identification and operations' development.

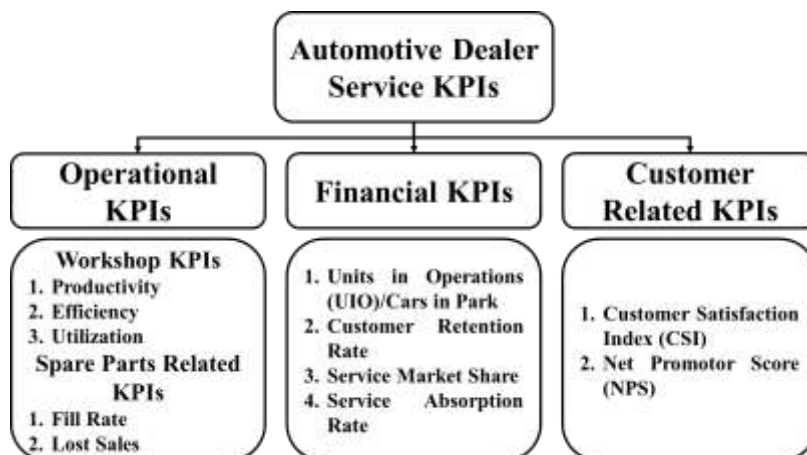


Figure 1 Automotive Dealer Service KPIs

II. OPERATIONAL KEY PERFORMANCE INDICATORS

OPERATIONAL HOURS

Operational Workshop KPIs were and still having the largest share of study and attention among all key performance indicators in the automotive field, especially service sector. So, in this paper we will study how these KPIs are identified and calculated from different perspectives. The comparison will be among four different techniques of calculation and definition, each technique represents summation of methodologies, definitions and application of Key Performance Indicators in different cultures and from different point of views.

First we will agree on all hours' definitions even though all OEMs and researchers agree on all hours' definitions, they use different names and terms.

Attended/ Available Hours

For **Technique 1** it is "Hours Attended" and defined as total number of productive hours available. This term represents the total number of hours that the technicians are available to work, or in other words, the total number of hours that the technicians are clocked-in at the dealership. The number of Hours Attended is the statistic that is used in the calculation of Utilization and Overall Efficiency.

Technique 2 and 3 use the same term and definition "Available Hours" and define it as the hours available for work and is the total of the regular working hours and overtime.

Technique 4 uses "Available Hours" as well and defines it as the number of hours that the service technician is available to work. This is the time between when they arrive for work and when they

depart at the end of the day, minus any lunch periods and official break times.

Sold, Invoiced or Labour Hours

Technique 1 defines the Sold Hours as the total number of invoiced hours, and it advises to keep track of the number of Hours Sold than it is to keep track of their monetary value. This is because the monetary value of the Hours Sold can be influenced by your charge out rate and this does not therefore provide an accurate reflection of the direction of your business. Also, it recommended that the easiest way to track the performance of the Hours Sold is to compile them into a simple graph on a weekly or monthly basis.

The four techniques did not differ on the name or the definition, but they provided more than one method for calculating the data available in each dealer.

Technique 2 represents the expert in detail offered two methods for "Labour Hours Sold" calculation,

Technique 2 - Method A: This applies to dealers where Labour Hours Sold (flat rate time) can be calculated and determined by the total number of accumulated technician Labour Hours Sold (Fig.2).



Figure 2 Sold Hours Calculation Equation (Method A) according to Technique 2 K.P.I Guide

Technique 2 - Method B: For dealers that cannot use method A, calculate the Labour Hours Sold from the technician service (labour) sales (including normal discount) and service (labour) rate.

Technique 2 - Method B-1: When the service (labour) sales and wage rate by work type can be categorized: Use the sales and rate based on the field (e.g., periodic maintenance, warranty, internal service) (Fig.3).



Figure 3: Sold Hours Calculation Equation (Method B-1) according to Technique 2 K.P.I Guide

Technique 2 –Method B-2: When the service (labour) sales and wage rate by work type cannot be categorized: Calculate from the General Service Technician Labour Sales and Overall Effective Labour Rate (Fig.4).

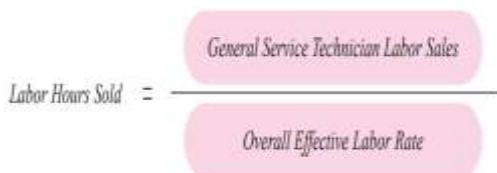


Figure 4: Sold Hours Calculation Equation (Method B-2) according to Technique 2 K.P.I Guide

Technique 3 did not offer more than that the “Sold Hours” are the total labour hours sold against total number of repair orders (ROs).

And Technique 4 with the simplest methodology defined the “Invoiced Hours” as the number of hours that can be billed/sold to produce the repairs. These were Billable hours prior to sale.

Actual, Clocked, Worked or Productive Hours

From the whole study we can conclude that the “Actual Hours Worked” is the foundation stone and point of connection for most operational KPIs that is why **Technique 1** mentioned a detailed description as the number of hours that the technicians have been working productively.

Working productively means, spanner-in-hand head- under-bonnet working on time that can be charged out to the customer. Although a technician may be clocked in and available to work for 40 hours per week, the time that they spent working productively is shown as the Hours Worked.

There is only one way to accurately capture the number of Hours Worked productively and that is for each technician to clock on and off each individual job. There is one question that must be asked here. If we do not accurately record this key performance area, when we do have a problem needs to be resolved, where do we begin to look for the answers? There is an old quote that says: "If you can't measure it, you can't manage it."

The three other Techniques along with the first one agreed on one way to define, calculate and monitor “the Actual Hours,” **Technique 2** said that “This is the total number of hours that can be provided for actual work from the business hours. This does not include lunch time, pre-set break times, training, arriving to work late, leaving work early, and vacation time.” **Technique 3** explicitly defined it as “The total productive (actual) hours on service jobs” and **Technique 4** called it “Clocked Hours” and defined it with the same concept “The number of hours that a technician spends actually repairing vehicles. Clocked Hours is actual time the technician spends working on a repair.

1. WORKSHOP KPIs Productivity, Efficiency and Utilization

In this section we compared the famous operational workshop KPIs in automotive service centres. There is great controversy and disagreement among OEMs over the definition and calculations of the three basic KPIs (Productivity, Efficiency and Utilization,” not only among the different OEMs, but between different countries and scholars. So, here we will compare the four techniques’ points of view regarding the three KPIs as the three are connected then apply the four techniques on a real case study to conclude the best practice we can use.

Technique 1 Labour Utilization

$$\text{Labour Utilization\%} = \frac{\text{Hours Worked}}{\text{Hours Attended}} \times 100$$

This KPI is also known as Utilization, Labour Efficiency and Selling Efficiency. The statistic tells how much of the Technicians’ attended time is actually spent working productively. In more simplistic terms, each Technician usually clocks in and is available for eight hours each day, but how much of that time is

spent spanner-in-hand, head-under bonnet, working on hours that can be charged out to the customer? Labour Utilization gives the answer to this question.

Overall Efficiency

Overall Efficiency% = Hours Sold / Hours Attended (x100)

This KPI measures the relationship between the number of hours that have been sold and the number of hours that the technicians have been available to work.

The direction and travel of this key performance indicator keeps you informed of the balance and harmony that must exist between workshop Utilization and Productivity, Overall Efficiency clearly demonstrates that there is little point in increasing one and ignoring the other.

Productive Efficiency (Productivity/Working Efficiency)

Productive Efficiency % = Hours Sold / Hours Worked Productively (x100)

This KPI is also known as Productivity and Working Efficiency. It shows the relationship between Technicians' speed in completing jobs and the abilities of Front Counter Staff to sell the hours to customers.

Most franchise manufacturers provide dealers with allocated times for jobs on all vehicles and this allocated time is what the Hours Worked are usually measured against. The Hours Sold is the responsibility of the front counter staff and they could sell more or fewer hours than the manufacturers' book times. In order to make gains in profitability, technicians must complete the job in a lesser time than is allocated by the manufacturer, or the front counter must sell more hours on the same job, thereby increasing Productive Efficiency. Productive Efficiency is a double-edged sword. If Technicians take more time to complete the job than the manufacturers' allocated time, then profitability diminishes, and Productive Efficiency falls below 100%.

Technique 2

Technical Efficiency (Work Efficiency)

This indicates the portion of service (labour) sales (time) of a technician that was achieved during the standard work times established for each job.

Technical Efficiency = (Labour Hours Sold / Actual Hours Worked) x100

Technical Efficiency is believed to be greatly affected by the technical expertise and Muda of technicians. A low value can adversely affect the

service gross profit rate (service (labour) sales profit rate).

Labour Utilization (Utilization Rate)

This indicates how many hours of actual work there are with respect to the business hours of one day.

Labour Utilization = (Actual Hours Worked / Available Hours) x100

A low value indicates that the technicians are not being utilized fully.

Technician Productivity

Total number of units serviced per technician. The productivity per technician is indicated by the number of units serviced.

Technician Productivity = Total number of vehicles serviced / Number of Technicians (x100)

Two elements that are used to determine the productivity of technicians include the technician skill level and the rate of work completeness. Even though skill levels may be high, if the work is not done completely, this number will not increase. If this number is unsatisfactory, there may be a problem in either area.

Technique 3

Overall labour efficiency

Overall labour efficiency = Sold hours / Available hours

labour Efficiency

Labour efficiency = Sold hours / Actual hours

labour Utilization rate (Productivity)

labour Utilization rate (Productivity) = Actual hours / Available hours

Technique 4

labour Efficiency

The number of Invoiced Hours a technician produces compared to the time he actually spends repairing vehicles.

labour efficiency (%) = Invoiced Hours / Clocked Hours * 100

Overall Productivity

Overall productivity is the ratio of Invoiced Hours to Available Hours. The number of Invoiced Hours produced by a technician divided by the number of available hours while those Invoiced Hours are produced.

Overall Productivity (%) = Invoiced Hours / Available Hours * 100

It is valuable to monitor this KPI for each technician and for the entire service department. Special needs such as training for an individual

technician can be highlighted to focus the improvement efforts efficiently.

Labour Utilization

This measurement compares the number of Clocked Hours a technician works compared to the time he is scheduled for work (Available Hours).

Workshop Utilization (%) = Clocked Hours / Available Hours *100

2. SPARE PARTS RELATED KPIS

Parts Fill Rate and Lost Sales

In here we chose two KPIS that have the strongest impact on service operations and workshop processes. Customer always expecting during the service of his car to find all needed parts regarding his repair and parts unavailability affects the service quality and customer satisfaction as well. So, Repair Order Fill Rate (ROFR) or Parts Fill Rate and Parts Lost Sales are two parts related KPIS that complement each other.

Parts Fill Rate:

In a nutshell the service department in most cases, is the parts department's most important customer. In most cases, the dealership's highest parts profits come from selling parts to the dealership's Technicians. Therefore, it is important that the dealership's inventory consistently provides Technicians with the parts they need. To determine if this is occurring, the dealership should monitor the fill rate to the service department on a monthly basis. Dividing the number of repair orders requiring parts where all the required parts were in stock by the total number of repair orders requiring parts. Parts Fill Rate indicates how well customer demands are met immediately from stock. This KPI is needed always to be 100% however the accepted minimum rate is 95%.

Parts Fill Rate can be calculated per Repair Order (RO) and for total Repair Orders (ROs) of the month. There are no disagreements on Fill Rate equation from Techniques' perspectives.

Parts Fill Rate = R.O.s that had parts/Total R.O.s needing parts Or, simply:

Parts Fill Rate (%) = (Supplied Lines/Ordered Lines) *100

Spare Parts Lost Sales

Low Parts Fill Rate means high Lost Sales. Parts Lost Sales usually calculated in terms of money or lost profit reflected from unfulfilled Repair Orders, it means that the service centre lost an opportunity to sell part to the customer however not all lost sales are due to parts unavailability

sometimes customer reject the parts for high price or thought it's not needed part. Analysis of Lost Sales helps a lot the service centre to monitor the inventory and manage the stock. The lost Sales equation is opposite to Fill Rate,

Lost Sales % = 100 – Fill Rate %

Or, for more accurate results:

Lost Sales % = (Lost Sales \$ / Total Invoiced \$) *100

And here the Lost Sales calculated for all cancelled parts even they were available in stock.

Operation KPIS Comparison

Obviously, OEMs and even scholars and experts have kind of disagreement and difference between definitions and calculations of the famous workshop KPIS, and the disagreement does not stop here but it expands to be a conflicting concept, as we see above the Productivity for example from one Technique's point of view is the Efficiency from another one's. The four techniques did not agree on the same concepts and definitions. But which KPI is the real key that highlights gap in process?

Now we are about to compare all points of view for each KPI's definition and calculation,

Productivity

The most controversial KPI, almost no one defined it typically like the others. Starting with Technique 1 that sees that the Productivity is the productive efficiency or the working efficiency as it believes that the Sold Hours is front staff responsibility while work accomplishment with high efficiency and in lesser time than OEMs recommends is technicians' responsibility and represents the workshop productivity so, it defined it as **Hours Sold / Hours Worked** and this is of course the famous Efficiency equation however **Technique 1** thinks that they are the same. Even though **Technique 2** is the reference of most standards and KPIS, **Technique 3** did not follow the Productivity conception of **Technique 2** as **Technique 2** considers that all workshop KPIS: efficiency, utilization and technician productivity are fall under the category of Productivity. For the Technician Productivity it is **Total number of vehicles serviced / Number of Technicians** and here **Technique 2** did not set a clear equation for the Overall Productivity as they believe that all workshop KPIS are connected and affect the Overall Productivity.

But Technique 3 clearly defined the Productivity as the Utilization Rate and give them the same equation **Actual hours / Available hours** and here

Technique 3 agreed with the Other concepts of most luxurious brands that define the Productivity with the same Utilization equation and have a unique definition named the Effectiveness which represents the Productivity from **Technique 4** point of view, they said that the key figure Effectiveness can be used if productive working hours in the business is not recorded, meaning that productivity and efficiency cannot be measured. This key figure is not as meaningful as the others because the ratio of time sold to time attended does not highlight actual problems - all the points specified under productivity and efficiency must still be checked.

However, Technique 4 depends on the theoretical number calculated from equation to monitor the Productivity **Invoiced Hours / Available Hours** and detect problems and needed trainings from this number.

Efficiency

There is no dispute over the definition of efficiency, not only in the automotive sector, but in any sector and in life in general. Efficiency is the ratio between the time expected to complete the work and the time it was actually completed. Note that the expected time is determined by the parent company, global standards, the best practice that has been achieved by peers in the same field or by benchmarking.

From perspectives, efficiency indicates the share of productive working hours of the direct workforce which are invoiced to customer orders. That is why the efficiency indicates whether the mechanics, for example, exceed the specified repair time (work units or hours), which equates to low efficiency, or need less time, which equates to high efficiency. This figure is used to measure performance for technicians' performance appraisals.

Techniques 1 and 2 agreed on use the efficiency as a part of the overall productivity.

While Techniques 3 and 4 use it clearly as separate KPI called labour Efficiency **Sold hours / Actual hours**.

Utilization

Whether it is called Utilization, Utilization Rate or even Productivity it is agreed that Utilization is the key KPI of workshop performance and it is the direct measurement of time waste that means the utilization indicates whether the production processes are lean or not.

Techniques 1 and 3 who merged the productivity and utilization in one KPI with one formula said that Utilization Rate/Productivity should be

monitored on a daily basis if possible so that fluctuations in workshop utilization can be reacted to immediately. Evaluating productivity on a weekly basis may be too long-term because the workshop manager will then have almost no chance of counteracting undesirable situations. If there are large deviations in productivity, particular attention should be paid to ensuring an exact time recording process (risk of manipulation or employee carelessness).

Even Technique 2 who considered the utilization rate as the first KPI indicates workshop productivity and **Technique 4** who defines it as it is, they all agreed on the same equation when it comes to Utilization definition.

Spare Parts Fill Rate and Lost Sales

The four techniques prefer to use the two equations to reflect the parts availability and parts sales activities on the Key Performance Indicators and on the workshop performance as whole as spare parts represent the core of workshop operations and sold hours and have the strongest impact on customer satisfaction and service centre revenue.

III. FINANCIAL KEY PERFORMANCE INDICATORS

Units In Operations – Cars in Park

The Units in Operations (UIO) or the Cars in Park as called by German brands is not exactly a KPI it's more into concept and critical number that controls all brand's major KPIs. The UIO is a key parameter in all KPIs that decide any expansion in service network or establishment of new dealership and real current market share of the brand.

Technique 2 defines UIO as the total number of vehicles sold by respective dealers, which are registered as being in operation in the market. New vehicles that have become used vehicles are included in the UIO as long as they are not scrapped. Also, **Technique 3** said, the performance of a dealer depends on the number of vehicles received for servicing, following new car purchases for planning targets for the number of services, UIO data is very useful. UIO calculated by checking the number of registered vehicles in specific sales area according to vehicle age by using data from the Ministry of Transport, or other relevant authorities.

Technique 4 directly defined the UIO as the estimated number of brand vehicles in operation in the dealer's market.



Figure 5 Units in Operation (UIO) Concept

So, is the UIO calculated or estimated number and how can we get it accurately?

Most brands depend on one methodology just like **Techniques 3 and 4** based on three basic steps:

- 1) Research the annual number of vehicle sales for the past ten years at your dealer. (If the dealership was taken over from another dealer in the past ten years, also include the figures of the previous dealer).
- 2) Multiply the number of vehicle sales for each year by the remaining rate.

Remaining Rate:

The remaining rate indicates the probability of vehicles still being in use after purchase in percentage terms according to the age of the vehicle. This remaining percentage considers the end of vehicle life through wear or deterioration, disposal after accident, resale to outside areas, and any other possibilities.

- 3) Dealer's UIO is calculated by adding each year's figures, calculated for the past ten years.

1993	100	98	95	90	80	70	60	45	30	10		
1994		100	98	95	90	80	70	60	45	30	10	
1995			100	98	95	90	80	70	60	45	30	10
1996				100	98	95	90	80	70	60	45	30
1997					100	98	95	90	80	70	60	45
1998						100	98	95	90	80	70	60
1999							100	98	95	90	80	70
2000								100	98	90	80	70
2001									100	95	90	80
2002										100	92	95
2003											100	98
2004												100
2005												

1) No. of sales
 2) Remaining rate
 No. of units sales = 100
 x 0.98, 0.95, 0.9 ...
 3) 10-year Total
 4) UIO by age group

Total	2007	2004	2005
	678	678	678
Aged 7 - 10	85	85	85
Aged 4 - 6	210	210	210
Aged 0 - 3	383	383	383

Figure 6 UIO Calculation using Remaining Rate Method

But using remaining rate is not the only criteria for UIO calculation.

Technique 2 identifies three ways with different degrees of accuracy (Table 1)

	Accuracy	Calculation method	Remarks
1.	High	Number of registered vehicles (information)	Use the figures published by a government-related agency for the number of registered vehicles.
2.	↑	Alternative calculation method: number of vehicles sold × remaining rate	Dealer sales total × remaining rate. See the next page for the calculation method.
3.	Low	Alternative calculation method: number of vehicles sold	Dealer sales total

Table 1 UIO Calculation Methods based on Accuracy.

Customer Retention Rate

One of the most important Key Performance Indicators in the automotive service sector that depends on UIO is the customer

Retention Rate, it is a very clear and solid indication of dealer performance and business trend for the upcoming period.

Service Retention rate is the ratio of number of vehicles serviced by the dealer to the number of vehicles available for service. The number of available vehicles will mainly be based on either the number of vehicles in the dealer's primary market area or the units in operations (=the dealer's new vehicle sales for the last n years)

Service Retention rate = (Charged Serviced Unit/UIO) *100

Usually, the Retention Rate calculated for one year. Customer Retention Rate within One Year = Number of Customers (VIN)/UIO

Service Market Share

A very unique KPI that mature OEMs concerned with, is the Service Market Share.

Technique 2 is the only Technique that mentioned this KPI, it is high level and strategic KPI that helps in business expansion and strategic decision making. This indicates the percentage of the total demand for service from the brand UIO that is held by the authorized brand network.

Service market share = (CPUS) / (Average yearly number of service visits × UIO) *100

- **Customer Paid Units Serviced (CPUS):** This indicates the number of paid service units for repair and periodic maintenance and repair.
- The reason for the service visit is limited to general maintenance and periodic maintenance.
- Vehicles serviced multiple times count as one unit.
- This is calculated for the past year.

The service market share is a number that shows what percentage of the service demand from your brand vehicle share that you are able to handle; and shows customer retention from the standpoint of the share of all service demand. A low value means low customer retention.

Service Absorption Rate

This indicates the degree to which costs required to run the dealer and fixed costs (administrative expenses) are covered by service profit. The service absorption rate is an index measuring the contribution of after sales profit to the sustainability of the dealer. Because service demand is not affected as strongly by the economy as new vehicle sales, the higher the ratio, the

greater the earnings by service sales and the more sustainable the business.

Service Absorption Rate = (Service Gross Profit) / (Administrative Expenses (fixed cost)) *100

IV. CUSTOMER RELATED KEY PERFORMANCE INDICATORS

In the very recent time Customer Satisfaction become the strongest and main point of concern for all market leaders in all industries and fields. Nowadays customers and service receivers have the power to promote and grow businesses or destroy it by word of mouth no doubt social media helps a lot in customer voice support. That's why the next two KPIs are essentials for any service centre wants to sustain their business and achieve higher revenues.

Customer Satisfaction Index (CSI)

The CSI is an index for customer satisfaction with the service visit including all service aspects for all Techniques it's a survey of standard questionnaire conducted with the customer through phone call, physical interview or online survey its objective is to measure the satisfaction of the customer with whole experience and the low rates of specific aspects will indicate gap in process or area for development.

The CSI survey must cover the whole visit details and all Methods have questions for the three service main aspects: Time Aspect, Quality of Work and Value for Money. And none of them ignores Staff and Facility evaluation.

However, Technique 2 added Fix it Right Rate as a separate question in the survey not included under Quality section.

Net Promotor Score (NPS)

This KPI was developed recently in many different industries and fields, purely aims to measure the real satisfaction of the customer with offered service or product as it depends on only one question "Do you recommend/promote our service/product to your friends and relatives?" Since no one would recommend service or product he doesn't really like or satisfied with, the Net Promotor Score gives a critical real indication to business status and voice of customers.

NPS measures customer experience and predicts business growth.

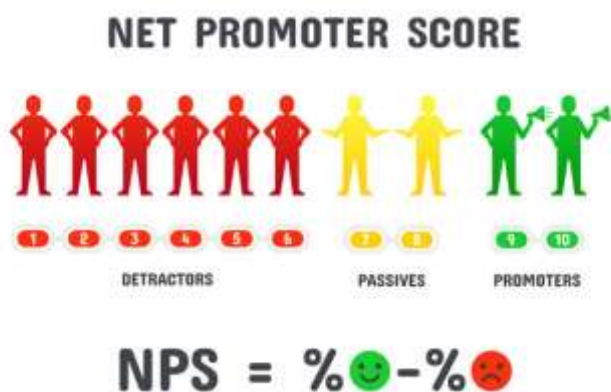


Figure 7 NPS Calculation Formula

The NPS is a number between -100 and 100.

V. CASE STUDY

Two growing up brands expand in the Egyptian market and the main authorized dealers work on different improvement projects to support the brands, increase sales, and attract new customers. That is why they started working on developing the aftersales services and monitoring the performance of different departments. The main KPIs that should be monitored are the Operational KPIs along with technicians’ performance. Also, the Customer Satisfaction Index (CSI) and Net Promotor Score (NPS). The OEMshavelimited guidelines and standards for Key Performance Indicators’ calculations. So, we will use our study to calculate the KPIs by using the four different Service Centres’ Data

Techniques and decide by results which approach is more convenient and able to illustrate gaps in performance.

Methodology

In this case study we used the four Techniques resulted from the comparative study to conclude the most efficient approach that balance the KPIs’ concepts with values and calculations. And this practice will lead to better monitoring of the performance and highlight different gaps in operations and processes. The below data for 6 consecutive months.

SC	SC Data	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22
SC 1	Available hours	7,864	6,944	6,476	5,000	6,028	5,235
	Sold hours	8,368	4,857	6,922	5,354	4,379	5,388
	Actual hours	5,823	5,249	4,359	3,912	3,507	3,740
	Parts Fill Rate	94%	86%	96%	94%	88%	93%
	CSI	86%	84%	88%	82%	80%	88%
	NPS	58%	55%	66%	85%	88%	85%
SC 2	Available hours	5,547	5,181	5,190	6,031	5,714	6,128
	Sold hours	5,615	5,419	4,806	5,968	5,603	5,587
	Actual hours	5,418	4,465	4,708	5,738	4,666	5,439
	Parts Fill Rate	91%	92%	88%	89%	86%	90%
	CSI	78%	79%	75%	81%	79%	80%
	NPS	44%	52%	69%	72%	64%	70%

Table 2: Service Centres’ Data

KPI	Service Center	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22
Overall Efficiency %	SC 1	106%	70%	107%	107%	73%	103%
	SC 2	101%	105%	93%	99%	98%	91%
Productive Efficiency (Productivity/Working	SC 1	144%	93%	159%	137%	125%	144%
	SC 2	104%	121%	102%	104%	120%	103%
Labor Utilization %	SC 1	74%	76%	67%	78%	58%	71%
	SC 2	98%	86%	91%	95%	82%	89%
Parts Fill Rate %	SC 1	94%	86%	96%	94%	88%	93%
	SC 2	91%	92%	88%	89%	86%	90%

Table 3: Calculated Operational KPIs from Technique 1 Perspective

KPI	Service Center	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22
Productivity %	SC 1						
	SC 2						
Technical Efficiency %	SC 1	144%	93%	159%	137%	125%	144%
	SC 2	104%	121%	102%	104%	120%	103%
Labor Utilization %	SC 1	74%	76%	67%	78%	58%	71%
	SC 2	98%	86%	91%	95%	82%	89%
Parts Fill Rate %	SC 1	94%	86%	96%	94%	88%	93%
	SC 2	91%	92%	88%	89%	86%	90%

Table 4: Calculated Operational KPIs from Technique 2 Perspective

KPI	Service Center	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22
Overall Labor Efficiency %	SC 1	106%	70%	107%	107%	73%	103%
	SC 2	101%	105%	93%	99%	98%	91%
Labor Efficiency %	SC 1	144%	93%	159%	137%	125%	144%
	SC 2	104%	121%	102%	104%	120%	103%
Labor Utilization Rate (Productivity)%	SC 1	74%	76%	67%	78%	58%	71%
	SC 2	98%	86%	91%	95%	82%	89%
Parts Fill Rate %	SC 1	94%	86%	96%	94%	88%	93%
	SC 2	91%	92%	88%	89%	86%	90%

Table 5: Calculated Operational KPIs from Technique 3 Perspective

KPI	Service Center	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22
Overall Productivity %	SC 1	106%	70%	107%	107%	73%	103%
	SC 2	101%	105%	93%	99%	98%	91%
Labor Efficiency %	SC 1	144%	93%	159%	137%	125%	144%
	SC 2	104%	121%	102%	104%	120%	103%
Labor Utilization %	SC 1	74%	76%	67%	78%	58%	71%
	SC 2	98%	86%	91%	95%	82%	89%
Parts Fill Rate %	SC 1	94%	86%	96%	94%	88%	93%
	SC 2	91%	92%	88%	89%	86%	90%

Table 6: Calculated Operational KPIs from Technique 4 Perspective

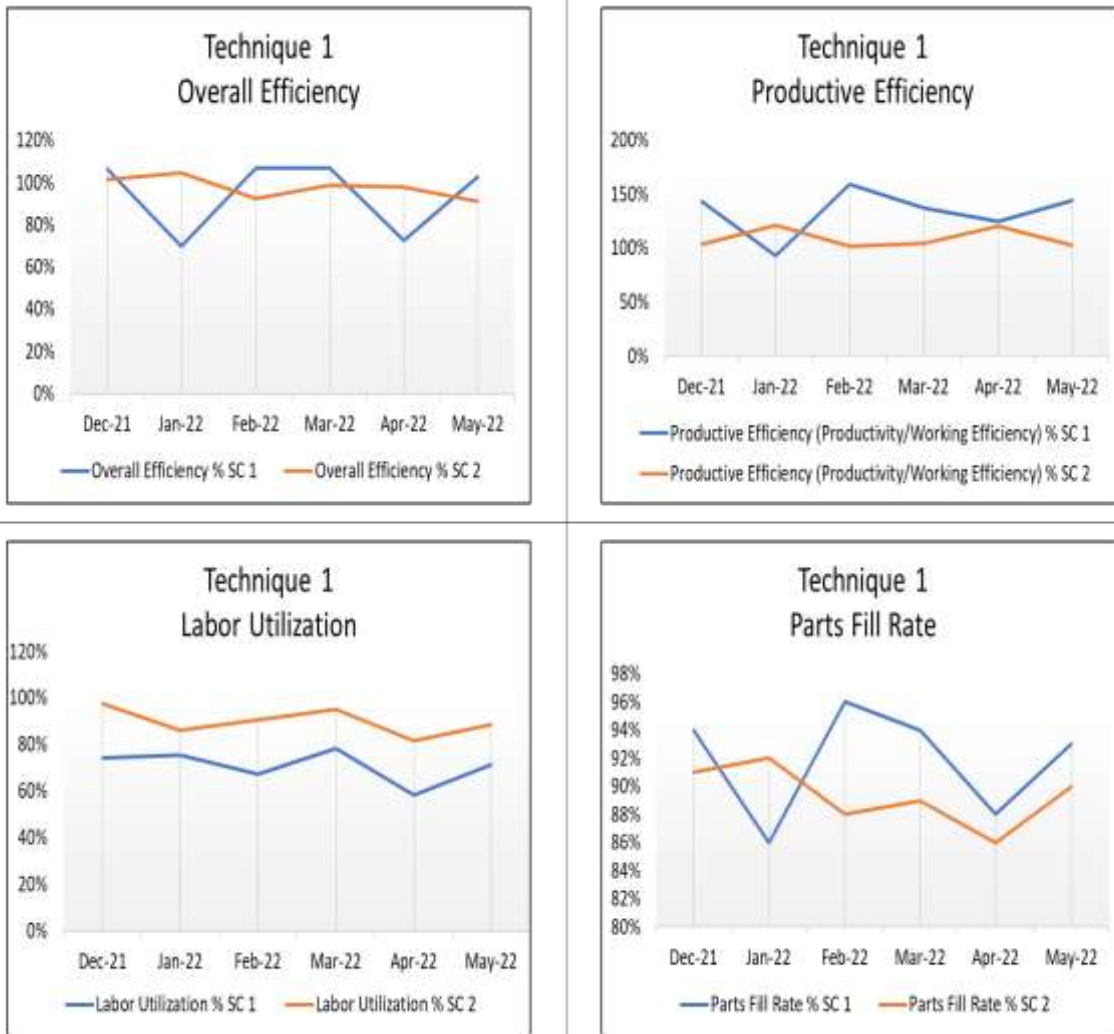


Figure 8 Service Centres' Performance Results for six consecutive Months based on Technique 1 Calculations

While comparing the four techniques for both service centres, we highlighted many gaps and roots for analysis that may lead to the reasons of weak performance or opportunities for better results and highest KPIs.

The comparison among the four techniques is for the Operational KPIs while the Customer Related KPIs will help us to reflect the workshop performance on customer experience, satisfaction, and retention.

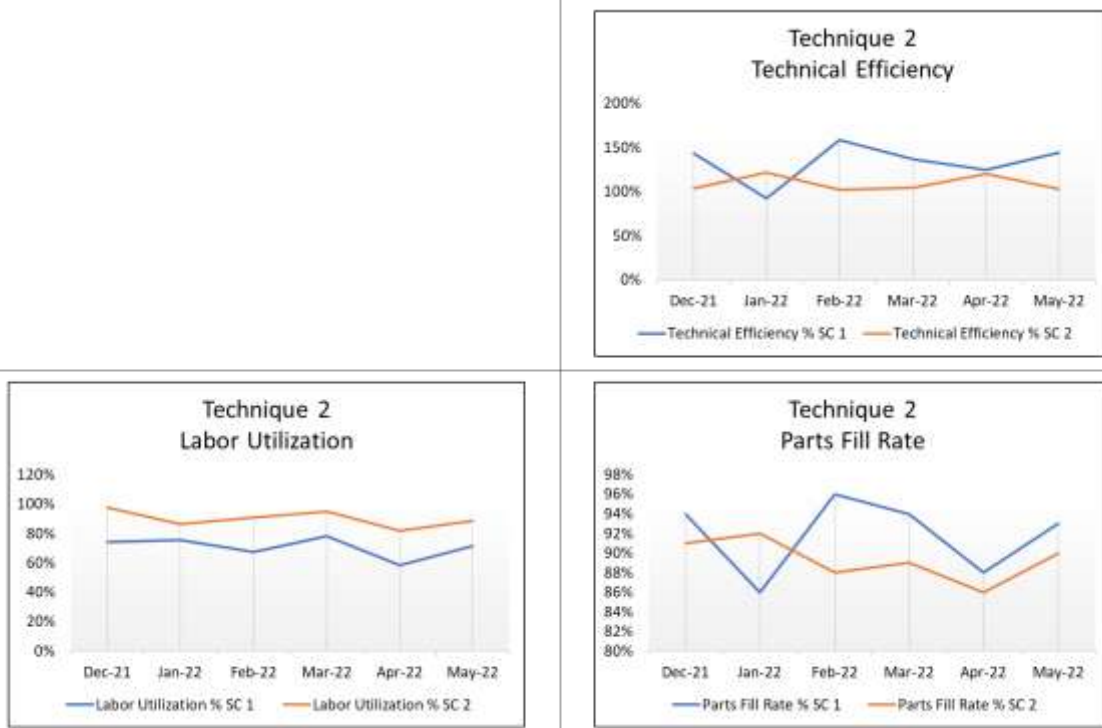


Figure 9 Service Centres' Performance Results for six consecutive Months based on Technique 2 Calculations

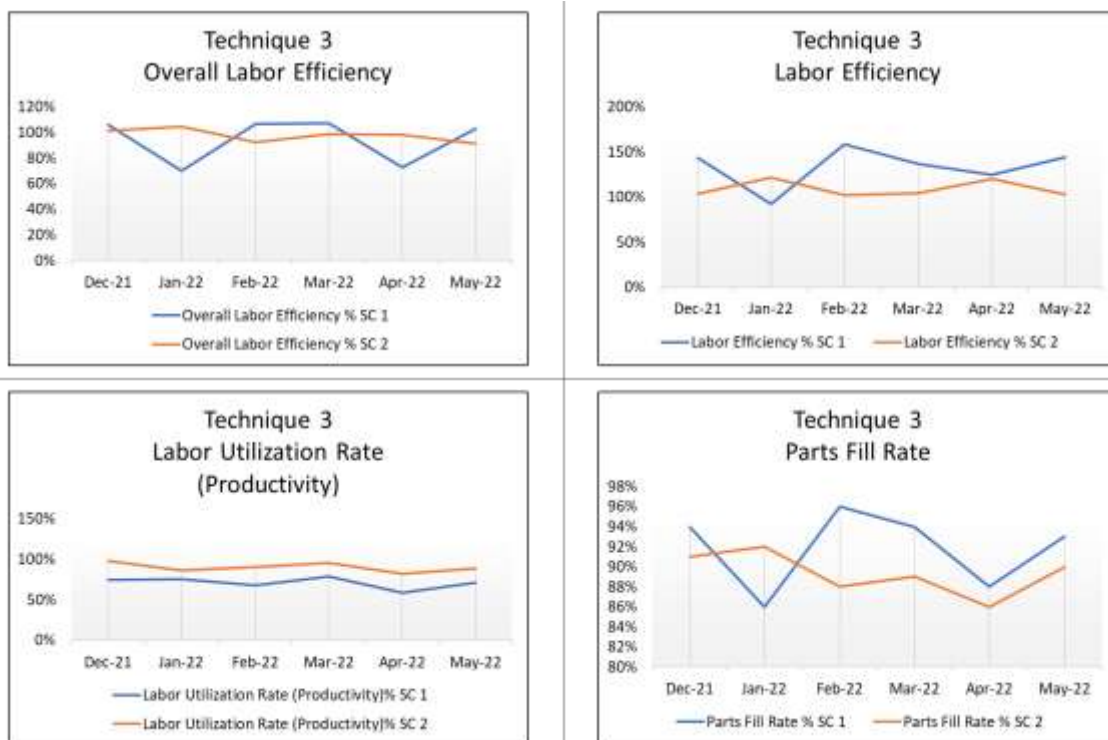


Figure 10 Service Centres' Performance Results for six consecutive Months based on Technique 3 Calculations

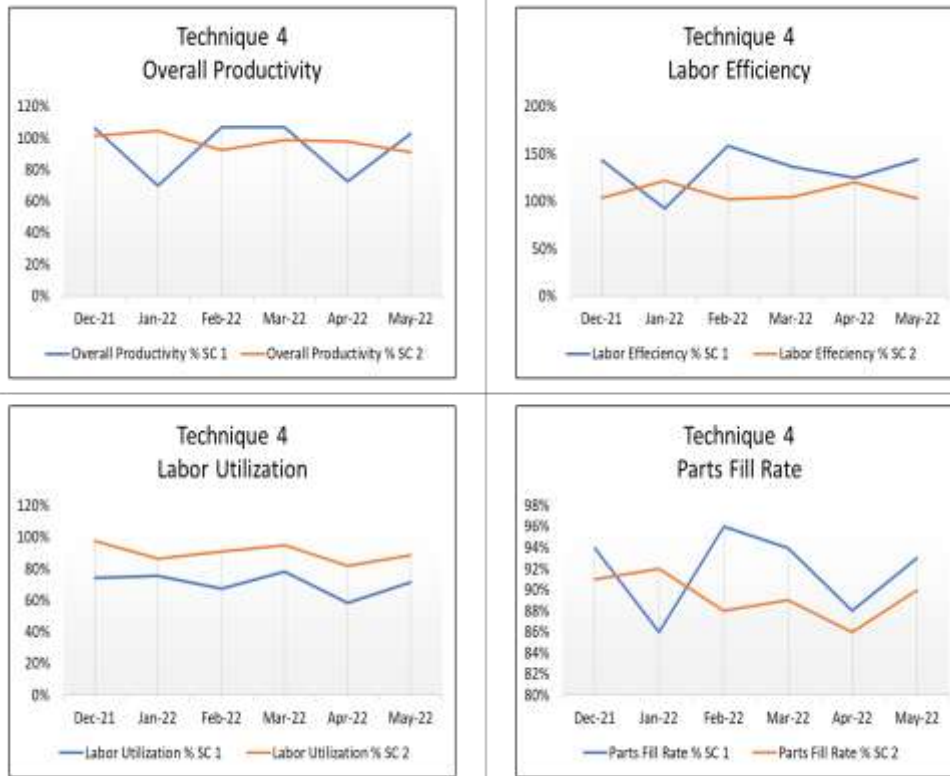


Figure 11 Service Centres' Performance Results for six consecutive Months based on Technique 4 Calculations

RESULTS

Technique 1

For Service Centre 1: These numbers indicate acceptable values of Productive Efficiency or Productivity while the Overall Efficiency and Utilization recorded low rates, we can agree on that the technicians are not fully utilized this may rely on overstaffed workshop however the Overall Efficiency numbers indicates decline in sold hours which may encourage the service manager to pay more attention for the service advisors in service consultations and upselling specially that the Productive Efficiency recorded accepted values.

For Service Centre 2: Numbers indicate slightly low values of Productive Efficiency or Productivity and Overall Efficiency, while Utilization recorded high rates, it seems that the technicians are fully utilized this may be understaffed workshop or inefficient technicians specially with low rates of Productive Efficiency.

Technique 2

For Service Centre 1: There are no values for Productivity however we can evaluate the performance of the workshop based on Technical Efficiency and Labour Utilization. Even though the

efficiency is accepted for most months but there is some fluctuation in performance and the low values of Utilization indicate drawback in labour utilization, but the sold hours are not measured compared to the Available hours so, some gaps in processes cannot be found or ignored.

For Service Centre 2: The overall performance indicates low Efficiency rates with high Utilization rates means gap in performance but having no values for sold hours makes us cannot see the complete picture.

Technique 3

For Service Centre 1: Same results of Technique 1 however, Technique 3 is more specific in defining the Productivity as the Utilization Rate and consider this value as the main KPI in workshop then the Efficiencies can indicate the technicians' skills and frontliners' skills as well.

For Service Centre 2: The Overall Labour Efficiency indicates average number of sold hours which means there are deficiencies in labour efficiency.

Technique 4

For Service Centre 1:Technique 4 gives very simple and somehow theoretical results since it depends mainly on the Productivity value which doesn't highlight any kind of operational gaps but refers to sales skills and consultancy of service advisors so, if we don't pay attention to low rates of Utilization many gaps will be missed.

For Service Centre 2:Technique 4 shows clearly that Productivity and Efficiency are slightly meeting the acceptable ranges and about to slip while the Utilization rates are very high which is good indicator if it doesn't relate to the other KPIs.

VI. CONCLUSION

The theoretical and analytical studies' results were evaluated and concluded that:

1. Workshop operational KPIs are the main Key Performance Indicators for any car dealership no matter how small the business is and always entails monitoring productivity, efficiency, and utilization.
2. By comparing the four techniques mentioned in the research, it turns out that no organization agrees identically with the others on all key performance indicators. The best practice was found in definitions of Technique No. (2) definitions along with views of Technique No. (1).
3. Productivity is a set of Key Performance Indicators which means that workshop will be productive if the labour is well utilized with high work efficiency, bearing in mind that the hours sold affect the productivity, but it is the responsibility of the reception staff in terms of service consultations, so, we can never neglect the percentage of hours sold to hours available if we experience a drop in workshop KPIs, but It doesn't measure the workshop performance.
4. Comparing the results of the two service centres based on the best practices reached, it was found that Service Centre No. (1) has very acceptable rates of Sold Hours and Labour Efficiency however, it does not take advantage from the manpower because the Utilization is relatively low, and this means that the technicians are not fully utilized. if the front staff cannot sell more hours the workshop will remain overstaffed. Parts fill rate is acceptable and CSI along with NPS gets better results over the months, SC just needs more business and marketing plan.
5. Service Centre No. (2) faces poor operations despite the fact that technicians are fully utilized but the Sold Hours are not much moreover, the technicians' Efficiency is

relatively low. Technicians spend all their man hours working but in low performance and then technicians need to be trained and closely monitored. Parts Fill Rate is not low but can be improved while CSI and NPS need more attention as technicians' performance affect Quality of Work and Repair Time.

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