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Edited by
Jean Love

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The Third International Conference On Competition and Ownership In Surface Passenger Transport

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Performance Measures Used for Comparing the Achievements of Passenger Transport Companies in Egypt

Khaled A. Abbas

Egyptian National Institute of Transport
Nasr City, Cairo, Egypt

1. Introduction

A bus company should be capable of quantifying the effects that might occur as a result of changes in strategic objectives, policies, decisions, or lines of action of the company. It is imperative that managers spend time in thinking of the most effective ways to present the output of their companies. One of the most powerful means of presenting the information output of a company is in the form of a set of performance measures. These are meant to describe the financial, operational, and level of service development of the company at any point in its life time. Many decisions concerning a bus company can be made on the basis of these performance measures/indicators.

Performance indicators can be presented as absolute and/or relative values. Relative performance indicators are of great importance. They can be best used in comparison and evaluation.

In light of the current deregulation of the transport industry in Egypt, this paper explores the different types of performance indicators that are used in the evaluation of the yearly achievements of the intercity passenger transport companies in Egypt. At present, this is provided by four bus companies each serving a different geographical area: the East, Middle, and West Delta companies covering the Delta region and the Upper Egypt company which serves the north-south Nile corridor.

The paper presents and compares the performance of these companies over the financial year 1991/1992. It stresses the importance of some financial and operational performance measures. It suggests the inclusion of other performance measures that are meant to guide the managers of these companies to steer the companies safely towards reaching more stable grounds and conditions that can encourage and instigate profit making.

2. Inputs/Outputs of a Bus Company

As shown in figure 1, there are three types of resources required by a bus transport company. These are: financial, human, and physical resources.

Several sources of funds are available for a bus company to finance its activities. These include: retained operational surplus accumulated from previous years; depreciation funds that are kept aside for fleet renewal; bank cash deposits; different forms of loans, grants and/or government subsidies; and any other marketable securities such as share holding in other companies.

A bus company employs labor of different levels of skill ranging from unskilled labor to highly technical staff. Staff could be mainly grouped into operational staff and administrative staff. The operational staff includes several skilful employees. Skills required involve planning, evaluation, financing, marketing, engineering, maintenance, and other types of skills.

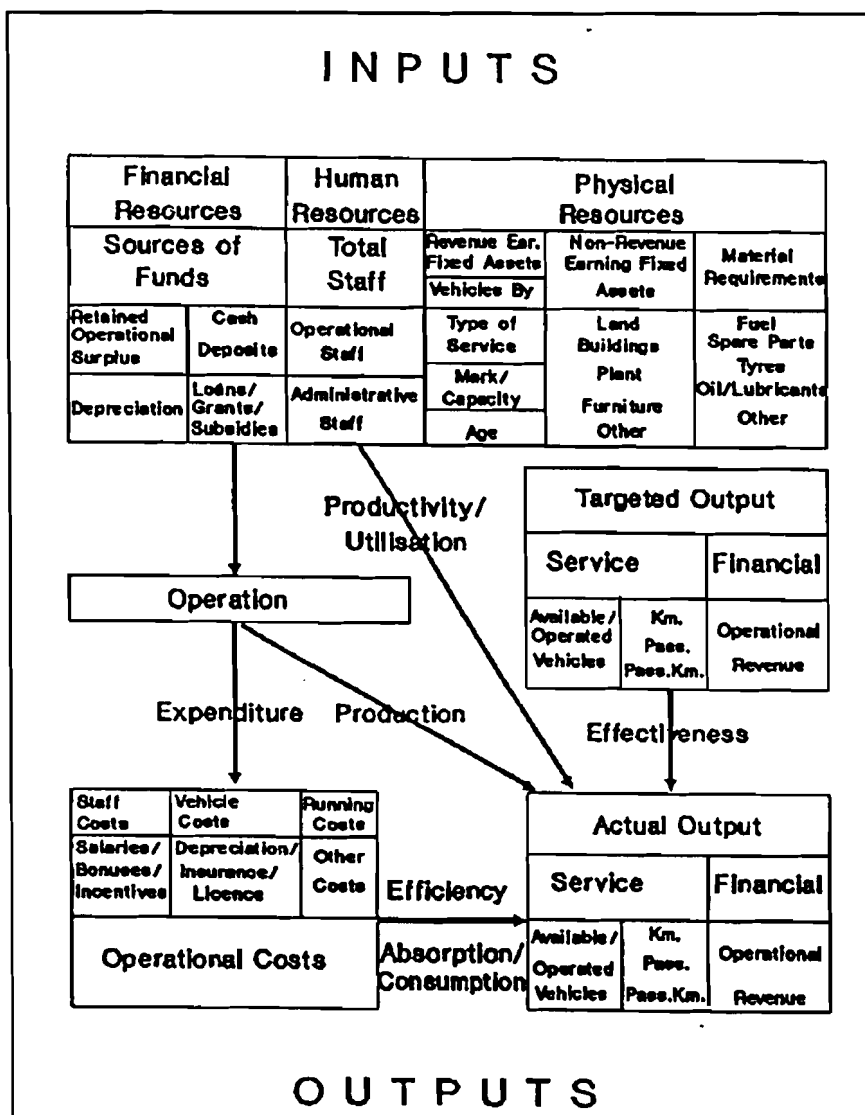
Physical resources could be grouped into fixed assets and material requirements. The fixed assets could be subdivided into revenue earning and non revenue earning. In a bus company, the revenue earning assets are mainly the vehicles constituting the fleet. Vehicles are categorized by mark, by capacity, by age, and by type of service provided. On the other hand, the non revenue earning fixed assets include land, build-

ings, plant, furniture, and other types of assets. The material requirements are needed for running and maintaining the fleet to an adequate acceptable standard. These include fuel, spare parts, tires, oil, lubricants, and others.

The management of a bus company is responsible to utilize these resources through the operation of the bus fleet and to provide service outputs and financial output. The supply of passenger transport service can be expressed in terms of available/operated vehicles, operated kilometers, carried passengers, and number of passenger kilometers. The financial output mainly involves the operational revenue obtained through the collection of fares.

In the process of providing/-obtaining these outputs the company incurs several types of operational expenditure. These include staff costs (salaries/bonuses/financial incentives), vehicle costs (depreciation, insurance, licensing), running costs (fuel, spare parts, tires, oil, lubricants), and other costs such as taxation, etc.

Figure 1: Inputs/Outputs of a Bus Company

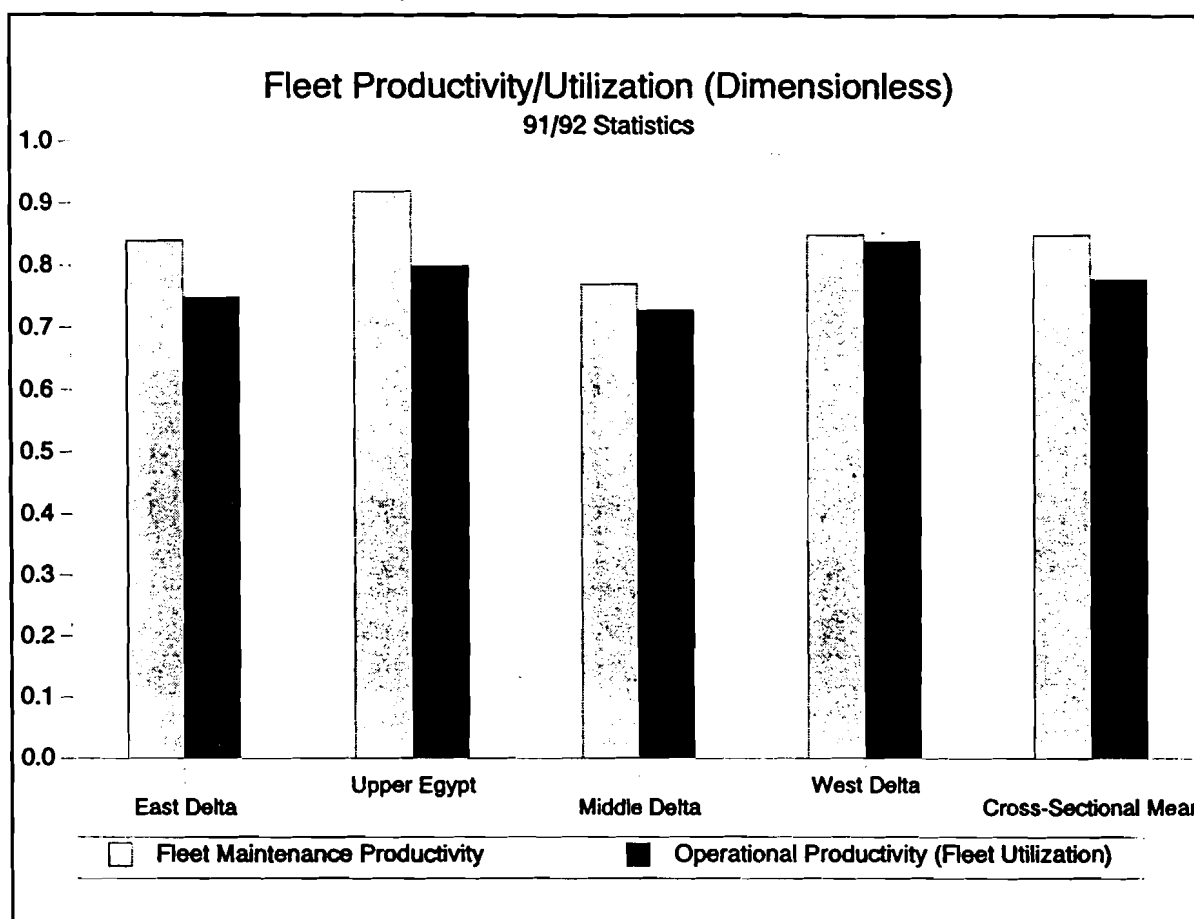


3. Importance of Performance Measures

It is crucial for the management of a company as well as for the board of directors to assess the company performance on a yearly basis. The management of the company should decide in collaboration with the board of directors on the important performance measures that should be included in their yearly report of achievements. These are meant to:

1. "measure and monitor the performance and quality of bus services so that deficiencies and opportunities for improvements can be readily identified", (Wright and Thiriez, 1987);
2. identify the most critical problems and issues that a company is likely to encounter, i.e. "to provide an early detection system to signal undesirable trends", (Giannopoulos, 1989);

Figure 2: Fleet Productivity Indicators



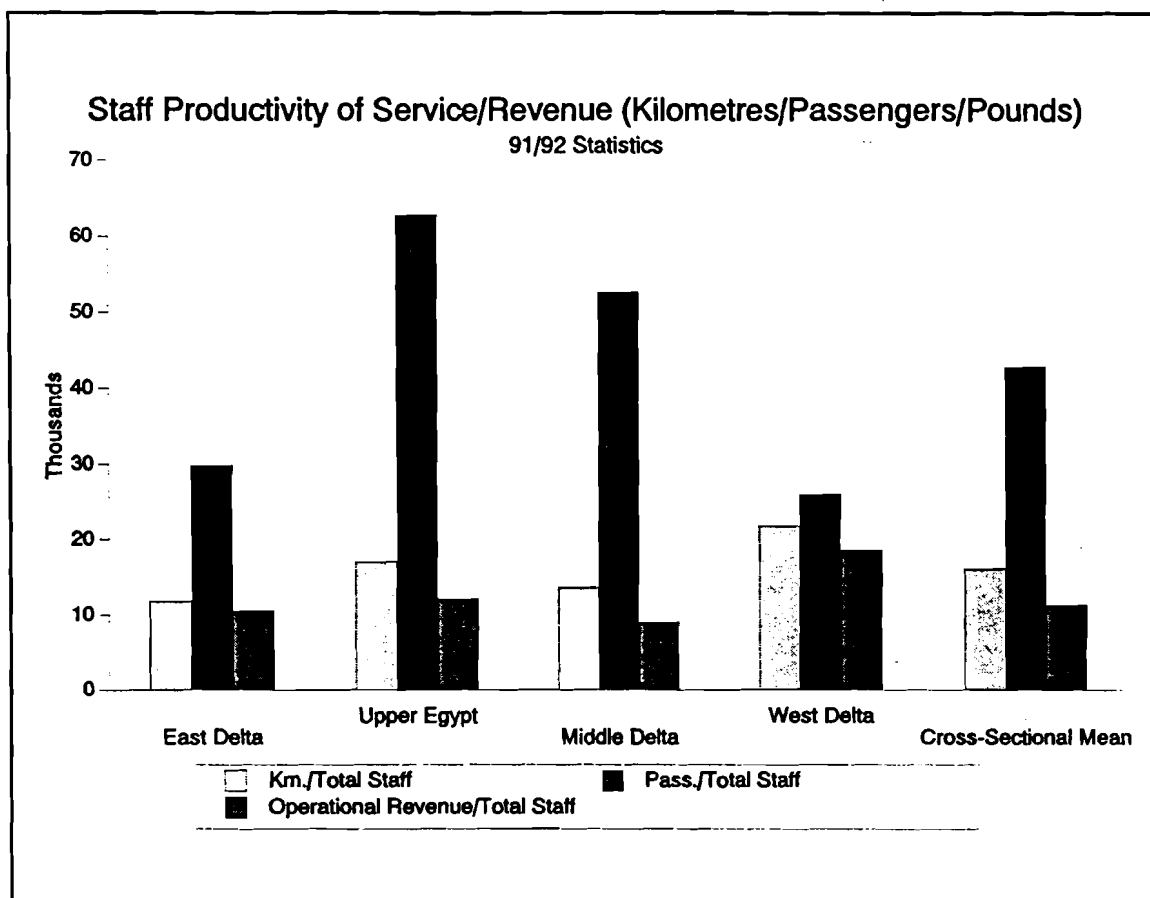
3. act as a forum of accountability, i.e. management accounting and control;
4. make better and more efficient use of existing resources in providing the bus service;
5. support more effective long term planning to meet future travel needs;
6. provide a common medium for evaluation to be used by the multiplicity of agents and levels of management taking decisions likely to affect the bus system; and
7. be used by organizations offering loans or grants to assess the performance of a bus company being considered for financial assistance.

In the following sections the paper discusses several types of performance indicators. These are grouped under four headings as shown in figure 1.

1. Productivity/Utilization measures.
2. Absorption/Consumption measures.
3. Efficiency measures.
4. Effectiveness measures.

These measures are proposed based on the data and information available in the 1991/1992 yearly reports

Figure 3: Staff Productivity Indicators



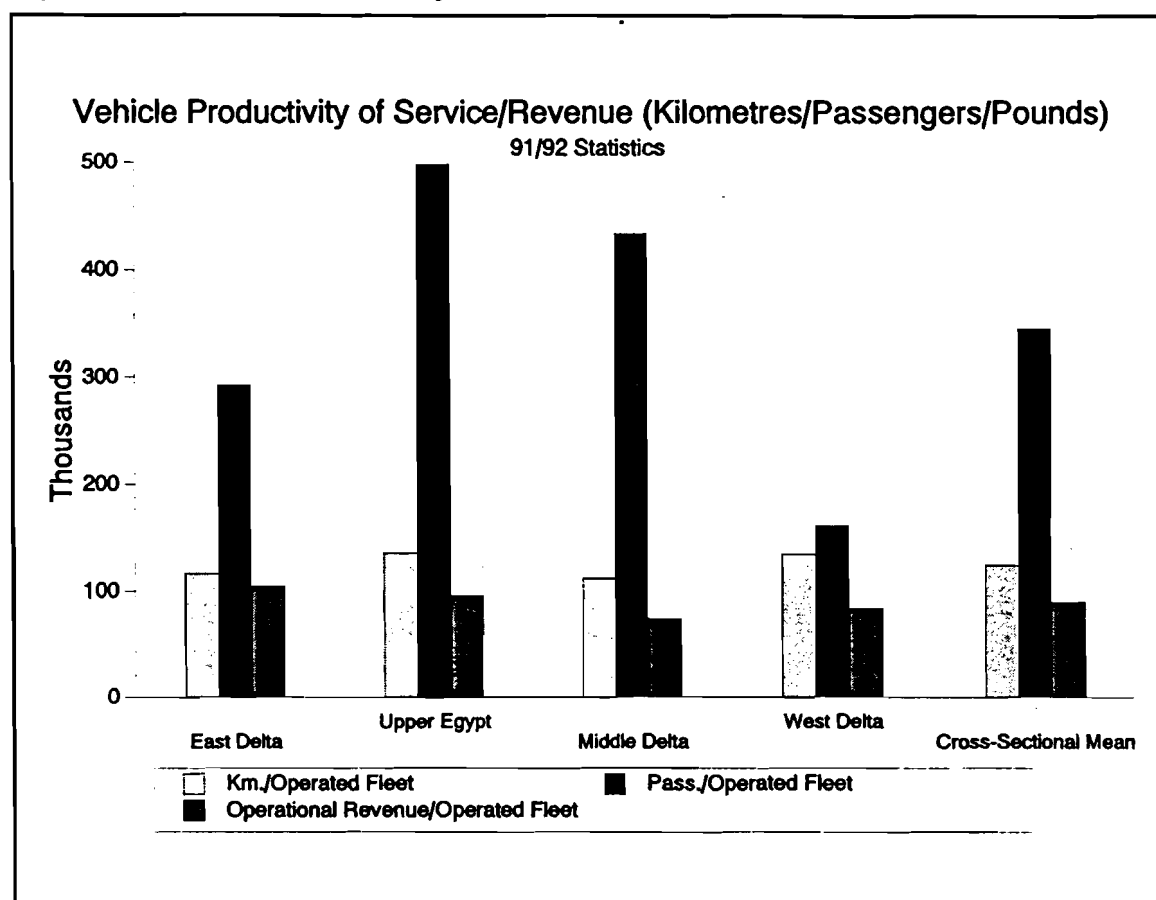
of achievements of the four intercity bus companies in Egypt. Some of the measures displayed in the following sections are computed and presented in these reports. However, in many cases they are either misnamed or mis-grouped. In addition each of the figures that display the performance measures includes the cross-sectional mean computed as the average 1991/1992 performance of the four bus companies. This cross-sectional mean can be used as a bench-mark for comparison among the four bus companies.

4. Productivity/Utilization Measures

Productivity can be defined as the amount of output that a unit input produces. Productivity measures demonstrate how well resources required as input are utilized. As stated earlier, the output of a bus company is in the form of service output and financial output.

One of the most important performance indicators is the fleet productivity/utilization. There are two forms of fleet productivity. The first, known as Fleet Maintenance Productivity (FMP), is computed as the ratio between the average number of buses available for operation relative to the total number of buses constituting the fleet. It represents the proportion of buses that can be put into service each day. This ratio is a general indicator of the productivity of both the staff and the depots responsible for maintenance and servicing of the fleet. As noted from figure 2, the FMP of Upper Egypt is the highest (0.92). The second fleet productivity indicator, known as Operational Productivity or Fleet Utilization (FU), is computed as the ratio between the average number of buses actually in operation relative to the total number of buses constituting the fleet. This ratio is a general indicator of the productivity of the operational staff and all the activities concerned with operating the available fleet. Figure 2 shows that the FU of West Delta is

Figure 4: Vehicle Productivity Indicators



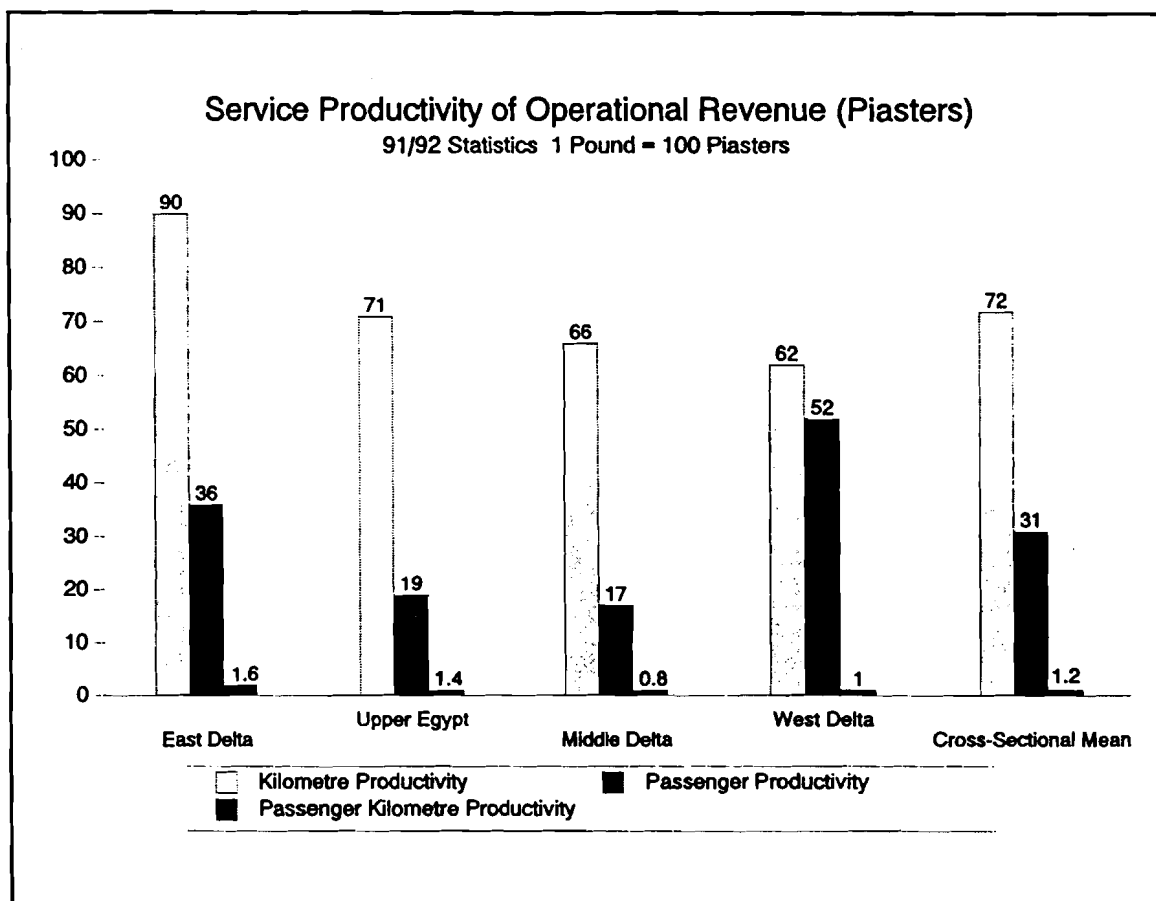
the highest (0.84).

There are two forms of staff productivity indicators. The first is the staff productivity of service. This can be subdivided into Staff Productivity of Operated Kilometers (SPOK) and Staff Productivity of Carried Passengers (SPCP). As shown in figure 3 while West Delta has the highest yearly SPOK (21722 km.), Upper Egypt has the highest yearly SPCK (62807 pass.). The second form of staff productivity is the Staff Productivity of Operational Revenue (SPOR). West Delta also has the highest yearly SPOR (13565 Egyptian Pounds L.E.), see figure 3. (1 U.S.\$=3.33 L.E.)

Similar to staff productivity, there are three equivalent indicators that show the Operated Vehicle Productivity of Operated Kilometers (OVPOK), of Carried Passengers (OVPCP), as well as of Operational Revenue (OVPOR). Figure 4 shows that Upper Egypt has the highest yearly OVPOK (135428 km.) and the highest yearly OVPCP (498375 pass.). On the other hand, the figure shows that East Delta has the highest yearly OVPOR (104644 L.E.).

Three other forms of productivity are suggested. These can be labelled as service productivity of operational revenue, i.e. Operated Kilometer Productivity of Operational Revenue (OKPOR), Carried Passenger Productivity of Operational Revenue (CPPOR), and Passenger.Kilometer Productivity of Operational Revenue (PKPOR). As noted from figure 5, East Delta has the highest yearly OKPOR (0.9 L.E.) as well as the highest yearly PKPOR (0.016 L.E.). On the other hand, West Delta has the highest yearly CPPOR (0.52 L.E.).

Figure 5: Service Productivity Indicators



5. Absorption/Consumption Measures

Absorption or consumption measures are indicators that represent the extent of operational cost that is absorbed or consumed by components of service output.

In figure 6, the Consumption of Operational Cost by unit Operated Vehicle (COCOV) is displayed. The figure shows that Middle Delta has the lowest yearly COCOV (76967 L.E.). Consumption of operational cost by unit service produced, i.e. Consumption of Operational Cost by unit Operated Kilometer (COCOK), by unit Carried Passenger (COCCP), and by unit Passenger Kilometer (COCPK) are all displayed in Figure 7. As regards yearly COCOK, West Delta has the lowest value (0.57 L.E.). On the other hand, Middle Delta has the lowest yearly COCCP (0.18 L.E.) as well as the lowest yearly COCPK (0.008 L.E.).

6. Efficiency Measures

Efficiency is concerned with the inputs used to achieve results, i.e. efficiency measures represent ratios of outputs relative to inputs of the same type. The Financial Efficiency (FE) of a bus company is computed as the ratio between operating revenue and operating cost. As shown in figure 8, the average 1991/1992 value of this indicator, over the four bus companies, is approximately 1.05. In fact all of the bus companies are just capable of covering their operating costs. East Delta and West Delta bus companies show the highest FE (1.09).

Figure 6: Operated Vehicle Consumption of Cost

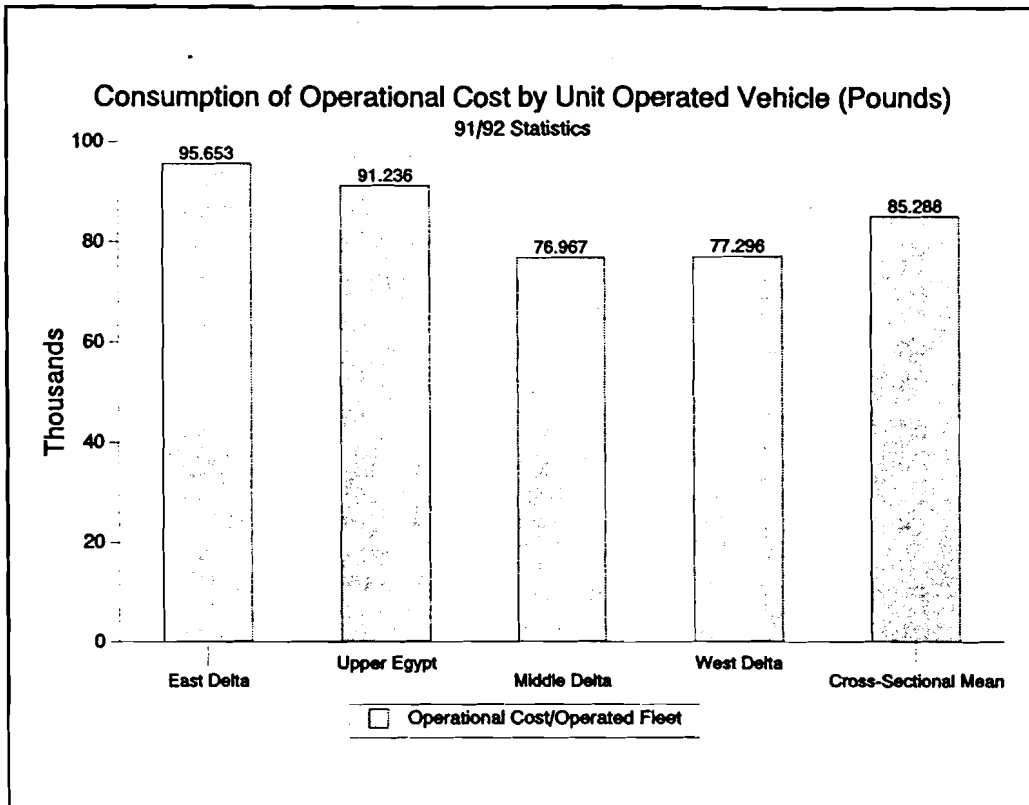


Figure 7: Service Consumption of Cost

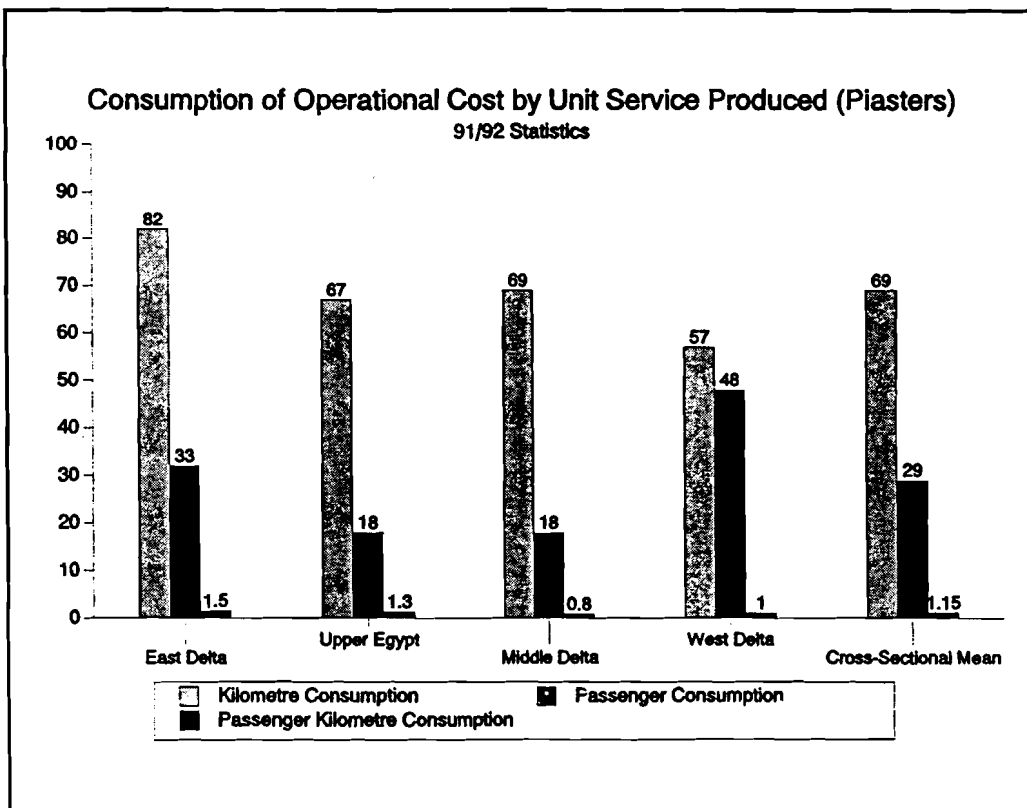


Figure 8: Financial Efficiency/Profitability Indicator

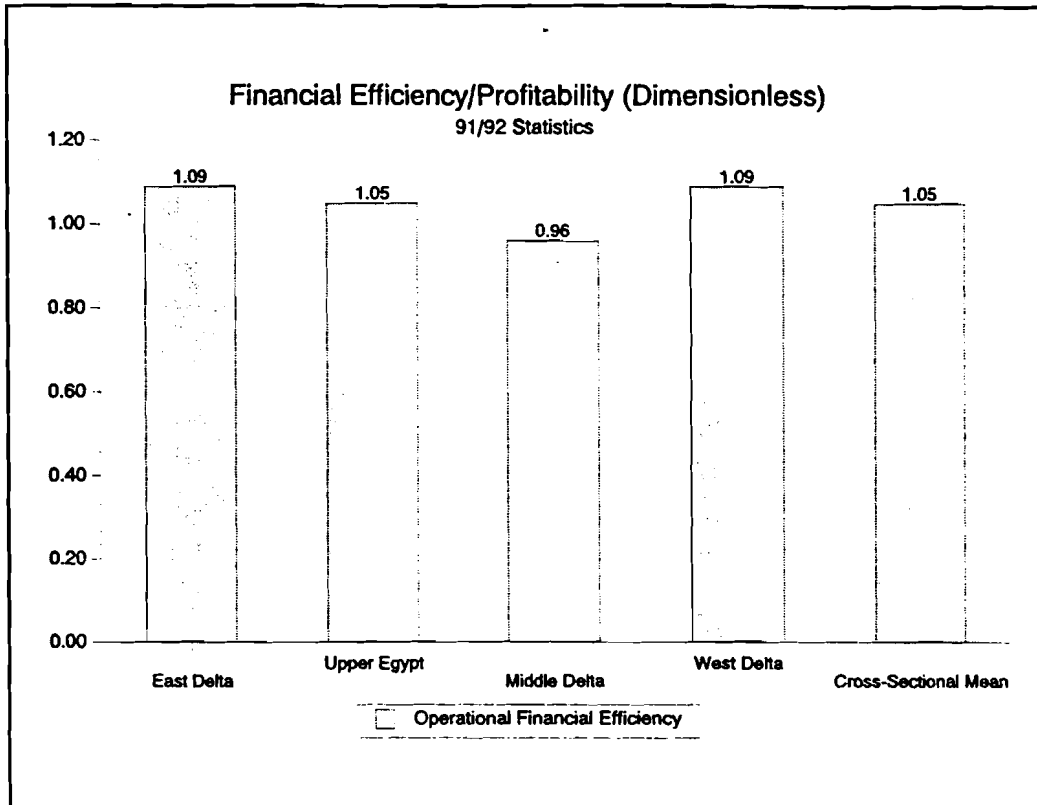
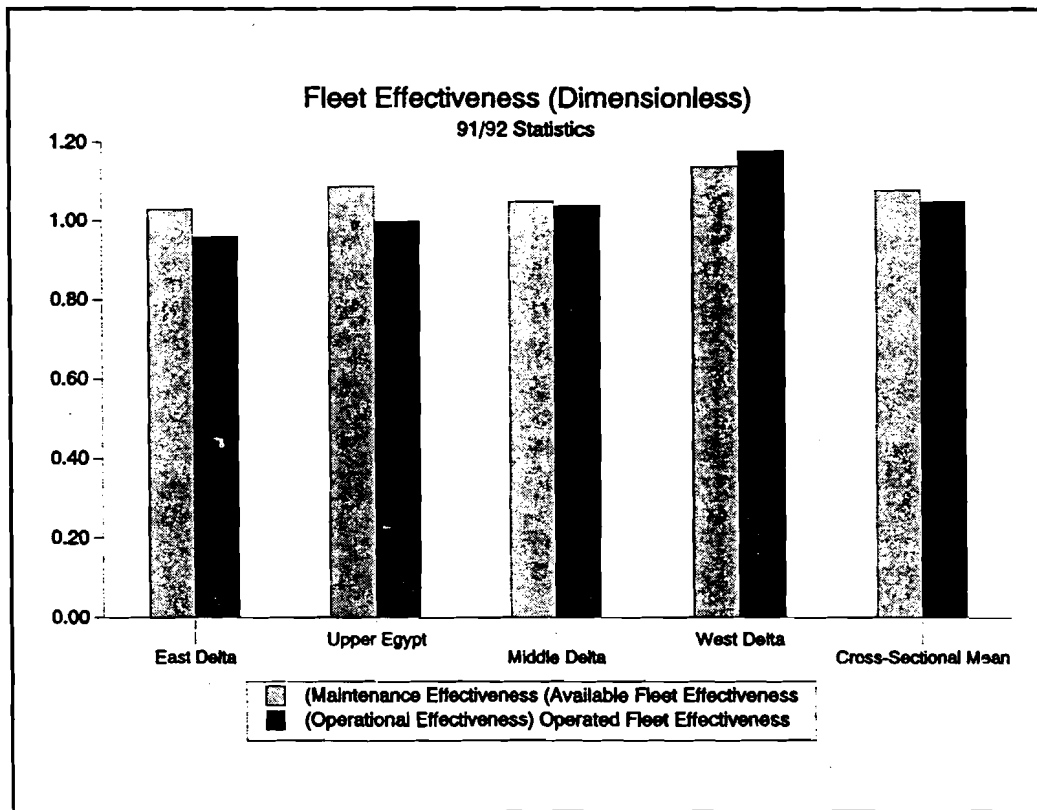


Figure 9: Fleet Effectiveness Indicators



The insignificant profitability of intercity bus companies can be mainly attributed to: minimum management awareness of cost reduction, low and concessionary fares, fare evasion, overriding, tardy collection of fares, and pilfering of fare revenues by conductors. Added to this are the lost opportunities to attain more revenue by better service planning, i.e. routing and scheduling, raising standards, and marketing.

7. Effectiveness Measures

Effectiveness is concerned with the degree of achievement of targeted (planned) results i.e an effectiveness measure is the ratio between actual results and targeted ones. There exist seven types of output that management of intercity bus companies in Egypt put expected values in advance.

The first two effectiveness measures are displayed in figure 9. These are both concerned with fleet effectiveness. The first is the Available Fleet Effectiveness known as Maintenance Effectiveness (ME) and the second is the Operated Fleet Effectiveness (OFE). It is obvious from the figure that West Delta shows the highest ME (1.14), as well as the highest OFE (1.18).

Three measures of service effectiveness are displayed in figure 10. The first is concerned with Operated Kilometer Effectiveness (OKE), and the second is concerned with Carried Passenger Effectiveness (CPE). For both these measures, West Delta has the highest values (1.56) and (1.91).

The third form of presenting service effectiveness is to compute Passenger.Kilometer Effectiveness known as the Load Factor (LF). This is computed as the ratio between the actual service consumption (pass.km) and the targeted service production (pass.km). Values of the Load Factors computed for the four bus companies are mostly higher than unity with Middle Delta having the highest value (1.63). This demonstrates the existence of high demand levels and a shortage in supply. It is important to avoid overcrowding through the provision of additional transport facilities.

Measures of financial effectiveness are displayed in figure 11. The first measure is concerned with the Operational Revenue Effectiveness (ORE), and the second is concerned with the Operational Surplus Effectiveness (OSE). West Delta has the highest ORE (1.41), while East Delta has the highest OSE (3.71).

As demonstrated throughout figures 9, 10, and 11, most of the values of the seven effectiveness performance indicators are above unity. A word of caution has to be stated here, that is: the targeted outputs may sometimes be intentionally set at low values under what can be realistically achieved by the companies. This might be done for the purpose of showing the company to be achieving more than its set targets so as to gain credibility at the time of accountability.

8. Evaluation of Achievements of the Bus Companies

The achievements of a bus company need to be evaluated. This can be carried out by comparing the actual performance of the company by a selected acceptable performance, i.e. cut off values used to distinguish between good and poor performance of each indicator. Assessment of the type and magnitude of the discrepancy between the actual and the selected performance is determined. There are several ways to determine values for the selected acceptable performance measures, which act as the base for evaluation by comparison. These could be taken as:

1. Cross-sectional averages, in a single time period, of the performance measures of bus companies operating in the same market including/excluding the company under evaluation.

Figure 10: Service Effectiveness Indicators

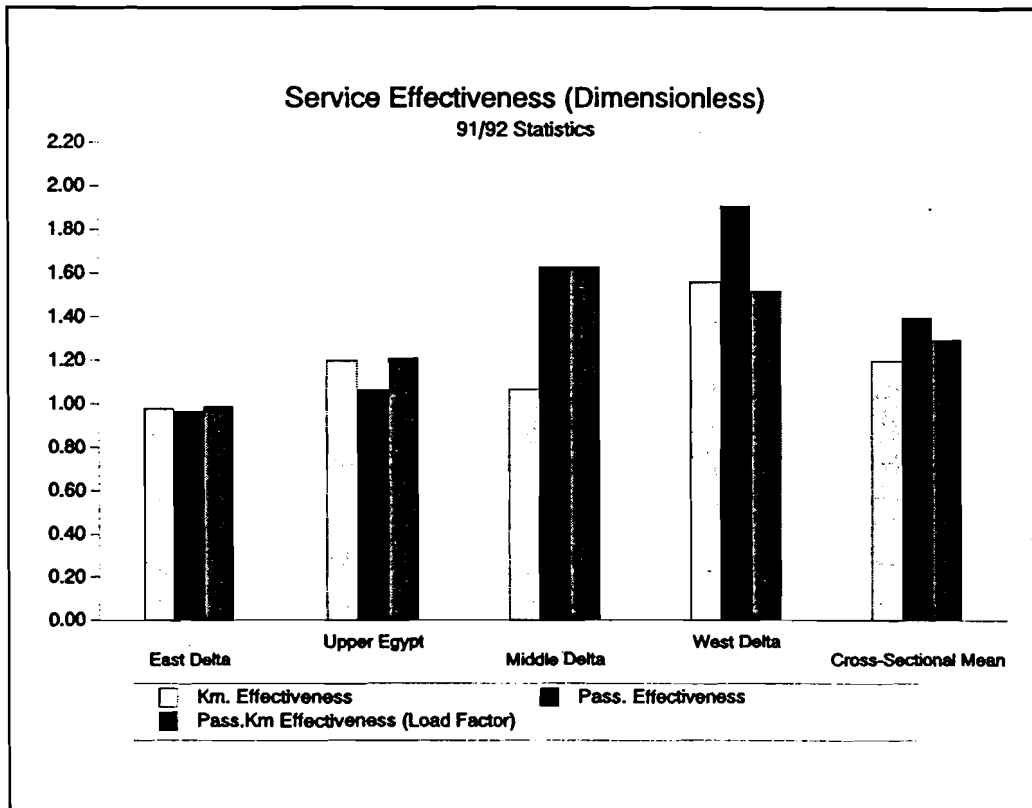
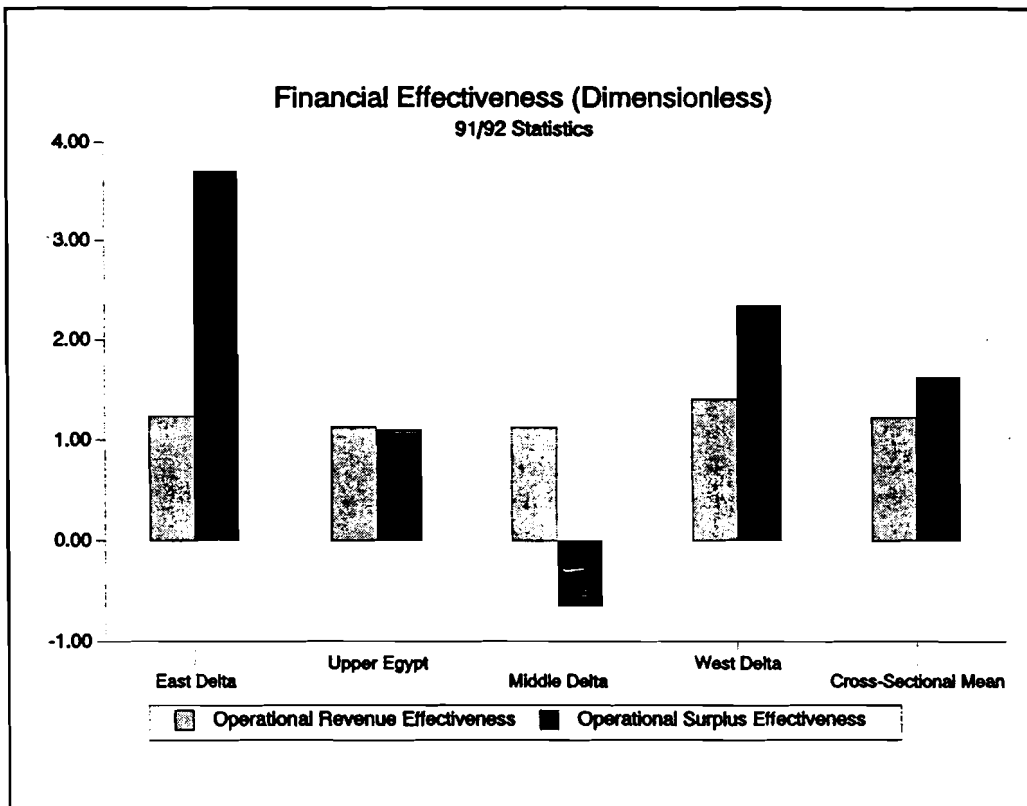


Figure 11: Financial Effectiveness Indicators



2. Time-series averages, over an extended period of time, of the performance measures of the company under evaluation.
3. Cross-sectional averages of time-series averages of the performance measures of bus companies operating in the same market including/excluding the company under evaluation.
4. Internationally published performance measures

The output of the four main intercity bus companies in Egypt was displayed in the form of performance measures. The indicators chosen and presented in the previous sections constitute the main portion of the measures that can be computed from available data and information. These are considered to represent important yardsticks that can be used to gauge the relative performance of companies. Figure 12 shows the number of times each of the bus companies has one of its performance indicators ranked as 1, i.e. the best in relative terms. It is obvious that out of the 23 displayed performance indicators, West Delta has the highest number of performance indicators ranked as 1 (11 times) and seven performance indicators ranked as 2. Coming next is Upper Egypt, then East Delta, and then Middle Delta.

"Most of the intercity bus companies are suffering from almost the same symptoms in terms of weak financial performance as well as low quality of service. However, the prescription to these symptoms will differ from one company to another depending on several factors:

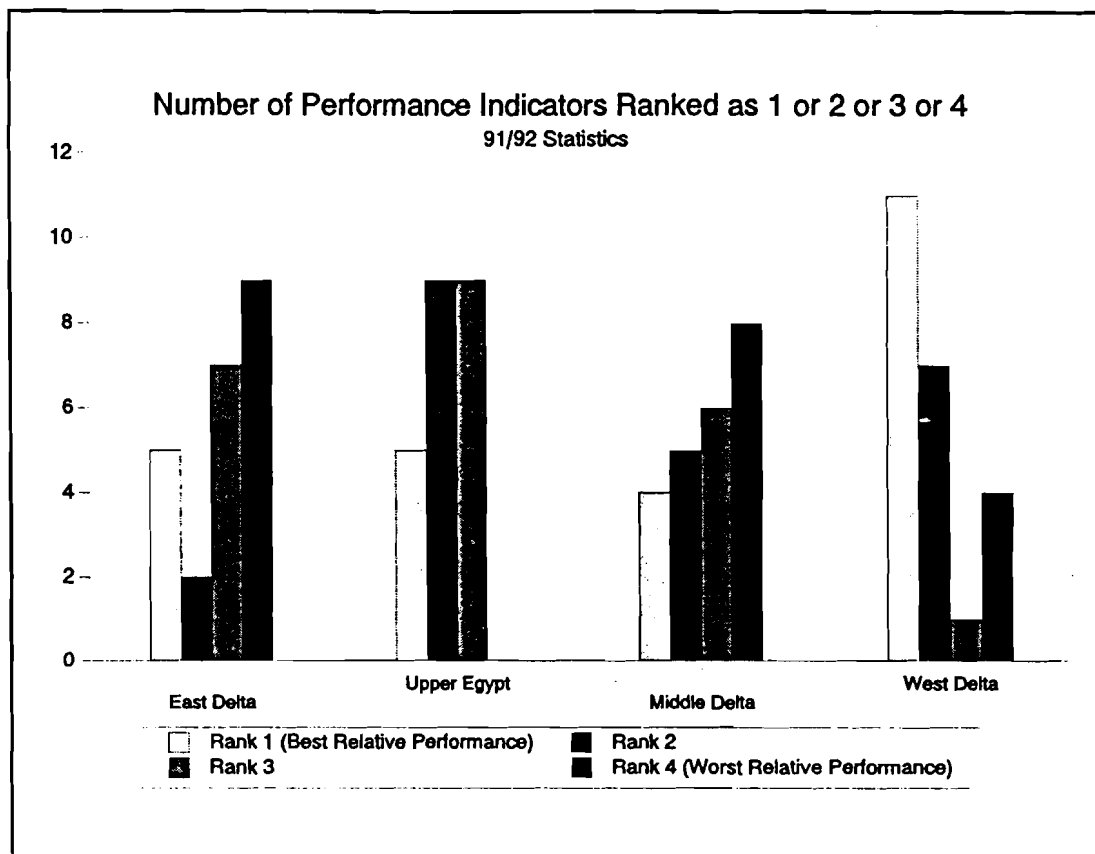
1. information about the company's costs and capacities;
2. the current market environment and forecasts of market development (market potential);
3. information about competitors (market share);
4. information about customers (elasticities of demand relative to fare changes and/or service changes); and
5. other external influences" (Abbas et al., 1992).

9. The Management Cycle

The management procedure proposed for a bus company could be described as a form of dynamic management whereby environment is thoroughly studied, targets are clearly set and defined, policies are well chosen, decisions are correctly implemented, performance is monitored and evaluated, and necessary modifications are carried out, see figure 13.

The decision-maker looks at the information output in the form of performance indicators. He/She compares that output with his/her criteria of achievement. This criteria is developed for the acceptance and prioritization of alternative lines of action, decisions, policies, and strategies. If there is positive or no discrepancy between the actual performance and the selected acceptable performance the system is described as effective. On the other hand, if there exist a negative discrepancy, the management has to pause and try to identify the reasons behind this negative discrepancy. As shown in the figure, there could be several causes or combinations of causes for this negative discrepancy.

1. Selected acceptable performance standards are set at high levels.
2. Course of action is wrongly implemented.
3. Exogenous factors affecting working environment.
4. Decisions are wrongly taken.
5. Design policies badly or incorrectly specified.
6. Unrealistic/unattainable goals and objectives.

Figure 12 Ranking of Intercity Bus Companies in Egypt

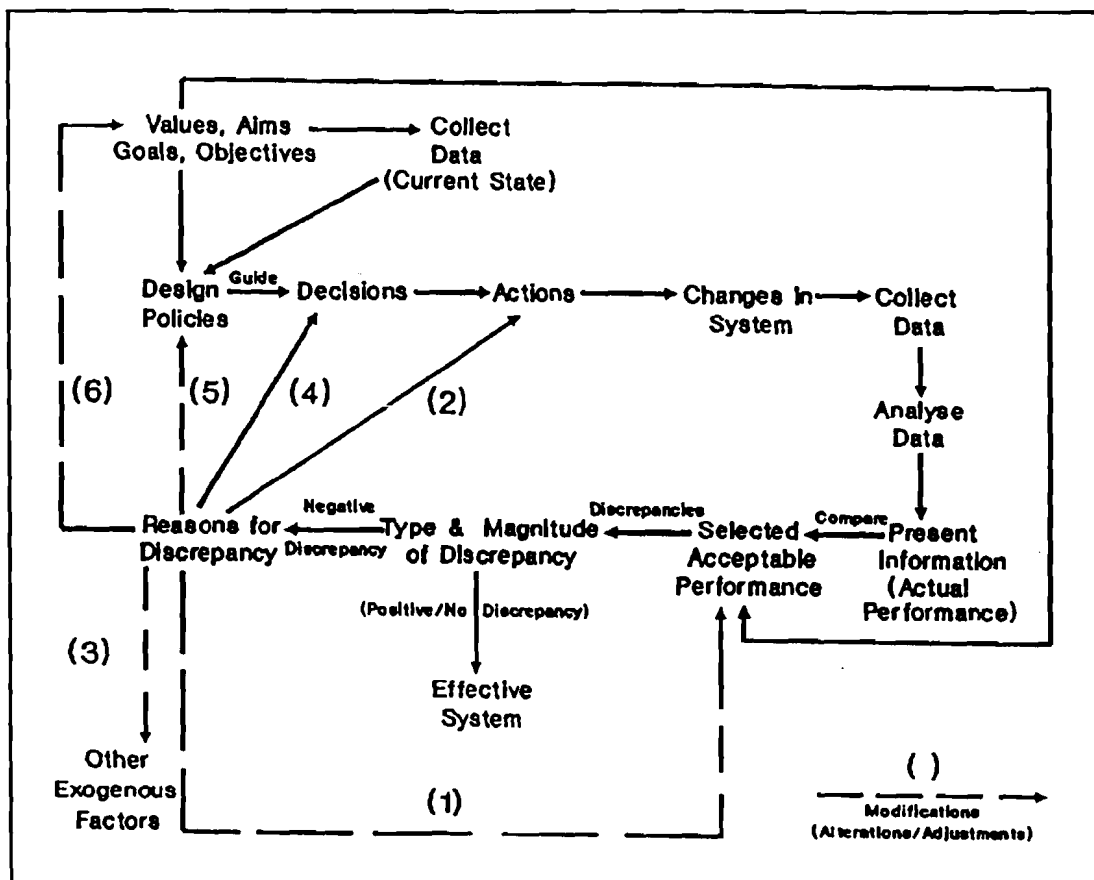
It is to be noted that the causes for negative discrepancy can be categorized into two main categories. The first is concerned with the setting of over-ambitious targets that any form of management can find it difficult to achieve in light of the current company constraints and exogenous factors. The second is concerned with how the current management is trying to achieve these results. Once the main reasons for the negative discrepancies are identified, modifications in the form of alterations or adjustments can be carried out so as to positively redirect the management cycle. The policy/decision maker can then decide, whether to accept a particular strategy, policy, decision, course of action or whether to perform some further modifications.

The process described in figure 13 has the advantage of enhancing management ability, improving mental concepts that people possess about a system, as well as providing a rich medium for gaining intuition and acquiring knowledge by experience and learning. The output of the management system is not intended to recommend any specific policy, decision or action, rather to show their impacts. A policy, a decision, or a course of action is selected according to the ability to produce a level of service that is acceptable to decision-makers. Bus passenger transport can be seen as a service to be provided, administered, operated, and maintained to the highest possible standard for the most reasonable and affordable cost. The balance between standards and costs is a matter of informed judgement for decision-makers.

10. Conclusion

The paper discussed the framework of inputs and outputs of a bus company. It stressed the importance of performance indicators to be used by the levels of management and the different bodies concerned for the evaluation of the achievements of bus companies. Four main types of performance measures were

Figure 13: The Management Cycle of a Bus Company



presented. These are productivity/utilization, absorption/ consumption, efficiency, and effectiveness indicators. These indicators cover the financial and operational sides of a bus company. Within these four types of performance measures, 23 performance indicators were displayed. Several other performance indicators that lie within these four categories do exist. For the sake of brevity, these were not mentioned. "The quality of a battery of indicators lies not in the number of its constituent indicators, but in the internal consistency of the indicators taken together" (OECD, 1980).

However, data and information regarding one very important type of performance of a bus company are virtually missing from the reports of achievements of the four intercity bus companies in Egypt. This is the level of service performance measures. Level of service performance measures include aspects like frequencies, headways, waiting times, boarding and alighting times, (i.e. regularity, punctuality, and reliability), average vehicle speeds (i.e. passenger in vehicle times), terminal locations and interchange facilities (i.e. walking distances), number of transfers (i.e. connectivity), overcrowding (i.e. load factor), cleanliness, crew attitude, safety record, and environmental impact. In addition, there exist different types of service provision such as special seating arrangement for handicapped and elderly people, air conditioning, catering, lavatories, video display, and other aspects of comfort and convenience. All in all, these indicators are becoming even more important — and more a competitive factor — in light of the current deregulation and moves towards privatization of the intercity bus industry in Egypt.

Ability to compete is vital to retain a company's own passengers as well as to gain more share of the market, thus achieving more profitability and better resource utilization. There exist two forms of competition: the first known as within mode competition, i.e. between alternative bus companies and

services. The second known as among mode competition i.e competition between different available intercity modes such as bus, train, service taxi, and private car. "It is important for an operator to be aware of the market structure and how users are likely to respond to fare changes, service changes, and the like. The opinions and attitudes of users towards the service should be sought, and an investigation should be made of how demand is generated and how mode of conveyance is chosen, i.e. determine demand elasticities (Adapted from Maunder and Jacobs, 1987).

In conclusion, the mission statement of a bus enterprise can be stated as "providing the maximum number of road-worthy buses, operating them on the road for maximum utilization with the objective of minimizing cost and maximizing revenue and passenger kilometers whilst maintaining adequate and acceptable levels of service" (Adapted from El-Mezawie et al., 1981).

The views expressed in this paper do not necessarily reflect the views of the Egyptian Government.

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