

**ANALYSIS AND RECOMMENDATIONS TO THE
PROBLEMS OF AUTOMOTIVE VENDOR INDUSTRY OF
PAKISTAN -----II
(Medium Tech Manufacture)**

Muhammad Naeem Khan Khattak & HamidUllah

Department of Mechanical Engineering

NWFP University of Engineering and Technology Peshawar, Pakistan

Engr. Shehryar

COMSATS Institute of Information Technology,

Lahore Campus, Lahore, Pakistan

Abstract

This paper presents very useful analysis and comprehensive recommendations for solution of major problems of the automotive vendor industry. The analysis of the findings of survey interviews, expert's discussions, and media releases has unveiled some daunting facts pertinent to automotive vendor industry of Pakistan. The salient outcomes of the analysis are presented. On the basis of the analysis and interview results, comprehensive recommendations are also provided for the automotive vendor industry of Pakistan.

Keywords: *Automotive industry, car vendors, motorcycles vendors, motorcycle assemblers, analysis, recommendations*

1. Introduction

The global competitive business environment has created new international trade challenges between developed and developing regions. Such challenges can affect corporate strategic directions and alter business and manufacturing strategies (Gordon and Wiseman, 1995; Sambasivarao and Deshmukh, 1995; Ferdows, 1997). For manufacturing companies in developing countries, these challenges mean that they should take extra efforts to survive in the current global competitive environment (Mora-Monge, 2008). Manufacturing is a key for survival in developing countries under such global competitive conditions because if manufacturing is given a more strategic role beyond the traditional support for marketing, it can play a major part in strengthening a company's market position (Wheelwright and Hayes, 1985).

The available literature shows a widely documented contribution of manufacturing technologies to the overall competitive capabilities of companies (Monge et al., 2006; Small and Yasin, 1997a; Wheelwright, 1984; Wheelwright and Hayes, 1985). However, in decades to come, the use of more advanced manufacturing technologies will undoubtedly emerge to be an important source of competitive advantage. Although, the advanced manufacturing technologies

advantages and capabilities are already known, problems regarding the management process, from the planning to the implementation, represent the main hurdles to the effective use of such technologies (Gouvea da Costa and Pinheiro de Lima, 2009). The remarkable industrial achievements of Asian countries like Korea and Taiwan are underpinned by the ability to master technological competencies. Both countries have moved rapidly into new technology fields, and now achieve world-class levels in areas of state-of-the-art technology, especially in telecommunications and semiconductors (Rahman, and Bennett, 2009).

However; on the other hand, the current status of Pakistan's manufacturing sector appears to be bleak, with mostly obsolete technology being employed in its industries. Moreover, given this obsolete level of technology, complicated parts cannot be produced accurately and this leads to high manufacturing time and cost. As a result, the final product is of an inferior quality and therefore unable to attract even the local consumer. Consequently, Pakistan is rapidly losing its share in the international market – this is obviously a sensitive issue for the government (Khattak et al., 2009).

Pakistan is a developing country, with slow technological development, less penetration of roads, absence of skilled labor and inadequate infrastructure facilities, all of which have proved to be a major impediment in the development of the automotive industry in Pakistan (EDB, 2006; TUSDEC, 2006-07).

The automotive industry in Pakistan consists of four major segments, which include two/three wheelers, passenger vehicles (including cars, jeeps and station wagons), commercial vehicles (trucks and buses) and tractors. There are around 25 manufacturers and assemblers in Pakistan who have technical collaborations with Japanese and Korean manufacturers like Suzuki, Honda, Toyota, Hino, Hyundai and Mazda (TUSDEC, 2006-07).

The Pakistan automotive industry is an import driven market, and with a few exceptions, the entire automotive industry depends largely on imports from Japan, Korea, China, India and the US. The automotive industry in Pakistan has more assembling units than manufacturing units. The purchasing power of consumers is also one of the weaknesses, and self sufficiency still remains a dream for the automotive industry in Pakistan (TUSDEC, 2006-07).

Presently, the automotive industry in Pakistan is going through a major phase shift, with the entrance of new players from foreign countries. Pakistan does not qualify as a major exporter of automobiles with an exception of marginal exports of tractors. The market is dominated largely by Japanese and Korean manufactures with as much as 90 percent market share.

2. Methodology

This research does not encapsulate the analysis of the entire automotive industry but is focused solely towards the automotive vendor industry of cars and motorcycles. The vendor industry of Pakistan consists of small and medium sized manufacturers who produce spare parts for both foreign and local automotive assemblers.

As a part of our need assessment stage, detailed interviews were conducted with the vendors of both cars and motorbikes. It also includes some representatives of motorcycle assemblers. The vendors were highly supportive and revealed their technical and managerial problems in a comprehensive manner. For the ease of understanding and to bring the results into a presentable form, similar problems are lumped into one major category. The following sections present the interview results, as well as the frequency of each problem. The analysis of the findings of survey interviews, expert's discussions, and media releases is presented. On the basis of the analysis and interview results recommendations are drawn for solving the major problems of the automotive vendor industry.

The remainder of the paper is structured as follows: section 3 represents problems of car vendors. Section 4 mentions problems of motorcycle vendors. It is followed by the problems faced by motorcycle assemblers in section 5. The analysis of the findings of survey interviews is given in section 6. Section 7 presents comprehensive recommendations are presented for solving the major problems of the automotive vendor industry. At the end, conclusion is provided.

3. Car Vendor's Problems

The problems of car vendors are divided into five major categories: processes/operations, supply chain, resources, testing & quality control, and poor technology climate. The findings of the study on car vendors are discussed in the subsequent sections.

3.1 Processes/Operations

Problems faced by the vendors of cars in the category of processes/operations are provided below in the order of importance,.

- Die and mold designing.
- Inadequate knowledge on process techniques.
- Heat treatment of dies and molds is a common problem of metal and plastic parts vendors.

3.2 Supply Chain

Problems faced by the vendors of cars in the category of supply chain are given below.

- The major supply chain issue is that of frequent quality defects due to, poor manufacturing techniques and poor quality control of suppliers. They very often receive substandard components. This problem becomes even costlier when vendors themselves have to eliminate the quality defects in the supplies of their suppliers.
- The second major problem is that of unplanned production and development modifications by Original Equipment Manufacturers.
- The problem of delayed deliveries is also one of the problematic areas for vendors. It is the lack of professional behavior on the part of suppliers that make them disobey their delivery commitments.

3.3 Resources

Problems faced by the vendors of cars in the category of resources are presented below.

- The most outstanding problem is the unavailability of skilled manpower
- Followed by the shortage of labor there is an acute shortage of raw material.
- Apart from labor and raw material the unavailability of sophisticated machinery is also mentioned as a secondary issue.
- High cost of capital and unavailability of industrial loans is another issue.

3.4 Testing and Quality Control

Problems faced by the vendors of cars in the category of testing and quality control are given below.

- The most vital issue is that of long delays in the delivery of testing results by the existing testing facilities.
- The second major issue is that of limited number of testing facilities. Almost 45% of vendors feel that the number of testing facilities is not enough to meet the industry requirements. The problem is of larger concern to the car vendors of Gujranwala. The geographic distribution of testing facilities is also a cause of concern for Gujranwala vendors.
- Another problem, mentioned by car vendors is that the level of service being offered by testing facilities is highly dependant upon the personal relationship with the staff.
- There is no availability of sophisticated testing equipment in the local market and this is what impedes the establishment of in-house testing facility.

3.5 Poor Technology Climate

Problems faced by the vendors of cars in the category of poor technology climate are discussed below.

- One of major concerns mentioned by the car vendors of both Gujranwala and Lahore is the lack of immediate solutions. Vendors feel that their immediate problems are never addressed and they are not provided what they need.
- Unsteady flow of electricity is causing hefty loses to machinery and production.
- Policy issues involve unavailability of soft loans to the industry and the absence of price ceilings on different factors of production.
- Vendors very strongly believe that no support has been provided by the government in terms of subsidies and duty free imports, the factor which is making the local vendors uncompetitive against imported substitutes.
- Trainings are conducted only on the lines of management systems, whereas, the technical front is always underdeveloped.
- Suppliers are not professional enough to respect their commitments.

4. Motorcycle Vendor's Problems

The following problems have been identified for motorcycles vendor.

- The industry is in desperate need of skilled workforce.
- The industry is in the need of help from technological point.
- The industry is not satisfied with the performance of existing testing laboratories like PSQCA, PITAC and PCSIR.
- Another major problem confronted by the industry is the quality, availability, and price of specialized raw materials such as tool die steel, steel alloys, different grades of steel etc.
- Problem that arises when trying to export is the non-availability of different international standards.
- A common facility centre for machinery procurement is suggested, so as the life of entrepreneur be made easy and he gets all the information required under one roof.

5. Motorcycle Assembler's Problems

The major problems mentioned by the motorcycle assemblers are discussed below.

- The major problem that is being confronted by motor cycle assemblers is lack of awareness on the part of entrepreneur.
- The industry lacks the technology required for the operation of a motor cycle assembly.

- The industry feels that there must exist a laboratory fully dedicated to motor cycle assemblers where all parameters of motor cycle can be tested and verified.

6. Analysis

The analysis of the findings of survey interviews, expert's discussions, and media releases has unveiled some daunting facts pertinent to automotive vendor industry of Pakistan. The salient outcomes of our analysis are as follows.

6.1 Eroding Foundation; Need of Immediate Attention

In case of all the developed and developing countries strong industrial foundations have been established by assuring the competitive availability of fundamental industrial inputs (labor, raw material, knowledge infrastructure). These inputs have always been the fundamental pillars of the industrial structure. However, the problems identified with the survey are showing that in the case of Pakistan's automotive vendor industry it is the fundamental pillars that we are loosing, so what to talk of upgradation. The automotive vendor industry has been one of the fastest growing sectors of Pakistan's economy for the last five years, but now it is at the verge of downfall. The problems being encountered by the vendor industry are of such a nature that if not addressed on immediate basis the industry will devastate, even a slight delay can nudge the industry on decline.

6.2 Diminishing Competitive Advantage

The largest problem which is emanated from the survey of both the car and motorcycle vendors is the unavailability of skilled manpower. The unavailability of manpower has caused a huge demand and supply gap, which is further creating the problems of high labor cost and high turn over rate. Cheap and skilled labor has always been the only competitive advantage of Pakistan and was the major incentive for all the automotive OEMs to set up their units in the region of Pakistan. But as illustrious from results that labor in the automotive vendor industry is getting scarce and expensive simultaneously, therefore, the industry is loosing its sole competitive advantage. The loss of labor competitive advantage is the biggest disincentive for the OEMs to sustain their business with the local vendors and therefore, it is highly probable that the sales of local vendors will have a substantial dip. Some of the OEMs have already started to shed some of their vendors and have started in-house manufacturing. The lack of competitive advantage will certainly become even dreadful for the vendor industry with the introduction of globalization. The only factor that could make the Pakistani vendor industry a preference for global customers, in the time of globalization, is its ability to deliver good quality products at low cost. But with the absence of economical labor it will not be possible for the industry to deliver low cost products, which means losing its customers to global competitors.

6.3 Competitive Disadvantage

The survey has exposed that the local vendor industry of Pakistan is confronted with immense competitive disadvantage in the following areas:

- a- *Lack of knowledge* is the worst disadvantage of our local vendor industry. There is no availability of technical knowledge over process techniques and this is what not letting the vendor industry to identify its gap with international counterparts and to upgrade their production processes. The neighboring economies are gradually developing into knowledge economies and making the relative position of Pakistan even worse. We are at high competitive disadvantage in terms of our knowledge imparting institutes. The technical training and engineering institutes of Pakistan, despite their potential, have failed to address the requirements of our local industry. Hence, it can be said that very limited knowledge and imperfect distribution of information has impaired the ability of Pakistani vendor industry to become globally competitive.
- b- *Lack of Technology* has always the weakest aspect of the local vendor industry. Previously the lack of technology might not be a major concern, but rapid advancements at the global level have made technology indispensable for the Pakistani vendor industry to survive. Problems like improper designing of dies/molds, insufficient CAD/CAM expertise, lack of technology support in process techniques and unavailability of sophisticated machinery prove that the local vendor industry is lagging way behind on the front of technology.
- c- *Lack of Industry Raw Material* is one of the vital disadvantages that our local vendor industry is facing. In the competitor economies like India, China, Malaysia and Thailand there is intense research being conducted on new materials and we are even loosing the present sources of raw material. As the quality and cost of the final product is highly dependant upon the availability of raw material so its unavailability right away puts our vendor industry on disadvantage.
- d- *Lack of Government Support* has become one of the disadvantageous factors under the current scenario, where strong government support is causing economies like China and India to flood their products in the international market.

6.4 Revival of Competitive Advantage

The analysis of problems being faced by the automotive vendor industry of Pakistan shows that the only way of immediately reviving the competitive edge is through gaining cost advantage. The vendor industry needs to be assisted on the lines of cost savings. The availability of skilled manpower, development of information database, availability of required raw material and government support can be the steps taken to impart cost efficiency into the local vendor

industry. The ability to produce at lower cost is indigenous to the local industry of Pakistan and it is the dimension on which the other global industries can not match the performance of Pakistani industry. The strategy of differentiation may not bring competitive advantage to the vendor industry of Pakistan. It is because the automotive industry of Pakistan is highly under control of automotive assemblers and the vendors are obliged to follow their directions. Automotive vendors do not have enough leeway to bring any modifications in the products they are manufacturing for their customers. OEMs ask for standardized products and therefore do not leave enough room for vendors to bring differentiation.

6.5 Need of Defensive Strategy

Another important fact which has emanated from the results of need assessment research is that our local vendor industry is currently not capable of competing against global players. It is mandatory for the local industry to flourish that a defensive strategy is adopted and a protected environment is provided by the government. Under the current situation, where the vendor industry does not even have the required resources, opening up of the economy in automotive sector can turn out to be severely fatal for the local vendors. A reasonable level of deterrence (tariff barriers, price floors, subsidies to local industry) is required which can make the local market of Pakistan highly unattractive for the global players and let the local vendors achieve a level playing ground.

6.6 High Dependence on OEMs; Need of Diversification

The interviews with the vendors of both cars and motorcycles have revealed that the business of all the vendors is highly dependent upon local assemblers. The major chunk of vendors manufacture parts exclusively for OEMs and this is what brings OEMs in high bargaining power. It implies that majority of vendors have very limited range of customers and products. This is where lies the need for diversification, such opportunities should be provided to the local vendors that they can hit upon new markets and new products. However, the point to be taken care of is that it should be done in parallel to the revival of their competitive advantage, otherwise, the strategy of diversification may back fire. But there is a strong need of reducing the dependence of vendors on OEMs, because it will not let them develop beyond certain limits.

7. Recommendations

On the basis of our analysis and interview results the following recommendations are drawn for solving the major problems of the automotive vendor industry.

7.1 Unavailability of Skilled Manpower/ High Cost of Labor

- Identification of organizations working for skill development and upgradation of automotive vendor industry is required. Once the

organizations are identified, the reasons for their inability to deliver the desired results should be analyzed. In order to expedite the process instead of establishing exclusive skill development centers, the infrastructure of the existing training institutes like TEVTA and PITAC should be utilized to the possible extent. It will not only save the infrastructure cost but will also enable TUSDEC to provide a rapid supply of skilled manpower.

- Long term and state of the art projects should be avoided and the focus should be on small scale projects which will have the ability to deliver on immediate basis. This need is substantiated by the survey results in which 10 out of 20 vendors have intensively stressed upon the requirement of immediate assistance. (Traineeship Vs SDCs).
- Divide the automotive vendor industry into different geographical clusters and establish one training center per cluster. This activity can be made rapid and economically viable by hiring rented facilities in each cluster and making it address the manpower requirements of the particular cluster.
- The liaison should be developed with local engineering institutes and collaborative efforts should be made to establish automotive specific training laboratories within the premises of universities. These laboratories should be developed as automotive specific training centers and should offer short certification programs on either process specific or technology specific basis.
- The success of skill development project is highly hinged upon the extent of coordination that we get from the industry i.e. the vendors themselves. Vendors should be persuaded to sign internship contracts with TUSDEC on voluntary basis, according to which traineeship programs will be arranged at the facility of vendors for the period of 2 to 3 months.
- Training course structure is another area where considerable changes need to be brought. The current course structure is purely theoretical based and delivers very general concepts in the fields of mechanical, electronics, civil etc. The course contents should be made either process or technology specific and job specialists should be produced. Additionally, training structure should have the break up of 70% theoretical lectures and 30% On-the-Job training (traineeship).
- Selection of target population is another critical issue to decide upon. As per the findings of survey interviews skill development programs should be targeted towards Matriculation/F.Sc. students and the existing unskilled class of workers in the industry. The admission criteria of the existing training institutes are impeding further training of uneducated but skilled labor from getting admitted into the technical training institutes. Therefore, either the admission criteria of the existing institutes should be lowered or exclusive vocational institutes should be established for the low level labor.
- In order to make the automotive vendor industry attractive to the engineering graduates and to expose them to the technology being used in the industry,

formal visits should be organized for the graduating engineers. It will make them understand the career prospects in the automotive sector.

- Incentive based education for students from rural areas is important. The students of the rural areas should be given nominal monetary incentive for getting admission in the training institutes. It is required to motivate the parents which otherwise are earning good amount of money from the employment of their children.

7.2 Unavailability of Raw Material /High Cost of Material

- There are certain specialized materials which are in acute shortage in the local market. The imports of such materials are highly expensive on individual basis. Therefore, vendors are reluctant to get it imported on their own. There should be a centralized warehouse of materials (material bank) where materials like Alloy Steels, Tool Steels, Pig Iron and High Carbon Steels can be made available.
- The problem of imperfect information can be addressed by establishing a data base for vendors, which can provide easy accessibility to information on international sources of raw material supply.
- Peoples Steel Mill is a new source of material production but it holds huge potential in itself. The current capacity of Peoples Steel Mill should be enhanced. and like imports TUSDEC can arrange collective orders of the scarce materials. A special division can be created within PSM which exclusively addresses the requirements of automotive vendor industry.
- Manufacturers should be allowed to import raw material on subsidized rates.
- The current processes of getting approval for duty free imports of raw material are very intricate and lengthy. These processes should be made simple and understandable for the vendors.
- The intermediate dealers of raw materials should be eradicated and the vendors should be allowed to purchase the raw material directly from Pakistan Steel Mill. It will cater to the problems of high cost and material holding.
- Availability of soft loans for the imports of raw materials.
- The production of raw material should be decentralized and Pakistan Steel Mill should establish its branches in other major industrial cities.

7.3 Limited Number of Testing Facilities/ Long Delays in Test Results.

- An exclusive automotive testing facility should be developed on urgent basis. Once the testing facility is operational it should be handed over to a group of industrialists from the vendor industry. Let the vendors sustain the facility. The same purpose can be served by establishing exclusive sections for automotive testing within the existing testing facilities. The ownership of these sections should also be handed over to a group of vendors.

- Reestablishment of PITAC, keep the existing management and congruently develop a new team of experts. The new experts should be hired through formal recruitment procedure, so that, a right person can be selected for the right job. It will stretch the pool of applicants to national level and will prevent any talent from being ignored.
- Implement strict monitoring and performance appraisal system, assuring the timely delivery of results. In addition to performance measurement, the staff of the existing training institutes should undergo a formal training procedure. This is where the trainings in the foreign automotive laboratories should be arranged.
- Identify the list of tests which are required to be performed in automotive vendor industry and check their availability with the present facilities.
- Institutes like GIKI and NUST have well developed testing labs for metallurgical and mechanical testing. These are well equipped laboratories and offer wide range of testing, but are highly underutilized. So, we can always get into formal contract with engineering institutes which have well developed testing laboratories.
- Spread the testing facilities across the maximum number of industrial states. Instead of establishing one state of the art testing facility in one city, it is better to establish smaller facilities but in multiple cities. It will not only increase the availability but will also reduce the testing cost for the vendors operating in small cities.
- Support of OEMs should be gained by persuading them to support their vendors in the development of moderate level of in-house testing facilities. Additionally, OEMs should be taken on board for the development of exclusive testing center for automobile products.
- Local distributors of testing equipment should be developed who can import the required testing machinery as per the need of industry.
- The government-run testing facilities should be handed over to respective provincial governments. For instance, the governance of institutes like PITAC and PCSIR is decentralized and is transferred from federal to provincial government. At the same there should be one federal authority like National Institute of Quality Control which can actually monitor the performance of and bring consistency among provincial institutes.

7.4 Inadequate Knowledge on Process Techniques

- A centralized data base should be established where the information on different process techniques and process controls can be shared. It should be accessible for a very nominal membership fee and should be upgraded on regular basis. It is better to develop it with the coordination of foreign automotive experts, so that, unconventional inputs can be brought.

- Identify all special and trouble some operations in the automotive vendor industry. Once the operations are identified small briefing sessions should be held in different industrial locations, across the nation. It is through these sessions that the knowledge of different process techniques can be imparted.
- In order to make these briefing sessions fructified, all the lectures should be delivered in native languages and the selection of instructors should also be made according to the qualification of the audience.
- This is where the coordination with OEMs can be highly effective. Organize combined briefing sessions with OEMs, as they are in a better position to approach foreign experts.

8. Conclusion

Pakistan being a developing country, with slow technological development, requires a consistent Government policy and a rational tariff plan for the automotive sector to reduce uncertainty amongst local manufacturers and assemblers in Pakistan. Upgradation of technology, reliable quality control, well trained manpower and strong financial support from Government is necessary for the very existence of automotive vendors and assemblers in Pakistan.

The automotive industry of Pakistan depends largely on imports from Japan, Korea, China, India and the US and self-sufficiency still remains a dream for the automotive industry in Pakistan. However, there is hope for upgradation in the auto industry. The Pakistan automotive market has become more competitive over the years, and there has also been a clear shift towards the small cars segment. It is hoped that the salient outcomes of the analysis and the detailed recommendations provided for the automotive vendor industry of Pakistan will definitely benefit the automotive industry in the country.

Acknowledgement

The authors are very thankful to the Technology Upgradation & Skill Development Company (TUSDEC) for providing the relevant data collected by the author during his service at the company.

References

Engineering Development Board (EDB) (2006), "Draft Auto Industry Development Programme (AIDP)", Ministry of Industries, Production & Special Initiatives, Government of Pakistan.

Gordon, J. and Wiseman, J. (1995), "Thriving on competition", Ivey Business Quarterly, Vol. 59, No. 3, pp. 79-84.

Gouvea da Costa, S.E. and Pinheiro de Lima, E. (2009), "Advanced manufacturing technology adoption: an integrated approach", Journal of Manufacturing Technology Management, Vol. 20, No. 1, pp. 74-96.

Khattak, M.N. Baseer, M.A. and Bajwa, M. (2009), "National Innovation System and the Need for an Upgradation Policy for Innovative and R&D Capabilities in Pakistan" Journal of Quality and Technology Management, Vo. 5, No. 5, pp. 44-55.

Ministry of Industries, Production & Special Initiatives, Government of Pakistan, January (2005). "Towards a Prosperous Pakistan: A Strategy for Rapid Industrial Growth."

Monge, C.A.M., Rao, S.S., Gonzalez, M.E. and Sohal, A.S. (2006), "Performance measurement of AMT: a cross-regional study", Benchmarking: An International Journal, Vol. 13, Nos 1/2, pp. 135-46.

Mora-Monge, C.A., Gonzalez, M.E., Quesada, G. and Rao, S.S. (2008), "A study of AMT in North America A comparison between developed and developing countries", Journal of Manufacturing Technology Management, Vol. 19, No. 7, pp. 812-829.

Rahman, A.A. and Bennett, D. (2009), "Advanced manufacturing technology adoption in developing countries: The role of buyer-supplier relationships", Journal of Manufacturing Technology Management, Vol. 20, No. 8, pp. 1099-1118.

Watson, R., Crawford, M and Farley, S. (2003), (2003), "Strategic Approaches to Science & Technology in Development." World Bank Policy Research Working Paper 3026, April 2003.

Sambasivarao, K.V. and Deshmukh, S.G. (1995), "Selection and implementation of advanced manufacturing technologies: classification and literature review of issues", International Journal of Operations & Production Management, Vol. 15 No. 10, pp. 43-62.

Skill Development Department, (2006-07), Technology Upgradation & Skill Development Company (TUSDEC), Ministry of Industries, Production & Special Initiatives, Government of Pakistan.

Small, M.H. and Yasin, M.M. (1997), "Advanced manufacturing technology: implementation policy and performance", Journal of Operations Management, Vol. 15, No. 4, pp. 349-70.

Wheelwright, S.C. (1984), "Manufacturing strategy: defining the missing link", Strategic Management Journal, Vol. 5 No. 1, pp. 77-91.

Wheelwright, S.C. and Hayes, R.H. (1985), "Competing through manufacturing", Harvard Business Review, Vol. 63 No. 1, pp. 99-109.