# CHAPTER 5

# DISCUSSION AND RECOMMENDATIONS

## INTRODUCTION

Based on the data, both primary and secondary, the researchers found that the RMN logistic support system is not focussed to achieve a mission capable fleet despite the 'tall order' of the top management by setting the objective of 70% operational availability (CAT1) for the fleet. Operational availability was translated differently down the line. It is therefore, crucial for RMN to re-look into the direction statement and synchronize the objective and set a measurable and achievable objective pertaining to the fleet's mission capability. The 'operational availability' in the technical terms means the relationship between mean time between maintenance and total time taken to retain or bring the back equipment to its operational status (including the corrective and preventive maintenance down time, logistic and administrative delay time).

The road to establish a sound logistic support system is not a simple task as it involves many factors both internal and external of the RMN organisation. The researchers found that the post-mortem on the present logistic system is a salient point and the following areas are the major framework whilst other inter-connected issue may arise when the matter is scrutinise further. The recommendations are mainly on the framework and other inter-connected issue will require further exploration.

### Identifying the Failure

RMN is adopting the ILS approach for its logistic support. Figure 5.1 shows the points where improvement on the present can improve the cycle of

work processes and lead to customer's satisfaction and achievement of the new objective which is based on the designed supportability

Policies played an important driving factor and it should be adhered to in order to ensure success though political and economic undeniably at times become a hindrance RMN should correctly scale its supportability based on the political and economic constrains The minimum requirement must be established so that the support is sufficient for the fleet

**The ILS Benchmarking**

The centre of issue is the main frame of ILS itself RMN must satisfy the basic elements of logistics as shown in Figure 5.1

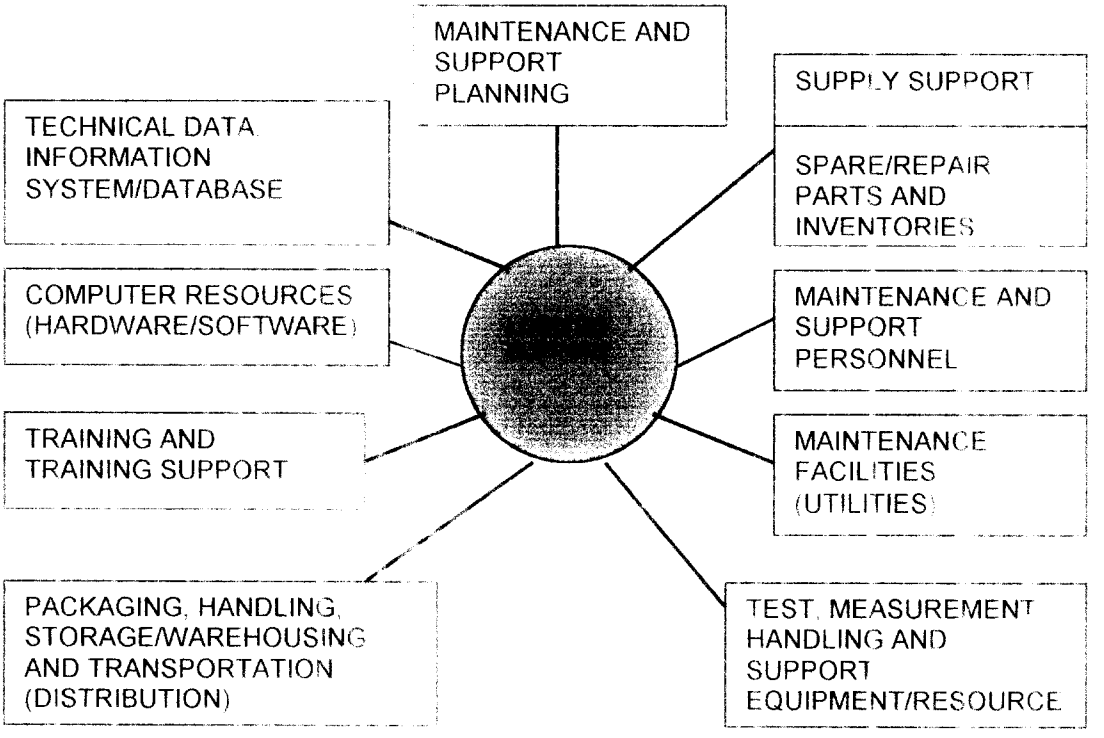


Figure 5.1 – Elements of Logistics

These elements shall be the basic framework in the identification of failure upon establishing appropriate policies to support the integrated system. The policy shall be designed to posses all elements. The study on the support capability, the researchers strongly recommend that the supportability analysis be adopted as previously mentioned in Chapter 3. In the modern and sophisticated era, RMN should have a stable IT infrastructure to integrate data based on input from the elements. A thorough analysis must be made in order to introduce the required logistic support system.

RMN has its own peculiar way of designating mission to its fleet. As such, the study will provide data specific to RMN needs regardless of the OEM recommendation. The Supportability Analysis Framework (sample) provides some guide on the data requirement that is of help. The framework is highly recommended for RMN to apply it on the existing systems and the new systems in the future. One important point to note is that RMN do not involve in the design phase, so the application starts at the inception of the particular system or equipment in the RMN service especially on the mission-related elements and support infrastructure.

**Maintenance and Support Infrastructure**. The infrastructure technical measures will provide the reliability (effectiveness) of the support capability. The logistic system intended for use shall be measurable in terms of its responsiveness (response time) and efficiency (cost per support action). The main driving force behind these issues is the policy of equipment procurement which has major impact on supportability as the more number of equipment type the more difficult and complex will the management of maintenance be. Appropriate quantities of an equipment that is economically viable only should be in the RMN inventory (examples; limited types/makers of guns, radars, combat system and engines). RMN should work out the policy (which need detail study) on

main equipment holding otherwise the maintenance and support infrastructure will either be ineffective or costly or both.

**Maintenance and Support Personnel**. In the event of an inception of a particular system or equipment RMN need to analyse the personnel strength and skill levels. OEM is to be involved in establishing the desired skills. RMN is to ensure sustainable attrition rate (turnover rate) inclusive of rotation of personnel's appointments. The labour hour or maintenance action and the error rate must be measured. Even though RMN is a non-profit organisation, the cost per person and department must be established as a measure of productivity. Presently RMN conduct basic courses for equipment maintainers and operators using generic model. Courses specific to ship's equipment are considered impossible as there will be too many modules of training and a tremendous expansion of the training syllabus. Such training ends up with personnel putting his effort to learn about an equipment or system which is new to him at the time when he is required to perform. RMN should revise its training system along with the ILS implementation in order to churn out competence support personnel.

**Training and Training Support**. RMN need to establish the strength of personnel to be trained over a specific period, training days, frequency and duration of training. It must be a continuous process and not a one time event especially at initial stage of equipment or system procurement. The training data must be established inclusive of training programme, students' data, equipment involved, software used and cost.

**Packaging, Handling, Storage and Transport**. The analysis must include each activity concerning the transportation mode, its route and distance, frequency, time and cost. Consider each delivery packaging requirement, container utilisation, effectiveness of transportation

(reliability), successful delivery rate and packaging damage rate. The delivery system must be designed to be adhered to with respect of the urgency of the requirement and not as what option is easily made available during the period.

**Computer Resources**. Software acquired must be checked for its reliability and maintainability. OEM or vendor involvement may be a necessity. Consider the complexity of the computer language and coding to match personnel IT literate level. The number of systems used (modules) and its cost per element of software must be borne in mind. The supply depot personnel must be involved in each equipment or system training.

**Technical Data and Information Systems**. Technical data for each system must be organised. These data must be accessible in good time as such, RMN need to look at the number of data for each system, its format and capacity. The larger the database size, the longer the information processing time. 'Change implementation' time must be measure so that those changes are available to all users for effective action especially to integrate the maintenance and supply support personnel.

**Maintenance Facilities**. This aspect needs the commitment of the maintainers. Directives for maintainers' action are to be considered. Maintainers shall be required to record number of items processed over a period, each item repair time, number of queuing items, materials consumption (spares/repair parts/modules), equipment utilisation (including utilities) for each maintenance action. Again the maintenance action must be measured in terms of cost.

**Test, Measurement, Handling and Support Equipment**. Often the users get frustrated when the service of a simple mobile crane is not available when needed and the other classic example is the non-availability of weapon (gun) calibration and alignment analysis unit. RMN need to analyse the need of these facilities in terms of utilisation rate (period of usage), time, availability, reliability (MTBF) or failure rate, the need for calibrations and cycle time its cost for each test/utilisation or cost per hour of usage.

**Supply Support**. Supply support is the main issue raised by the fleet officers despite it is only one of the elements in ILS. FSD has to some extend recorded the spares/repair parts demand rate but there are a list of other actions to be taken. A study on MTBR for each equipment or system is to be done based on the asset's utilisation (task and mission assigned) and not on OEM recommendations. Besides RMN, NDSB could also be made to cooperatively share data and study the spares requirement based on track history of ships sent to yard. Storage of spares in FSD shall be done in a manner to facilitate locating time and not otherwise. The system (inventory management) probability of success must be measured. This is to reduce ship staff presence for identification. The spares availability, stock level, inventory turnover and the economic order quantity (quantity to buy and the reorder time) must be carefully formulated.

The analysis is not a simple task but if RMN is serious to improve its logistic support system the analysis is highly recommended. Going through this analysis process would make the relevant parties, department and organisation realised what are lacking and what are needed to be done. Before an integrated logistic support system structure is achieved, the inter-organisations (RMN-Vendors-Yards) and intra-organisation (divisions, department, units and ships) must be integrated and their effort concerted.

**Total Quality Management**

As an organisation that strives for quality, the supportability analysis will supply the data required for performance measurement. Each of the elements analysed is measurable either in time, cost or its peculiar measurement tools. The elements involved in the analysis marry with the Organisational Excellence Model which concerns about managing data and information, managing human resource, focussed on customer needs, relationship with external vendors and revolves within the process management.

As mention earlier in Chapter 2 (Figure 2.2), the model of Quality Management Principles also concerned similar issue such as performance management, top management function, the need for enhance teamwork, the requirement of training and recognition, quality assurance, strategic quality planning and focus on customer needs.

The Asset Performance Management (APM) framework illustrated in Figure 3.5 provides a roadmap for management, operations, engineering and maintenance to achieve operational excellence with all its attendant benefits: profitability, predictable production at the lowest possible cost, and failure-free operations. It also provides a context within which to determine the correct technologies to implement in order to realise best-in-class reliable operations. In addition to employing technology that uses the results of the evaluate stage to revise strategies and improve execution. Another benefit to using APM technology is that it can be implemented in stages. As real opportunities for improvement are identified and addressed, platforms (ships) can readily adopt incremental improvements without protracted rollout programs, thereby realizing platform performance benefits within a smaller time frame. Utilising APM model would also allow RMN to measure always revisit its work process as feedback available. The loop of the maintenance process based on APM may then be applied on the approach to RCM.

Customers' needs (based on their expectations) as discussed in Chapter 4 is highly recommended to be taken as input for the improvement of the RMN logistic support

**Breaking the Cycles of Failure**

The Cycles of Failure in Figure 5.2 may look a little bit exaggerated. It is purposely done to highlight the grave error of a poor logistic support system. To enhance or improve supportability, the cycles of failure need to be broken and thus induce a positive chain reaction as depicted in Figure 5.3. The ultimate aim of the whole process is to achieve customers' satisfaction and higher ship operational time.

The researchers highly recommend RMN authorities to incorporate the cycles of failure in their study (post-mortem) and identify the weaknesses commencing from the policy stance to satisfaction of the elements of logistic, vendors relationship and finally the processes and management. Within the cycles, one very critical tool is the APM.

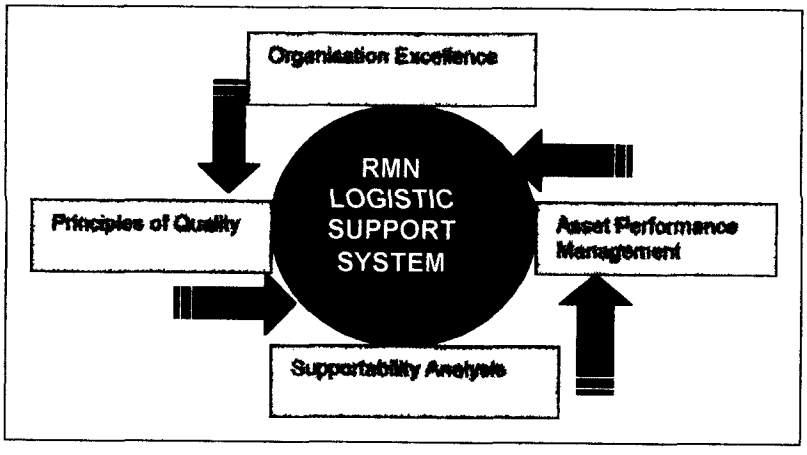


Figure 5.3 – Linkage of Quality, Supportability and Performance Management Models
Source: Own Model

The models recommended are linked to each other and is recommended to be adopted as a part of action to be taken either consecutively or simultaneously. The linkage of models is shown in Figure 5.3. RMN is considered to be on the right track but lack the micro perspective of looking into various components within each model. Thorough analysis and corrective actions will put RMN as a small but efficient navy.

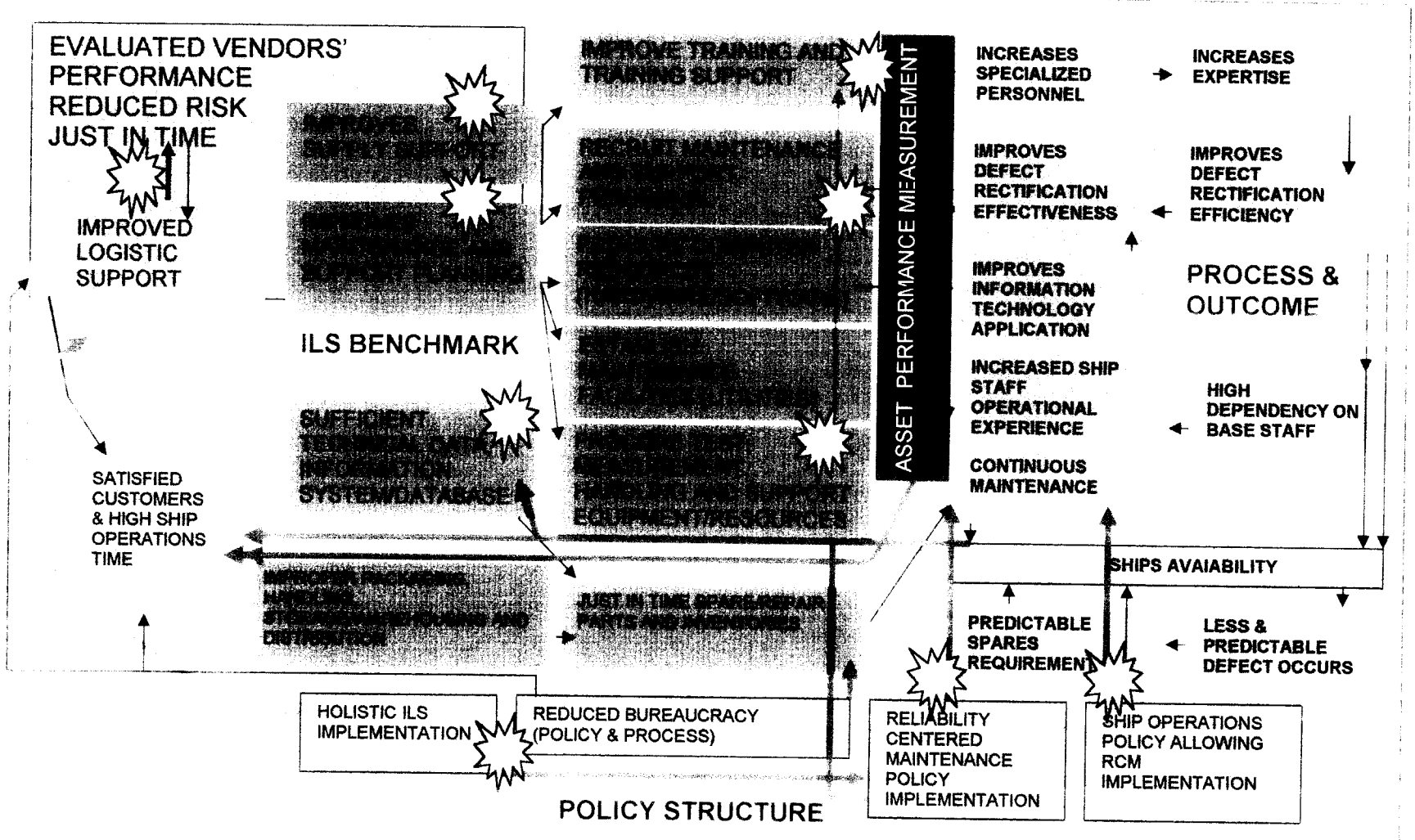


Figure 5.2 Breaking Cycles of Failure
Source Own Design on Breaking Cycles of Failure