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The Management of Interface between Palestinian Water Authority and Costal Municipalities Water Utility of Water Sector in Gaza Strip

إدارة العلاقة المتداخلة بين سلطة المياه الفلسطينية و مصلحة مياه بلديات الساحل لقطاع المياه في قطاع غزة

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Abstract

The aim of this research is to evaluate the management of interface between Palestinian Water Authority (PWA) and Costal Municipalities Water Utility (CMWU) which work in water sector in Gaza. The targeted population was all the staff members with a managerial position.

A structured questionnaire was specially designed for the study to evaluate the aspects of the management of interface which are communication mechanism and style, the level of coordination, the clarity of roles and the allocation of responsibilities, financial resources and soft and hard skills. 89 questionnaires were distributed to the research population, and 74 of them were received with a response rate of 83.14%. A group of statistical methods were used to analyze the study data using the statistical package system for social sciences SPSS.

The results showed that the application of the management of internal interface in PWA and CMWU is better than the application of the management of external interface between them. Moreover, it showed that the aspects of the management of interface influence the management of interface between PWA and CMWU in water sector. Also, it showed that there are no significant statistical differences among the respondents in their opinions about the study fields attributed to gender, age, years of experience, qualifications. Whereas, it showed that there are significant statistical differences among the respondents in their opinions about the study fields attributed to Job title and name of organization.

The recommendations drawn mainly include, first, enhancing the aspects of the management of interface between PWA and CMWU. Second, reinforcing and improving the management of interface concept through holding training seminars for the managers to understand and figure out the nature of this concept. Third, emphasizing the role of PWA as a policy maker and regulator and the role of CMWU as a service provider through strengthening the laws and legislations that identify the roles and responsibilities of each organization.

ملخص الدراسة

يهدف هذا البحث إلى تقييم إدارة العلاقة المتداخلة بين سلطة المياه الفلسطينية و مصلحة مياه بلديات الساحل العاملة في قطاع المياه في قطاع غزة. و شمل مجتمع الدراسة المستهدف كل الموظفين بدرجة مدير.

وقد تم تصميم استبانة خصيصا لهذه الدراسة لتقييم مجالات إدارة العلاقة المتداخلة (شكل وآلية الاتصال، مستوى التنسيق، وضوح الأدوار و تحديد المسؤوليات، الموارد المالية، المهارات). وقد تم توزيع (89) استبانة على مجتمع الدراسة, وتم استرداد (74) استبانة بمعدل استجابة (83,14%). و تم استخدام مجموعة من الطرق الاحصائية لتحليل بيانات الدراسة و ذلك باستخدام نظام الرزمة الاحصائية للعلوم الانسانية SPSS .

أظهرت النتائج أن تطبيق إدارة العلاقة المتداخلة داخل كل مؤسسة أفضل من تطبيق إدارة العلاقة المتداخلة بين المؤسستين. كذلك اظهرت الدراسة أن مجالات إدارة العلاقة المتداخلة تؤثر على إدارة العلاقة المتداخلة بين المؤسستين في قطاع المياه. و أوضحت أيضا بأنه لا توجد فروق ذات دلالة إحصائية بين استجابات المبحوثين حول مجالات الدراسة تعزى إلى المتغيرات (الجنس, العمر, سنوات الخبرة, المؤهلات), بينما أظهرت بأنه توجد فروق ذات دلالة إحصائية بين استجابات المبحوثين حول مجالات الدراسة تعزى إلى متغيرا المسمى الوظيفي و اسم المؤسسة.

قدمت الدراسة العديد من التوصيات من أهمها: أولا: تعزيز مجالات إدارة العلاقة المتداخلة بين سلطة المياه الفلسطينية و مصلحة مياه بلديات الساحل. ثانيا: تعزيز وتحسين مفهوم إدارة العلاقة المتداخلة من خلال عقد دورات تدريبية للمدراء لفهم طبيعة هذا المفهوم. ثالثا: التأكيد على دور سلطة المياه الفلسطينية كصانع السياسات ومنظم لقطاع المياه ودور مصلحة مياه بلديات الساحل كمقدم للخدمات من خلال ترسيخ القوانين والتشريعات التي تحدد أدوار ومسؤوليات كل مؤسسة.

Dedication

I would like to take this opportunity to express my deepest thanks and lovingly dedicate this work to:

My dear parents, my father and my mother, who have given me the drive and discipline to tackle any task with enthusiasm and determination,

Dear wife for her understanding, patience and continues support. Without her love and support this research would not have been made possible,

My sons, Karim and Tamim, who suffered patiently and silently, wait for a day when we could all "go out" together.

Sisters and Brothers,

My friends for help and promotion,

All my lovely people I know.

Acknowledgment

Praise be to Allah, Lord of the Worlds, and prayers and peace on the prophet Mohammad peace be upon him.

I take this opportunity to express my sincere gratitude to my supervising guide, Prof. Majed Mohammad El-Farra, for the effort he exerted during the entire process of my research work. I acknowledge his valuable help and significant contribution from the very beginning of shaping the title of the study, to completing the procedural formalities of the thesis submission. He has been continuously helping and encouraging me at all the stages of this study for ensuring quality and perfection.

I would like to express my deepest appreciation and gratitude to the discussion committee, Dr. Rushdy Wady and Dr. Mohammed Al-Madhoun, for their cordial support and valuable information and guidance.

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Last but certainly not least, I wish to acknowledge the critical role my family has played in helping me to complete my work. The unbounded love and support they gave to me were invaluable in crucial moments.

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LIST OF ABBREVIATIONS

Abbreviation	Description
APM	Agile Project Management
BOT	Build-Operate- Transfer projects
CIIM	Construction Interface Information Management
CIM	Construction Interface Matrix
CL	Chloride
CMWU	Coastal Municipalities Water Utility
EQA	Environment Quality Authority
EU	Europe Union
HRD	Human Resource Development
ICU	International Coordination Unit
IM	Interface Management
IMS	Interface Management System
IOM	Interface Object Model
IT	Informational Technology
km2	Square kilometer
L/C/D	Cubic Meters per Day
MCM/yr	Million Cubic Meters per Year
mg/L	Milligrams per liter
MI	Multilevel Interface
mm/year	Millimeters per Year
MOA	Ministry of Agriculture
MOH	Ministry of Health
MoLG	Ministry of Local Government
NWC	National Water Council
NWP	National Water Policy
PLC	Palestinian Legislative Council
PNA	Palestinian National Authority
PSM	Process Safety Management
PWA	Palestinian Water Authority
PWL	Palestinian Water Law
SPSS	Statistical package for social science
UN	United Nations
VOIP	Voice-Over-Internet Protocol
WHO	World Health Organization
WMIM	Web Matrix-based Interface Management

Chapter 1

Introduction

1.1 Background

Water sector is acknowledged as the first priority among Gaza problems and it needs special attention from the responsible bodies. Therefore, the Palestinian water Authority (PWA) sets the policy and plays a regulatory role, while services for domestic and industrial supplies are mostly delivered by the Coastal Municipalities Water Utility (CMWU) in Gaza (Amnistie, 2009).

However, this vision is not reflected in the present organizational arrangements. There is a major difference between the governance structure envisaged under the Law and the current set up. The National Water Council (NWC) has met once and has never functioned as intended. The PWA is not only a regulator but also an implementer, with projects management unit (PMU) reporting to it. Of the regional utilities, only one has been set up, and water supply remains in the hands of several municipal water departments. Sector governance concerns require continued technical assistance and capacity building support from the donor community.

In the opinion of the PWA, none of the regional utilities has been setup according to the water law. CMWU formation has been managed by the project management unit (PMU) of the Second Gaza Emergency Water Project since 2005. Neither the structure nor the financial system have been put in place, and most importantly the bylaws, which have to meet the water law requirements, have not been issued (World Bank, 2009).

According to Palestinian water authority, the relative roles, responsibilities and relationships of the institutions within the water sector are in need of clarification. The ability of the PWA to lead, develop and regulate this suboptimal and exogenously constrained sector is severely hampered by unclear mandates and undefined relationships among key sector institutions including central and local government, civil society and private actors. It is assessed that the institutions and institutional framework created since 1995 to manage water resources and water uses, including the provision of water and wastewater service are insufficient for their purpose and consequently do not meet the needs of the Palestinian people in Palestine (PWA, 2010).

The lack of clear institutional mandates has contributed to a situation of ineffective governance and weak capacity in the Palestinian water sector, which combined with occupation-related restricting factors, impairs the development of adequate policies and

strategies for water resources management, infrastructure development and service provision. The institutional fragility of the water sector in Palestine is generally acknowledged, as reflected in a number of reports (PWA, 2010).

1.2 Research Problem:

The overall framework of water sector governance is set out in the Water Law, which provides for separation between water resources management and regulation (to be conducted by the PWA), and water supplying and using institutions. However, this vision is not reflected in the present organizational arrangements. The responsibilities of the various stakeholders, including both governmental and non-governmental bodies in the water sector, greatly overlap, causing confusion and often a gap in services, ultimately creating a disastrous impact on the Palestinian population at large. The importance of studying effective interface management aroused from the ineffective governance and weak capacity in the Palestinian water sector; which requires cooperation, communication and integration to well-manage this vital resource through initiating effective interface management for the working water institutions in Gaza.

So the problem of this research can be summarized in the following question:
How do Palestinian water Authority and costal municipalities water Utility, as concerned bodies in water sector, manage the interface between them?

1.3 Research variables:

- *Dependent variable:* Management of interface.
- *Independent variables:* The aspects of the management of interface and the sub variables are:

- Communication mechanism and style.
- The level of coordination.
- The clarity of roles and the allocation of responsibilities
- Financial resources,
- Soft and hard skills.

1.4 Research hypotheses:

There are two main hypotheses for this research:

1. The management of interface between Palestinian Water Authority and Coastal Municipalities Water Utility of water sector in Gaza strip is influenced by the five aspects of interface management.

From this main hypothesis the following sub hypotheses result:

a) The management of interface is influenced by the communication mechanism and style at significant level α =0.05.

b) The management of interface is influenced by the level of Coordination at significant level α =0.05

c) The management of interface is influenced by the clarity of roles and the allocation of responsibilities at significant level α =0.05

d) The management of interface is influenced by the Financial resources at significant level α =0.05.

e) The management of interface is influenced by soft and hard skills at significant level α =0.05.

2. There is no significant difference at level α =0.05 among respondents' about the management of interface in water sector in Gaza Strip due to demographic characteristics (Gender, Age, Job title, Qualifications, Experience, Name of organization).

1.5 Research Objectives:

The objectives of this research are the following:

a) To know the ways of management of water sector in Gaza strip.

b) To evaluate management of interface for the sector in Gaza.

c) To get recommendations that could help the concerned bodies in their interface management in the sector.

1.6 Research importance:

Water sector is a much related sector to people life, and as mentioned in many national and international reports, Gaza Strip is exposed to very difficult circumstances and the water sector faces many problems. According to researcher's reading, there is a scarcity in studies that search interface management. So, this research is mainly important for its advantages and benefits for the following:

1. **Water institutions:**

- It's a motive to initiate constant development in all fields in the water institutions to obtain efficiency and effectiveness in interface management.
- This study sheds the light on the importance of the interface management.
- It is important for interested people to know the main problems that face the interface management of the sector to set their strategies.

- It is also important for interested people to take the benefit from research results and recommendations since the studies in this field are few.

2. Community

- This research will give a chance to study and evaluate the ways of interface management in water sector in Gaza strip to keep the effective running of the systems and save access to water services to people.
- The development in water sector and its systems through good management will lead to community satisfaction.

3. Researcher

- The research enhances the researcher's skills in scientific research .Also; it provides enough scientific background, objective studying and knowledge about water interface management reality in the water institutions in Gaza strip.

1.7 Organization of the Research:

The research has six chapters. Chapter one provides a general background for the study introducing the problem, objectives, study importance and previous literature. Chapter two provides a theoretical background on the management of interface from different international literature. Chapter three focuses on the present water sector situation in Gaza Strip. Chapter four explains the methodology adopted in this study. Chapter five is analyzing the questionnaire and discussing the results of questionnaire and related aspects in the study. Finally, Chapter six is containing the conclusions and recommendations.

1.8 Previous Studies:

1.8.1 Weshah et al. 2013) : Factor analysis of the interface management (IM) problems for construction projects in Alberta

This study aims to identify, and classify interface problem factors in Alberta's construction projects through structured, face-to-face, interviews and empirical questionnaire.

The data analysis results provided a comprehensive view of the main causes behind IM conflicts in Alberta's construction industry. The results identified six IM factors affecting construction project performance in Alberta, namely: “management”, “information, bidding and contracting”, “by-law and regulation”, “technical engineering and site issues”, and “other interface problems”.

The study concluded that the management factor is the factor most impacting IM performance. Although there are strong relationships between the six extracted factors and the company type, job title type and years of experiences, there are no relationships between the six extracted IM factors and the industry type. The findings present the basis for future research to enhance the overall project performance by developing a multiple-regression analysis model and risk analysis model among the underlying interface problem factors and the project performance indicators.

1.8.2 McCarney and Gibb (2012) : Interface Management from An Offsite Construction Perspective

This study aims to determine a pragmatic framework of the main process and people factors which have an impact on the interface management of offsite and onsite forms of bathrooms/wet rooms through a pilot study using semi-structured interviews. This study focuses on the process factor of design management and the people factor of communication.

The study concluded that the importance of early engagement of the contractor in the design process and that open communication between all stakeholders is essential to resolving organizational interfaces issues. The results of this study have also confirmed that the management of interfaces are of equal, if not more importance when incorporating offsite forms of bathroom construction into the construction process.

1.8.3 Shokri et al. (2012): Interface Management Model for Mega Capital Projects

This study aims to study the complexity of Mega projects because of the scope, size and numerous stakeholders collaborating during the project life cycle. These projects face conflicts and issues because of misalignment between stakeholders, and insufficient communication process. Interface Management is introduced as an effective approach in dealing with these problems.

A process based approach is proposed for interface management of mega capital projects, starting with the definition and taxonomy of interfaces. Then, the main steps for implementing an Interface Management System are introduced: (1) interface identification, (2) documentation, (3) issuing, (4) communication, and (5) closing.

This study concluded that, implementing Interface Management during the early stages of a project will improve project performance in terms of quality, cost, time and safety by providing a framework for appropriately understanding the inter-related requirements, needed information, and deadlines. Furthermore, it helps to reduce additional costs of the project through adding visibility on project description, roles, and common boundaries.

The proposed approach which has been implemented provides a tool to improve project performance through better alignment between stakeholders, enforcement of contract terms, and effective sharing and distribution of interrelated information within formalized interface management framework, as well as collaborative problem solving amongst interested parties.

1.8.4 Siao and Lin (2012): Enhancing Construction Interface Management Using Multilevel Interface Matrix Approach

This study aims to manage construction interfaces effectively, for this purpose the study proposes the novel Multilevel Interface (MI) Matrix approach to enhance interface management during the construction phase of construction projects, which allows project participants to easily present the identified interface problems and handle them effectively; and, enables project participants to track the condition of managing interface problems that occur without reviewing other data. By using the MI matrix, interface relationships, including both direct and indirect interfaces, and interface conditions can be presented for project participants in a construction interface network.

The study concluded that the MI matrix is an effective approach for construction interface management. The MI matrix significantly enhances the performance in tracing and managing construction interfaces. Also, the application of the notice sheet and the interface issue sheet are used in the IM procedure to implement an effective IM system. The application of the interface issue sheet presents problem statements, interface types, problem-solutions, and implemented efforts. Furthermore, the successor can review the construction conditions of the predecessor’s work after acquiring the notice sheet provided by the predecessor. And interface problems can be detected early via the notice sheet and interface issue sheet to decrease negative impacts for a project.

Finally, this study develops a construction web matrix-based interface management (WMIM) system integrated with the proposed MI matrix approach for project participants. By utilizing the WMIM system, whole interface-related information sharing can be tracked and managed effectively for project participants. Furthermore, the MI matrix approach and the WMIM system are applied to a pilot test to illustrate how to support interface management during the construction project. The results of the pilot test indicate the WMIM system integrated with the MI matrix approach provides an effective interface management tool in the construction phase of the project.

1.8.5 Allmayer and Winkler (2012): The Impact Of Inter-organizational Interface Problems On A Company's Flexibility

This paper aims to analyze the impact that inter-organizational interface problems have on the flexibility of companies through an online-questionnaire. The collaboration of suppliers and buyers is strongly affected by problems at inter-organizational interfaces. These interface problems lead to interruptions in processes and strongly influence the flexibility of companies. Based on an empirical investigation, the current paper presents specific problems that arise at inter-organizational interfaces, such as organizational, personnel, procedural, cultural and technical problems. This paper concluded that to enhance flexibility, it is essential for a company to accurately plan, design and monitor inter-organizational interfaces regarding the flow of goods and information.

1.8.6 Siao et al. (2011): Interface Management Practices In TAIWAN Construction Project

This study aims to propose approaches to enhance interface management effectively in the construction phase of a project. The proposed approaches have been applied in selected case study of a construction building project in Taiwan to verify the proposed approaches and demonstrate the effectiveness of interface management in the construction phase.

The study concluded that:

(1) Based on the good integration of interfaces, there are positive benefits for the use of the resource, the constructability, and the construction schedule etc., and further to affect the project cost,

(2) The integration of interfaces plans are made to implement the integration of interfaces and communication before the construction starts, and although the

interface problems occurred is still not avoided, the chance of interface problems occurred can be reduced,

(3) The interfaces can be managed and controlled by the communication meetings but the interfaces between the diverse meetings will be arose if the communication meetings are built too much. Moreover, the member of the management can be joined in the meetings, and the schedule of administrative procedure can be compressed to assist the construction related works,

(4) The results of the study indicate that although the budget for the integration of interfaces has been considered in the contract and the numbers and qualifications of the engineers for the integration of interfaces are also stipulated, the integration of interfaces is still attended insufficiently. Hence, the engineering management should be incorporated with the concept of interface management (IM).

1.8.7 Siao and Lin (2011): The Development of Construction Interface Information Management System

This study aims to enable project participants and managers to directly acquire available information for managing interfaces efficiently without other data supporting through utilizing the Construction Interface Matrix (CIM) approach.

This study develops a Construction Interface Information Management (CIIM) system by integrating the proposed CIM approach and web technology for the construction phase of construction project.

The study concluded that CIIM system can improve the interface management for project participants to manage interfaces in the construction phase. The recommendations are as follows:

(1) Project managers should join IM team since the CIM requires them to assign and manage related assignments.

(2) E-mail service is very important for IM to notice all responsible participants to respond the interfaces in the CIIM system so participants should check mails once time per day.

(3) Policy and strategy must be considered to encourage the use of the system because the effective use requires that changes be made to almost every aspect of a firm's business.

(4) The training and workshops for the CIIM system are necessary and useful for all users.

1.8.8 Ku et al. 2010: Development interface knowledge management system for the Mass Rapid Transit system construction

This study aims to extract the interface problems and key factors through factor analysis and regression statistical methods, verify 28 interface problems that are often seen in Mass Rapid Transit (MRT) construction projects, and divide them into management, experience, negotiation, contract, law, and unavoidable factors (a total of six categories).

This study concluded that experience and negotiation problems have the greatest effect on construction results, and this information can be used as a reference during the interface management decision processes. The experience and negotiation factors in this study are both know-how characteristics, and through this categorization the researcher analyzed the detailed structure of interface problems, and further introduced the "construction interface management knowledge database system" for use as the negotiations platform for the interface management, allowing participants to mutually understand the requirements of their counterparts, effectively reducing goal conflicts and the risk of individuals trying to solve interface problems through intuition.

This study establishes a “construction interface management knowledge database system”, and the milestone alarm modes for its four main options/function are set, being able to react to interface problems quickly and find solution strategies, being able to serve as a data comparison for planning and design, and calculating and evaluating relative interface costs so that construction can be on schedule, and quality and cost can conform with the set goals.

1.8.9 Yu-de and Zhao-hui (2010): Research on the HRD of State-Owned Forest Enterprises in Heilongjiang Province Based on Interface Management

This study aims to discuss the relative concepts of Interface Management and the necessity of the application of Interface Management in human resource development (HRD). It attempts to explore the influence mechanism and intrinsic factors of the interface contradictions from a perspective of micro-crystal interface. The interface contradictions and barriers such as unbalanced individual development, the shortage of group development and the balk of organizational development.

This study concluded that the internal influence mechanism of interface contradictions and barriers, expounding the effect of internal energies of departments and employees on enterprises' global energy through multi-angle, raising some feasible countermeasures to promote the HRD quality in state-owned forestry enterprises, in order to earnestly enhance the internal energy and attractions of employees, the internal energy and coordinative energy of departments, and then achieves the enhancement of enterprises' global energy. And, Human resource is extremely unreasonable in various aspects such as age structure, academic structure, training mechanism, staffing and system design. "Elitism" causes unbalanced individual development of employees, irrational staffing causes the deficient development of groups, the unscientific organizational structure and system design, and the weakening of corporate culture impede development of organizations.

This study recommended that:

- Starting integrated training and highlighting main objects.
- Allocating human resource rationally and establishing the mechanism of personnel flow.
- Optimizing the organization structure, strengthening the corporate culture

1.8.10 Mortaheb and Rahimi (2010): Interface Management in Mega Oil Refinery Projects

The study aims to develop a dynamic interface management plan for using project participants and implementation to improve and effectively manage the common problems and issues related to interface management of mega oil refineries projects of Iran. For this aim the study used questionnaires and interviews.

The study concluded that the top ten causes of project interface problems based on all industry professionals opinions and ideas which were collected, clarified, analyzed, tabulated, grouped, categorized, and prioritized in terms of the number of times quoted by respondents as follow:

1) Owner's Late Decision for Dividing the Program into the Smaller Projects.
2) Lack of Key Deliverables such as Internal and External Interface List, and Interface Management Plan within FEED Package
3) Owner's Late Decision for Hiring Qualified Project Management Consultant
4) Change Order Issued by Owner

5) Incomplete and Unclear Scope Definition
6) Poor and Slow Owner's Decision Making Process
7) Owner's Late in Progress Payment to Contractor
8) Poor Contractor's Communication and Coordination with Other Parties
9) Contractors' Poor Planning and Scheduling
10) Consultant's Delay in Approving Key Engineering Deliverables

Finally, an effective and applicable Interface Management Plan (Procedure) was prepared for Oil Refinery Mega Projects in terms of an applicable project job specification for helping the practitioners (The Owner, Contractors, Engineering Parties, and Consultants) to improve and manage different interface issues among design and construction disciplines (i.e.: mechanical, instrumentation, civil, electrical, etc) of oil refineries mega projects effectively and immensely. The generated interface management plan is a generic and applied procedure, since it can be easily customized in order to use to any other mega oil, gas, and petrochemical project.

1.8.11 Chen et al. (2009): Object Model Framework for Interface Modeling and IT-Oriented Interface Management

This study aims to find an IT- oriented IM solution that employs a systems approach that allows for modeling various types of interface issues in a real-world construction setting, and to enhance overall project performance of the construction industry as a whole. For this aim the study used case study method.

The study conclude that performing efficient interface-related coordination, decision making, operation, and management can only be achieved through software applications, and they recommended a future research in order to further develop the IOM, to facilitate comprehensive and accurate interface modeling and simulation, to integrate interface modeling with building information modeling, as well as to create and enrich interface databases.

1.8.12 Lisong (2009): Brand Relationship Interface Management: Communication, Interaction and Integration

This paper aims to analyze the importance of stakeholders in the brand relationships, the interfaces between major stakeholders and the reasons for the conflicts.

Also, it aims to establish brand relationship interface management methods or strategies based on interaction of brand and stakeholders.

This paper concluded that, the management upon interaction behaviors in brand relationship interface may help enterprises efficiently spread the information about all kinds of brand promotion activities and establish the relationships between them. The introduction interface management tools may help enterprises better view the interaction mechanism between them and stakeholders in information, materials, capitals and personnel, etc., and develop corresponding management strategies. To carry out effective management upon brand interface may satisfactorily meet the needs of stakeholders, improve people's recognition of the brand and their loyalty to it and eventually improve the brand value.

1.8.13 Klakegg (2009): Challenging the Interface between Governance and Management in Construction Projects

This paper aims to explore and challenge the existing, unclear interface between the project owner's perspective (associated with governance) and the executing party's perspective (associated with management). An approach based on case studies was chosen.

The paper concluded the following areas of improvement as important in order to optimize the interaction between governance and management:

- The understanding of governance as both hierarchical and network based.
- Consistency in multi-project related definitions.
- Further clarification of roles and responsibilities of the governing party and project management. Improve unclear or supply missing governance structures.
- Definition and priority of the functions of the governing party and project management. How to implement good governance principles.
- Balancing cost and benefit focus in construction projects – how to keep a value focus.
- Integration of management systems on all levels, and between organization and project.

1.8.14 Rong-Yau et al. (2008): Factor analysis of interface problems-a case study of MRT

This research aims to investigate common interface problems in the MRTS and the relationship between them and the project performance through face-to-face interviews and questionnaires. The research concluded that:

1. Six interface problems were extracted, namely, management factor, experience factor, coordination factor, contract factor, acts-of-God factor, and regulation factor.
2. On one side, two interface problems (experience and coordination factors) were identified to be critical with regard to project performance. They both occurred due to the lack of know-how. On the other hand, in spite of the insignificance of the remaining four factors, they make the overview of interface problems more complete. Therefore, in practice, the first step to solve interface problems is to train employees, increase their coherence, and create an atmosphere of cooperation.
3. Past experience dominates the rate of project progress and thus experience and instruction should be emphasized among the involved parties. With regard to practical application, it is crucial to avoid the repetition of the same mistakes and thus some taskforces comprising experienced personnel should be formed, whereas inexperienced employees should get involved in the construction project.
4. Coordination is so critical to the quality of the project that a system that is capable of facilitating the participants' knowledge of their mutual needs should be established to avoid internal competition for resources. Integration will be the core ingredient of management in the future as well as the essential part of tomorrow's organization; therefore, to increase competitiveness, it becomes vital to establish the integral platforms for proper coordination among the participants.
5. Environmental factors seem insignificant to the project performance because they are external forces that are not brought about by humans.

1.8.15 Chen et al. (2008): Multiperspective Approach to Exploring Comprehensive Cause Factors for Interface Issues

This research aims to enhance the industry's overall project performance by applying interface information modeling and systematic model-based IM to the entire project delivery process. This research presented the first step—conducting an interface related built environment analysis to identify and streamline comprehensive causes of interface issues. The multiperspective approach systematically explored comprehensive

cause factors for interface issues from six different, yet interrelated perspectives, namely *people/participants*, *methods/processes*, *resources*, *documentation*, *project management*, and *environment*. From each perspective, hierarchical cause factors were identified and displayed in a structured way.

The research concluded that these factors led to numerous interface issues that spread into the entire project delivery process as well as operation and maintenance of a built facility. Also, many of these factors are related to existing aspects of project management, e.g., quality management, schedule control, and resource allocation. Therefore, the authors proposed a systems approach that aims to integrate the conventional aspects of project management with IM at various project stages. This will avoid, minimize, and resolve many interface issues.

This research presented the identified interface management and control elements in affinity diagrams. These elements, e.g., *information standard*, *interface responsibility*, *coordination*, *product quality*, *constructability*, and *work sequence*, are essential to IM. They acted as a very important reference for developing an *interface object hierarchy*—the most critical component of the interface object model (IOM) proposed in the second step of this research. The IOM (to be presented in a companion paper) introduces a data structure and dependencies of interface information to be used in an IT solution. It is envisioned that the IOM and the systematic model-based IM will finally find their way into a software solution. This will make the management and coordination of a vast amount of interface information feasible and will furthermore allow for optimization of interface-related project performance.

1.8.16 Chen (2007): An Object Model Framework for Interface Management in Building Information Models

This research aims to investigate three challenging problems associated with Interface Management: 1) how to build a holistic understanding of interface issues for developing all-around Interface Management solutions; 2) how to define and present interface information in a unified, accurate, and efficient way to improve information sharing, coordination, and implementation; and 3) how to resolve interface issues as a whole to optimize Interface Management performance.

This research conducts an interface-related analysis to explore the comprehensive cause factors for various interface issues in the current built environment. Then, this research creates an Interface Object Model (IOM) framework that presents a data structure and dependencies of interface information for modeling. This research also develops a conceptual, systematic model-based interface management (IM) strategy that can implement the IOM.

The research concluded that:

1) The researcher identified six interrelated perspectives (*People/Participants*, *Methods/Processes*, *Resources*, *Documentation*, *Project Management*, and *Environment*) as main cause areas. From these perspectives, 155 cause factors (including major causes, minor causes, and sub-factors) of various interface issues.
2) This research initiated an *object* view of interfaces, and defined a unified way of presenting interface information. Consequently, in the object-oriented modeling environment, interfaces become a collection of active objects that react to outside requests and automatically perform complex operations. These objects can play a very important role in model-based interface coordination, management, and operation.
3) This research conceptually developed a systematic model-based IM strategy that employs *systems engineering* thinking.
4) Effectively executed IM can be of great benefit to construction projects. Through this research development, potential IM benefits can be concluded as follows:

- Build a deep understanding of project complexity for project participants
- Optimize design in terms of quality, compatibility, constructability, cost, risk, and function to meet customer needs.
- Improve project planning by avoiding, minimizing, or eliminating potentials for interface issues in advance.
- Improve work packaging and subcontracting to reduce project complexity and to avoid inherent interface issues.
- Build and maintain desirable relationships and interaction channels among project participants to achieve timely communication, coordination, and cooperation.
- Standardize handling processes and work flows for various types of interfaces in construction projects and reduce uncertainties.

- Enable a dynamic and well-coordinated construction project delivery system when responding to changes.
- Identify and record good practices in dealing with project complexity and reapply them in future projects.

1.8.17 Chen et al. (2007): Interface Management a Facilitator of Lean Construction and Agile Project Management

This paper aims to establish and clarify the close relationships between Interface Management (IM) and the two emerging construction management philosophies, lean construction and agile project management (APM). These two philosophies are both considering project complexity to a certain extent. This paper first briefly introduces the new concept of IM and its benefits to construction management. Then, it reviews lean construction and APM respectively. During the review, this paper simultaneously investigates the benefits that IM can offer to these two approaches in regard to philosophy and technique

This paper concluded that Interface Management (IM) can be regarded as a facilitator when coping with project complexity. Furthermore, IM enables a smooth application for lean construction and APM. IM helps build a deep understanding of project complexity. It has been proven to address project complexity which allows for a dynamic and well-coordinated construction project system. This is very important for both lean and agile construction management. The biggest benefits IM offers to these two emerging management philosophies are:

• Assisting lean construction in understanding and dealing with the "physics" of production as well as project complexity

• Assisting APM in coping with human dynamics and achieving the high efficiency and effectiveness of small, self-organizing multi-disciplinary teams.

• Optimizing overall performance of construction project systems.

1.8.18 Kelly and Berger (2006): Interface Management: Effective Communication to Improve Process Safety

The study aims to identify the critical "Interfaces" between the many participants in a process safety management system, and then to establish a protocol for each critical interface.

The study concluded that, Interface management (IM) is the systematic control of all communications that support a process operation. Given the significance of human involvement in most operations, it is important that interactions between people be managed and carefully coordinated to avoid incidents resulting from misunderstandings and lack of information. While such coordination is not formally defined as a process safety management (PSM) element, it is obviously needed and should be assumed to exist in each element. Therefore, a well-functioning process safety program depends on maintaining successful communication interfaces between each involved employee or stakeholder and the many other employees or stakeholders that person must interact with.

1.8.19 Chan et al. (2005): Interface Management for China's Build–Operate–Transfer Projects

The study aims to help managing the complexities in the Build-Operate- Transfer projects (BOT), which are the results of China's transition economy, which is emerging from decades of central planning to become on that is more market driven and globally integrated , and the involvement of many parties in the projects.

The study proposed two systems concepts. The first is a process modeling approach that maps key functions, parameters and interfaces in the project delivery process, and the second is the use of interface management involving specific measures that have contributed towards project success in China's (BOT) projects.

Also, an interface management framework consisting of five key steps is suggested for China's BOT projects, as the following:

1. Interface identification,
2. Interface simplification,
3. Interface prioritization,
4. Interface matching,
5. Applied this management procedure to the Chinese official BOT project structure.

The study concluded that there are (13) interface factors in the general processes of the official BOT processes, and they were evaluated, and the five most critical interface factors identified were public sector, Bidders, Contractual systems, Private sector, and Public resources. Effective selected Interface Management measures for each interface

factor are formed and Interface Management Framework for Chinese BOT projects was proposed.

1.8.20 Apedaile (2004): The Interface between the Planning System and Private Organizations In The Case Of Large Applications for Development: A Theoretical and Empirical Study

This study aims to explain and understand what is going on in the current relationships in the planning interface between public authorities and private organizations and can the interface be managed in a better way? This research has a qualitative focus and is based on case studies.

This study concluded that a dominant power of command in planning governance, a crucial importance of the right to challenge, and an absence of real collaboration and contractual relationships. The lack of discussion in practice of the importance of cultural differences and the impact on resources are also evident. From these findings the study proposes a prescriptive model for the management of the public-private interface. This is based on a modified collaborative model of the Institutional Approach.

1.8.21 Pavitt and Gibb (2003): Interface Management within Construction: In Particular, Building Façade

This study aims to discuss the need for interface management within construction, with particular reference to building façade interfaces. It categorizes the three different types of interface management, physical, contractual, and organizational. Also, discusses CladdISS, an interactive software tool that provides a strategy for optimizing technical and management aspects of cladding interfaces, to develop a standardized strategy for the design and management of window and cladding interfaces, and explains the principles of CladdISS with reference to process maps, action plans, management strategy, bibliography, advice on standards , materials, maintenance, joints, movement, and tolerances, which enable strategies to be developed to avoid the endemic interface problems occurring on-site, and guide the management throughout the project.

The study concluded that construction projects face many problems within construction process because of the lack of interface management. Therefore, there is a need to acknowledge and understand the problems as early as possible. First, the different

types of IM should be identified, as well as how they affect a project. Furthermore, ascertain the necessity for effective IM in a project—especially within critical areas of its structure, including those of technical design, overall detail design, procurement, programming, and logistic

And in order to achieve successful IM, the study recommended that:

- There must be an understanding of the project structure and procurement plan.
- Improve management and guidance.
- Use CladdISS as a tool to addresses the project problems, Which is applicable to the whole construction process, so that the issue of interface management becomes part of the construction process from inception through handover

1.8.22 Al-Hammad (2000): Common Interface Problems among Various Construction Parties

The study aims to identify and assess the interface problems among the various construction parties. The methodology used in this research consists of two phases. In the first phase, a literature review and interviews with various construction professionals were conducted in order to identify the interface problems among them. In the second phase, a questionnaire was developed that included the identified interface problems obtained from the first phase to evaluate the severity of the identified interface problems. The relative severity of the categories and their related problems were determined and then ranked according to a severity index

The study concluded that there were 19 common interface problems, which were classified into four categories: financial problems, inadequate contract and specification, environmental problems, and other common problems. Three categories were found to have a ‘‘severe’’ effect which are, the financial, the inadequate contract and specification and the other common problems category; while the remaining category, the environmental problems category, was rated ‘‘moderately severe.’’ Fourteen of the detailed common problems were evaluated as ‘‘severe,’’ while the remaining five were evaluated as ‘‘moderately severe.’’ Furthermore, this study presents additional common problems obtained from the survey.

1.9 Conclusion:

Comments on previous studies and articles:

a. All previous studies indicated the importance of interface management for organizations.
b. Some previous studies are studying the interface management in construction sector such as Chen et al. (2007), Klakegg (2009), Pavitt and Gibb (2003), Chen et al. (2009), Siao et al. (2011); some of the previous studies are studying the interface management in the project management field such as Mortaheb and Rahimi (2010), Chan et al. (2005);while other previous studies studying the interface management in the organizations such as Apedaile (2004).
c. The previous studies stated that interface management in every phase is very necessary.

However this research:

a. This research differs from the previous studies in the following points:

1. Focuses on the water sector in Gaza strip with its own problems, where these problems affect the interface management in this sector.
2. Assesses the management of interface between Palestinian Water Authority and Costal Municipalities Water Utility for the water sector in Gaza Strip.

b. This research benefits from the previous studies in the following points:

1. Writing the theoretical framework of this research.
2. Developing the research variables.
3. Compare and analyze previous studies to this study.

Chapter 2

Literature Review of interface management

2.1 Introduction:

This chapter contains the literature review for the topics of the research. This literature is used by the researcher as a knowledge background to understand the context of the research. This chapter consists of six sections; first section discussed the concept of management of interface and its classifications, the second section discussed the communication mechanism and style and its process, the third section discussed the coordination process and its mechanisms , the fourth section discussed the clarity of roles and responsibilities and its allocation, fifth section discussed financial management and its role, sixth section discussed the concept of skills and its classification.

2.2 Interface management overview:

2.2.1 Defining the Interface:

The word interface first appeared in the field of engineering technology. Afterward, Interface was introduced into computing, materials physics and materials chemistry, and principles of management to study the communication mechanism between departments. Interface reports to the parting surface between two objects, the port or border of two single objects, or the mutual connection and interaction between two things (Abou Najm & El-Fadel, 2004; Yu-de & Zhao-hui, 2010).

From the point of view of Management, considering the proper reflection of interface of the bonding state between two objects and the connections between elements, management scholars have introduced the concept of interface, which appears as primary form of interface management. In management science, the connotation and extension of interface are both broadened; interface not only expresses the link condition between different functional departments, but also reflects the connecting state between different process flows, and even describes the relation between human and material, human and human. Interface is not only a state of being, but a dynamic development process(Gupta & Wilemon, 1988; Yu-de & Zhao-hui, 2010)

However, from the literature review, there are many different definitions of the interface. The interface is the contact point between relatively autonomous organizations which are interdependent and interacting to achieve some larger system objectives"(Wren, 1967). The term interface carries four meanings. The following are derived from dictionary definitions (Wideman, 2003):

- "The functional and physical characteristics required to exist at a

common boundary or connection between persons, or between systems, or between persons and systems.

- Area, surface or function providing and regulating contact between two elements of a system.
- A common physical or functional boundary between different organizations or contractor's products. It is usually defined by an interface specification and managed by a system integration organization.
- A collection of operations that are used to specify a service of a class or a component".

The interface is a link at the boundary between two socio-technical sub-systems that is generated in the context of the division of labor, whereas the two sub-systems perform tasks and processes in common within an overall system (Apedaile, 2004; Lawrence Paul & Lorsch Jay, 1967) . The interface is a dimension between two firms or organizations that can mutually influence each other (Mortaheb & Rahimi, 2010).

In conclusion, interface was firstly applied in engineering technology to describe the interface between different instruments, equipment, parts and other units; after that it was introduced to management field in recent years to study the relationships between different organizations, different departments within one organization or different people.

2.2.2 Classification of the Interfaces

There are many categories relating to inter-organizational interfaces in the literature.Healy (1997) proposed general categorization of interface that can be "internal", if the work conducted is done with one organization, or "external", if different organizations collaborate. Also,Morris (1983) proposed two main interface types: static interfaces and dynamic interfaces. While, Stuckenbruck (1983) and Mortaheb and Rahimi (2010) proposed three main interfaces: personal interfaces, organizational interfaces and system interfaces. In addition,Healy (1997); Siao and Lin (2011); Stuckenbruck (1983); Wren (1967) proposed four main interfaces as follow:

- ***Time interfaces*** that are triggers conditioning the transition from a certain kind of activity to another,
- ***Geographical interfaces*** that separate on-site and off-site work,
- ***Technical interfaces*** that set the limits of a system's sub-components,
- ***Organizational interfaces*** that keep human groups or persons apart.

Pavitt and Gibb (2003) proposed three main interface types: physical interfaces, contractual interfaces, and organizational interfaces. Physical interfaces are the actual physical connections between two or more building elements or components; contractual interfaces are the groupings of work elements into distinct work packages to suit the availability of the design information; organizational interfaces are the interactions between various participants in a construction project.

Critsinelis (2001) and Chen et al. (2009) pointed out that interfaces were often complex and varied in level, criticality and nature in offshore construction. Accordingly, three inter-related interface categories were defined as:

- ***Intrinsic Interface*****: "**Related to the physical links existing in an established production system concept among the various components." Based on such a description, the intrinsic interface appears closely equivalent to the above-introduced physical interface.
- ***Discipline Interface*****:** "Related to the areas of knowledge necessary to engineer to develop studies, analyses, designs, investigations and developments sufficient and necessary for the concept, and detailed engineering of the production system and its components." Without this description, the term "*discipline interface*" creates confusion. It may be regarded as a general interface among disciplines (or trades), which does not remain at the knowledge level.
- ***Project Interface*****:** this is driven by the contracting strategy, which exists among contractors, subcontractors, vendors and any external provider, with regard to their scope of work, schedule and responsibilities. According to the description, this category may be equal to the aforementioned contractual interface.

Laan (2000) revealed that interfaces of a transport infrastructure project can be identified as completely as possible by viewing the system from three perspectives, which lead to three decompositions: 1) functional decomposition, 2) physical decomposition, and 3) the top level requirement decomposition (organizational). The physical decomposition helps identify physical interfaces; the top-level requirement decomposition facilitates the representation of organizational interfaces because relevant requirements are located to the organizational segments; the functional decomposition is the decomposition of functions necessary for the performance of the main function; then relations between the sub-functions are the functional interfaces. It is further stated that the sub-functions are

allocated to the responsible organizational segments. Thus the functional interfaces also contain contractual interfaces when sub-functions are grouped into separate workpackages and subcontracted out. In addition, when defining the responsibilities allocated to the "operator" contract and the "systems" contract, also, he indicated that "these have the character of functional interfaces, as they consist of the functional requirements for the infrastructure, and the restrictions of the infrastructure upon the operators."

Chen et al. (2009) defined four main interface categories: physical, functional, contractual/organizational and resource interfaces.

- ***Physical****:* physical interactions between two or more facility elements or components.
- ***Functional****:* requirements/influences presented by one facility functional element/system upon another functional element/system.
- ***Contractual/organizational****:* interfaces among various parties involved in a construction project. Contractual interfaces comply with contractual obligations among parties, including divisions in a company, who do not have contractual relationships.
- ***Resource interfaces****:* interfaces between equipment, labor, materials, space or information necessary to design and construct a facility and its components.

Apedaile (2004) and Winkler and Pichler (2011) classified the interface problems between the organizations as organizational, personnel, cultural, procedural and technical interface problems.

- ***Organizational interface*** *problems* often occur due to cross-functional task performance between organizations and the subsequent concentration on core competencies. This leads to unnecessary complexity, loss of joint objectives, and confusion of responsibility between partners and barriers to knowledge. Complexity increases in relation to the number of partners at the inter-organizational interface, because the divided tasks must be matched and performed economically. Partners can fail to meet joint objectives because of a lack of leadership from management and a lack of coordination at the interface. Accordingly, the interacting partners can lose the sight to their overall goal. The confusion of responsibility between organizations can create problems for executing tasks and processes because inter-organizational interfaces are

inadequately planned. Uncertain responsibilities inevitably lead to overlaps in decision-making duties and disrupt processes at the inter-organizational interface. Furthermore, vital knowledge or information can be obscured due to structural, procedural, political and technical barriers at the inter-organizational interface.

- ***Personnel interface problems*** in inter-organizational relationships originate from capability and willingness barriers. These problems result in conflicts, organizational thinking as well as uncertainty and mistrust. Conflicts occur through mutual influences of the interacting partners or if the partner's objectives are contrary. Therefore, conflicts can lead to entrenched opinions or objectives and insufficient communication between organizations. Organizational thinking can arise when employees fail to recognize and solve problems between the interacting organizations, or from a fear of a loss of control to the partner. This leads to insufficient communication and the absence of information transparency at the inter-organizational interface. Uncertainty and mistrust between the partners occur if they have negative expectations for the collaboration, for instance, due to information that was communicated incorrectly or incompletely. Uncertainty and mistrust often lead to tasks being insufficiently completed in the thoughts, feelings and actions of the interacting partners.
- Additionally, ***cultural interface problems*** can originate from differences in the qualifications of each partner's employees. This can result in misunderstandings, incompatible objectives, the misinterpretation of facts and conflicts between organizations.
- ***Procedural interface problems*** can emerge as a result of cross-functional task performance in which a transfer of goods and/or information at the inter-organizational interface is necessary. During the transfer of goods and information, quality-control problems can emerge which negatively affects the interaction between organizations.
- ***Technical interface problems*** emerge due to non-integrated communication and data transmission systems between organizations, which lead to a media discontinuity at the inter-organizational interface. Media discontinuities often require data and information to be reformatted to be compatible with different systems and formats. Consequently, additional workloads and/or transmission

errors can occur. Moreover, interruptions in the flow of materials may originate in inter-organizational relationships because of incompatible technical systems.

In both research and practice, it is hard for people to follow the strict and complete interface categorization when they approach interface issues. They often recognize where interface issues usually occur and then start from there for improvement. Such scattered improvements make some progress in interface management. But the overall performance remains poor because of other unattended interface issues (Chen, 2007).

2.2.3 Interface management

Based on the definition and classification of the interfaces, there are many interfaces between different organizations. Thus, the concept of interface management becomes important, and has been proven to address inter-organizational complexity and allows for a dynamic and well-coordinated inter-organizational system (Chen et al., 2008). The critical relationship between interface management and inter-organizational success is developed so constantly in literature (Mortaheb & Rahimi, 2010; Pavitt & Gibb, 2003).

Ku (2000) proposed five different perspectives in order to analyze interface management, namely, "contract interface", "technology interface", "monitor interface", "execution integration interface", and "the interacting behavior in the interface". Pavitt and Gibb (2003) and Lin (2009) proposed interface management procedure includes interface finding, interface identifying, interface communicating, interface recording, and interface closing. Each phase is briefly outlined in the following table:

Table (2.1): Proposed interface management

Phase	Description
Interface finding	Interface finding is the checking for new or existing interface events.
Interface identifying	Interface identifying ensures that the identified interfaces are consistent with all relational participants.
Interface communicating	Interface communicating is the process of requesting, responding to and tracing processes among relational participants.
Interface recording	Interface recording is all information recording processes related to identify interface event.
Interface closing	Interface closing is the final closing action when the interface event is reconfirmed without further identification or tracing

Source: Pavitt and Gibb (2003) and Lin (2009)

While, Chan et al. (2005) proposed an interface management procedure consisting of four steps:

1. Identify interfaces.
2. Simplify interfaces.
3. Prioritize interfaces.
4. Match interfaces.

2.2.4 The evolution of Interface Management:

Interface management is a very new concept in many industries. Interface management is not uniquely defined and usually varies based on an industry's characteristics and management needs (Chen, 2007).

According to (Kelly & Berger, 2006) , interface management was first identified as a key deficiency or contributor to several large-scale plant accidents only during the 90s of the last century. A holistic examination of several incidents from a large incident database enabled this single item to be pinpointed as a weakness and an opportunity. From this examination, it is clear that given the significance of human involvement in most operations, it is important that interactions between people be managed and carefully coordinated to avoid incidents resulting from misunderstandings and lack of information. Interface management is a key component of effective leadership in any organization. The following noteworthy incidents serve to illustrate where interface management contributed to an incident.

(A) An oil refinery had authorized contract maintenance workers to conduct weld repairs to a steel tank within a surrounding berm. A hot work permit was issued and the area was flagged off. Work commenced when conditions in the field were verified as safe. Soon afterwards, a process supervisor elsewhere in the refinery dispatched an operator to the tank farm to swing light product hydrocarbon rundown to a tank adjacent to the one being repaired. Valves were opened causing the level to slowly rise in the tank. Although the tank was covered with a cone roof and surrounded by a berm, vapors were emitted from a roof vent and blew into the adjacent tank lot. An ignition and flashback occurred causing the source tank to explode and killing two maintenance workers. Clearly, the interface between maintenance and process activities was not coordinated and the hazards were not recognized or communicated to the workers.

(B) A loud thud was heard outside a chemical plant late at night. A news reporter called the plant switchboard to inquire about the cause and was placed in contact with a supervisor in the packaging plant. The supervisor explained that a pallet had fallen off the back of a loading ramp and that there was no danger to any workers or to the general public. He then took the opportunity to explain how safety was managed on his shift and how well he performed his job. Meanwhile, in another part of the operation, a relief valve had lifted on a reactor circuit causing highly toxic material to flow into a diversion ditch. This was likely the noise that had been heard from outside. As the emergency situation escalated, the diversion ditch overflowed into a main river. The area supervisor followed protocol and attempted to contact the media to issue a public warning. The media ignored the call because they had already been informed of the safe status of the operation.

Effective interface management could have prevented the above incidents. Interface management starts with clear and concise job descriptions. It identifies what workers at all levels are expected to do and what they are not permitted to do. It clarifies the chain of command from top to bottom (Kelly & Berger, 2006).

The concept of interface management would appear to have had little exposure in general management literature and construction research in particular, evident by the limited publications and time gaps between same. Wren (1967) developed the concept of interface management to review the relationships between two or more organizations, thus indicating the issues which arise from people and processes. The organizational interface is the contact point between organizations which, in one sense, are independent of each other, but which interact and become interdependent to achieve a common goal (McCarney & Gibb, 2012).

However, there are different definitions of Interface Management available from the literature. Archibald (2003) believed that the basic concept of interface management is that the project manager plans, schedules and controls are the key interface events on the project, while the responsible functional project leader manages the tasks or work between these interface events. Meredith and Mantel Jr (2011) and Baker and Baker (1992) defined it as “managing the problems that often occur among people, departments, and disciplines rather than within the project team itself”. Wideman (2003) defined Interface management as the “management of communication, coordination, and responsibility across a common boundary between two organizations, phases, or physical entities which are

interdependent"; also, he provides another similar definition for interface management: "managing the problems that often occur among people, departments, and disciplines rather than within the project team itself."

Mortaheb and Rahimi (2010) used the definition of interface management within oil refineries mega projects as "the management boarders and boundaries between different project players, including designers and Contractors, Contractors and sub-Contractors, Owners and Licensors, Owners and designers, Owners and Contractors as well as common interface problems among various construction parties to enhance management of the resources, costs, schedules, safety, risks, contracts, and systems in order to create a dynamic, organized, and active environment during project execution of oil refineries mega projects".

Siao et al. (2011) believe that the interface management is "the management of the boundaries among project entities (people/participants, processes/phases, resources, contracts, costs, schedules, systems/functions, and safety/risks) to enable a dynamic and well-coordinated construction system".

Healy (1997) argued that the interface management is just to do the communication works. Therefore, interface management is to make the communication and control for the interface issues by the systematic procedure. Also, he defines interface management in the context of project as "a boundary where an interdependence exists across that boundary and where responsibility for the interdependency changes across that boundary". Thus, interface management is the systematic control of communications that support process operations.

Kelly and Berger (2006) believe that the Interface Management is "a system for ensuring timely and effective communications in an operating plant". It includes all verbal and written communications between workers, contractors and the general public. It also involves communications between different levels in an organization. Walker (1996) defined interface as "a boundary across which two independent systems meet and act on or communicate with each other".

Nooteboom (2004) highlighted that the management of interface refers to common boundaries between people, systems, equipment or concepts. Chen et al. (2007) defined interface management as "the systematic approach to dealing with complex

interrelationships or interactions among various project entities such as people, building components, and subsystems".

The researcher uses the definition of Wideman (2003) "the management of communication, coordination, and responsibility across a common boundary between two organizations, phases, or physical entities which are interdependent", and add to it two categories which are management of financial resources, and management of skills.

2.3 Communication mechanism and style

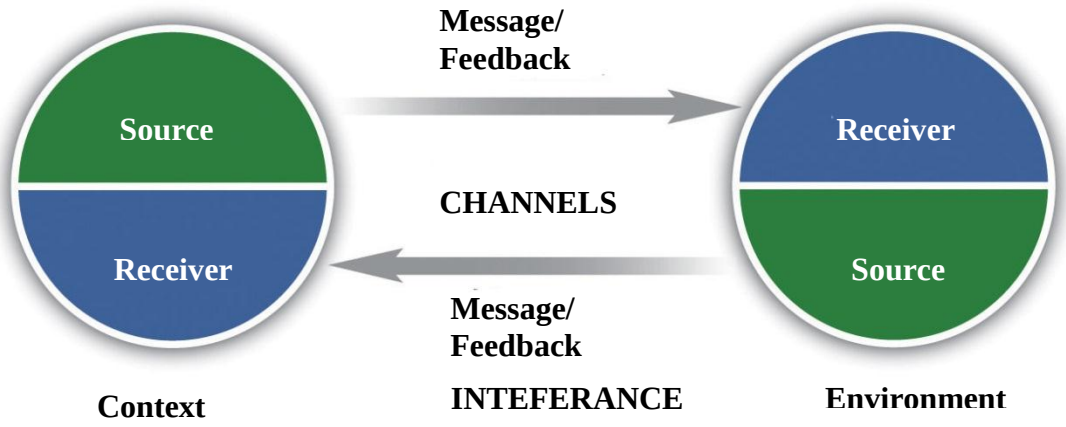
2.3.1 Defining the communication:

It is not possible to have good human relations without communication. On the other hand effective communication is required not only for human relations but for a good and successful business (Spaho, 2011). There are several approaches and definitions to communication; In general, communication may simply be defined as the process whereby persons or groups send messages to each other; Communication, by this definition, is a process by which information is exchanged for the purpose of achieving a shared understanding (Moore, 2013, p. 54). As a rational and goal-directed human behavior, communication can be defined as ''the process by which information is exchanged and understood by two or more people''(Turker, 2014). In a broader sense, the term means ''the relational process of creating and interpreting messages that elicit a response''(Griffin, 2012, p. 6).

2.3.2 The communication process:

Communication occurs when one person (or more) sends and receives messages that are distorted by noise, occur within a context, have some effect, and provide some opportunity for feedback (DeVito, 2012, p. 7). Figure 2.1 illustrates the elements present in all communication acts, whether intrapersonal, interpersonal, small group, public speaking, organizational or mass communication—or whether face to face, by telephone or over the Internet.

Figure 2.1: Basic Communication Model



Source: (McLean, 2010)

The communication process that is 'uni-directional' (does not have a way for feedback from the receiver) is defined as one-way communication. The process that is bi-directional (allows feedback from the receiver) is defined as two-way communication. A two-way communication process enhances the engagement between the sender and receiver and increases the probability of correct interpretation (Tehemar, 2014, p. 18).

2.3.3 The Essential Components of Communication:

In order to better understand the communication process and how it provides a foundation for group communication, it should be broken down into eight essential components. Each component serves an integral function in the overall process (McLean, 2010).

1. **Source:**

The source of the communication is the sender. The sender must know why the communication is necessary and what result is needed (MTD-Training, 2012, p. 12). The source imagines, creates, and sends the message, conveys the message by sharing new information with the audience. The speaker begins by first determining the message, what they want to say and how they want to say it. The next step involves encoding the message by choosing just the right order or the perfect words to convey the intended meaning. The third step is to present the information, sending the information to the receiver, audience, or group members. Finally, by watching for the audience's reaction, the source perceives how well they received the message, and responds with clarification or supporting information (McLean, 2010).

2. Message

"The message is the stimulus or meaning produced by the source for the receiver or audience. In addition, part of the message may be the environment or context you present in and any noise which may make your message hard to hear or see.

3. Channel

"The channel is the way in which a message or messages travel between source and receiver". When you speak or write, you are using a channel to convey your message. Spoken channels include face-to-face conversations, speeches, telephone conversations and voice mail messages, radio, public address systems, and voice-over-internet protocol (VOIP). Written channels include letters, memorandums, purchase orders, invoices, newspaper and magazine articles, blogs, e-mail, text messages, tweets, and so forth.

4. Receiver

"The receiver receives the message from the source, analyzing and interpreting the message in ways both intended and unintended by the source."

5. Feedback

When you respond to the source, intentionally or unintentionally, you are giving feedback. Feedback is composed of messages the receiver sends back to the source; verbal or nonverbal, all of these feedback signals allow the source to see how well, how accurately or how poorly and inaccurately, the message was received. Feedback, also, provides an opportunity for the receiver or audience to ask for clarification, to agree or disagree, or to indicate that the source could make the message more interesting. As the amount of feedback increases, the accuracy of communication increases.

6. Environment

"The environment is the atmosphere, physical and psychological, where you send and receive messages". The environment can include the tables, chairs, lighting and sound equipment that are in the room. The room itself is an example of the environment.

7. Context

"The context of the communication interaction involves the setting, scene and expectations of the individuals involved". A professional communication context may involve business suits (environmental cues) that directly or indirectly influence expectations of language and behavior among the participants.

8. Interference

Interference, also called noise, can come from any source. "Interference is anything that blocks or changes the source's intended meaning of the message". Noise interferes with

normal encoding and decoding of the message carried by the channel between source and receiver (McLean, 2010).

2.3.4 Communication Barriers

According to Moore (2013, p. 14), there are five common types of communication barriers as following:

- Organizational structure: hierarchy vs. horizontal, available technology.
- Intrapersonal factors: personality, level of knowledge and emotional state.
- Interpersonal factors: perceived credibility of sender by the receiver.
- Channel choice: match the medium to the message goals
- Lack of feedback: sender depends on feedback to judge success of communication.

2.3.5 Types of Communications:

Communications can be classified into different types based on a criterion. Based on the "level" "criterion" Communication is frequently divided into the following levels (Baker, 2009):

- **Interpersonal communication**: communication between two persons or among a small group of persons (DeVito, 2012, p. 2). Interpersonal communication is real-time, face-to-face or voice-to-voice conversations that allow immediate feedback. Interpersonal communication plays a large role in any daily activities, especially in organizations that use teams (Saleh, 2012).
- **Group level communication**: it involves three or more persons, though communication scholars are inconsistent as to the top end of the number scale. The smaller the number in the group, the more closely this mode resembles interpersonal communication. Often group communication is done for the purpose of problem solving or decision making. Example: University study group (Smith, 2010).
- **Organizational level communication:** organizational communication is a process of information exchange and decision making between the sender and the receiver with the consequence of positive result in raising efficiency of at least one of them, and that organizational communication is a central binding force that permits coordination among people and thus allows organized behavior (Spaho, 2011).
- **Inter-organizational level communication:** it is the exchange of meaningful information through established relationships between two or more organization

within an inter-organizational collaboration framework. It's a frequent exchange of plans, programs, goals, expectations and performance evaluations; because such frequent exchanges of information is critical for coordinating actions, preventing misunderstandings from arising, resolving disputes and making each party more confident in the relationship and more willing to make an effort keeping it alive (Hald, 2005).

- **Mass communication:** it is a more public form of communication between an entity and a large and diverse audience, mediated by some form of technology. This may be either real time or on a taped-delay basis or it may be rooted in the usually recent past. Examples: Radio and television, newspapers and magazines (Smith, 2010).

2.3.6 Patterns/ mechanisms of Communication

Communicators send and receive messages that are both internal and external to their organizations. Some of these messages are formal, others are informal. Some messages are work related; others are personal (Krizan et al., 2010, p. 6).

2.3.6.1 *Internal Communication Patterns*

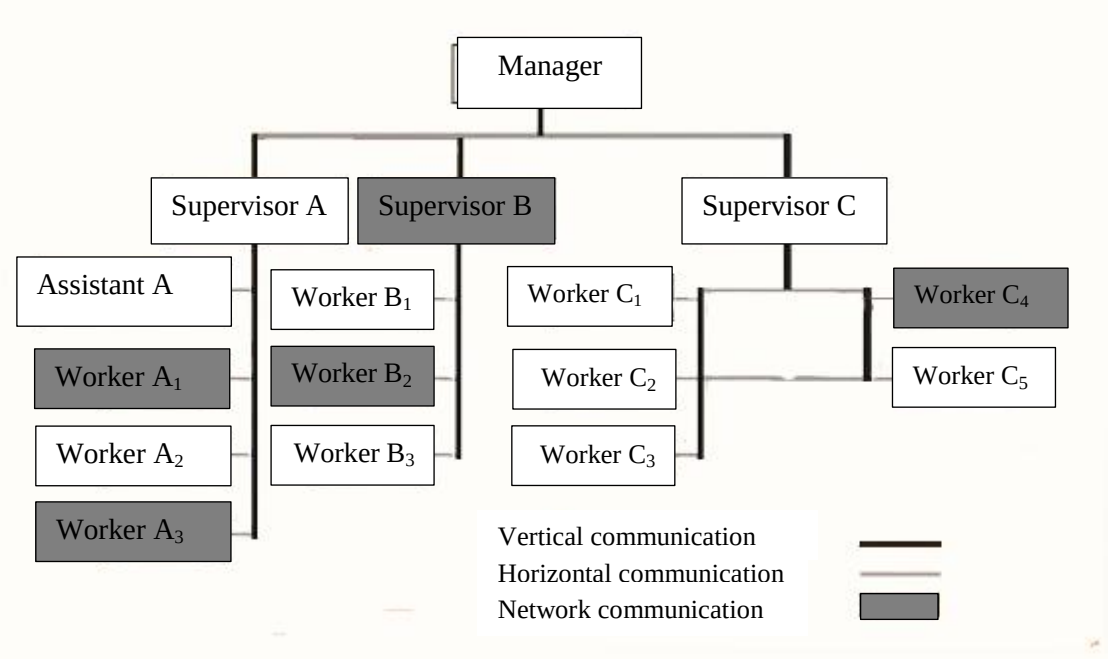
Internal communication includes exchanging ideas and messages with superiors, coworkers, and subordinates. Some of the functions of internal communication are to issue and clarify procedures and policies, inform management of progress, develop new products and services, persuade employees or management to make changes or improvements, coordinate activities and evaluate and reward employees(Guffey, 2008, p. 15).

Organizational communication can flow vertically, horizontally, or through a network. In vertical communication, messages flow upward or downward along a path referred to as the "chain of command." Reports and proposals commonly follow an upward path; policy statements, plans, directives, and instructions typically follow a downward path. Horizontal communication flow occurs between workers or units of comparable status who need to share data or coordinate efforts. In network communication, information flows freely among those who have a link that goes beyond the participants' role or unit within the organization. Members' roles or status within the organization will generally have the greatest influence in vertical communication and the least influence in network communication.

A network may be a planned part of the organization operations or it may arise from informal interactions. An example of a planned network is a project team formed to computerize a process. An informal network could consist of employees who share interests outside the workplace. Organization-based informal networks, such as company-sponsored softball teams, can be powerful. Members can discuss work related issues outside the traditional communication structure, and then combine efforts to influence the direction of the organization. Personal networks, such as those consisting of friends and relatives, classmates, faculty, current and former employers and current and former coworkers, are important sources of professional and personal support (Krizan et al., 2010, p. 6).

Figure 2.2 shows the communication patterns:

Figure 2.2: Organizational Communication Patterns



Source: (Krizan et al., 2010, p.7)

Formal Communication

Formal communication is business related, and can be written (memo, report, policy) or oral (speech, meeting). Most organizations keep written records of formal oral communication, copies of speeches, minutes of meetings. Formal communication is characterized the following:

• Planned by the organization.

• Flows in all directions.

• Essential for the effective operation of the business (Krizan et al., 2010, p. 7).

Informal Communication

Informal communication sometimes referred to as a *grapevine*, consists of both business-related and personal information. Rumors about company expansion and discussion about a popular TV show are two examples of such communication. Most informal communication is oral, but widespread use of e-mail has made informal written communication more popular. Informal communication is characterized the following:

• Not planned by the organization.

• Flows in all directions.

• Develops and maintains positive human relationships (Krizan et al., 2010, p. 7).

Serial Communication

Much of the information flows vertically and horizontally within an organization, and involves three or more individuals. For example, job instructions are developed by managers and transmitted to the supervisors who report to them; the supervisors, in turn, transmit the instructions to the workers under their direction. This communication pattern is called serial communication**.** In serial communication, messages are usually changed- sometimes dramatically- as they are sent from one member of the chain to another. Because each sender may omit, modify, or add details to the message as he or she relays it, special precautions are necessary. Four techniques will assist in maintaining the accuracy of and achieving understanding with serial communication:

Senders should	**Receivers should**
• Keep the message simple	• Take notes
• Request feedback	• Repeat the message

Although serial communication is typically oral, e-mail has increased its presence in written form. The ability to forward messages without paraphrasing them minimizes or eliminates the distortion customary in oral serial messages. However, this advantage is lost when those who receive the message add to or comment on it before passing it along. Having to read the additional information can place a burden on the receiver (Krizan et al., 2010, p. 8).

2.3.6.2 *External Communication Patterns*

External communication flows between an organization and the entities with which it interacts. Companies have many external contacts such as customers, suppliers, competitors, the media, governmental agencies and the general public. These contacts may be domestic or international. The information that flows between an organization and its external receivers can be either written or oral. Letters, reports, orders, invoices and web pages illustrate external written communication; telephone calls and radio or television advertisements are examples of external oral communication.

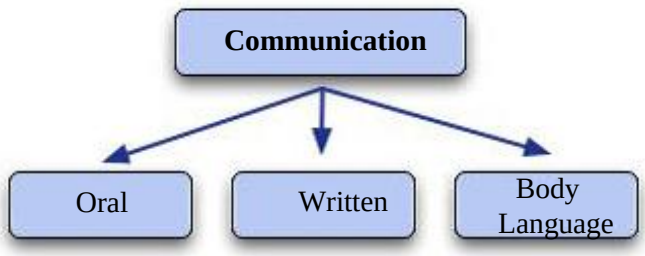
Although external communication is typically formal, it may occur informally as well. Whenever an employee comments about work-related matters to someone not affiliated with the organization, informal external communication occurs. The external audience could be a neighbor, a friend, someone to whom the worker has just been introduced at a party or someone who accidentally overhears a conversation. Employees represent their organizations both on and off the job; therefore, they should demonstrate good communication skills in their professional and social interactions.

Literally thousands of formal and informal communications take place every day. Effective communication enhances both individual and organizational success (Krizan et al., 2010, p. 9).

2.3.7 Forms / styles of Communication

Based on the "method" of communicating, communications can be classified into two broad categories: (1) Verbal Communications. (2) Non-verbal Communications. Verbal Communications relies on using words and language either through speaking and listening (Oral Communications), or through printed or e-forms (Written Communications) (Saleh, 2012).

Figure 2.3: General Categories of Communications



Source: (Saleh, 2012)

The most common methods of communication are carried out orally or in writing; but, when it comes to management techniques, the power of non-verbal communication must never be underestimated. Your smile, your gestures and several other body movements send out a message to the people around you. You need to be mindful of this while dealing with your colleagues, supervisors, employees and clients (Saleh, 2012).

When to Use Written versus Verbal Communication:

Erdogan (2009) highlights the main uses of written and verbal communication components as following:

Use written communication when:

- The message needs to become part of a permanent file.
- There is little time urgency.
- You do not need immediate feedback.
- The ideas are complicated.

While, use oral communication when:

- Conveying emotion and feelings.
- The message does not need to be permanent.
- There is time urgency.
- You need immediate feedback.
- The ideas are simple or can be made simple with explanations.

Table (2.2) illustrates the forms / styles of communication and their advantages and disadvantages.

Table (2.2): Forms / styles of Communication

	Forms	Advantages	Disadvantages
Oral Communication	Phone call	Immediate feedback	No permanent record
	Conversation	Nonverbal clues	Expression may be careless or imprecise
	Interview	Warm feeling	
	Meeting	Forceful impact	May be inappropriate for formal or complex ideas
	Conference	Multiple input	
Written Communication	Announcement	Permanent record	Leaves paper trail
	e-mail, memo, fax	Convenience	Requires skill
	Letter	Economy	Requires effort
	Report, proposal	Careful message	Lacks verbal cues
	Newsletter	Easy distribution	Seems impersonal
	PowerPoint presentation		
	Resume		

Source: (Guffey, 2008, p.18)

2.3 Coordination:

2.3.1 Defining coordination

Coordination is one of the two main principles of management. The first one is differentiation which relates to the division of a system into several components that then have to be coordinated to work as a whole (Daub, 2009, p. 69). According to literature, coordination has several definitions; at a very basic level, it means to bring different parts together to form an interrelated whole(Jordan & Schout, 2006, p. 40). Others have used more elaborate definitions such as *"Coordination is managing dependencies between activities"* (Chen et al., 2009; Liu & Yu, 2006; Olson et al., 2013, p. 10; Schumacher, 2001). Abebe and Kalinina (2012) defined coordination as "harmonizing of different specialized contributions of participants to accomplish a common task".

Although it is in many ways a common sense term, there is a need for a clear definition of coordination. Two of the most direct and most generally applicable definitions of coordination in the policy and administration literature are that coordination (Bouckaert et al., 2010, p. 15):

is" the extent to which organizations attempt to ensure that their activities take into account those of other organizations", and the second one is" mutual adjustment between actors or a more deliberate interaction produces positive outcomes to the participants and avoids negative consequences".

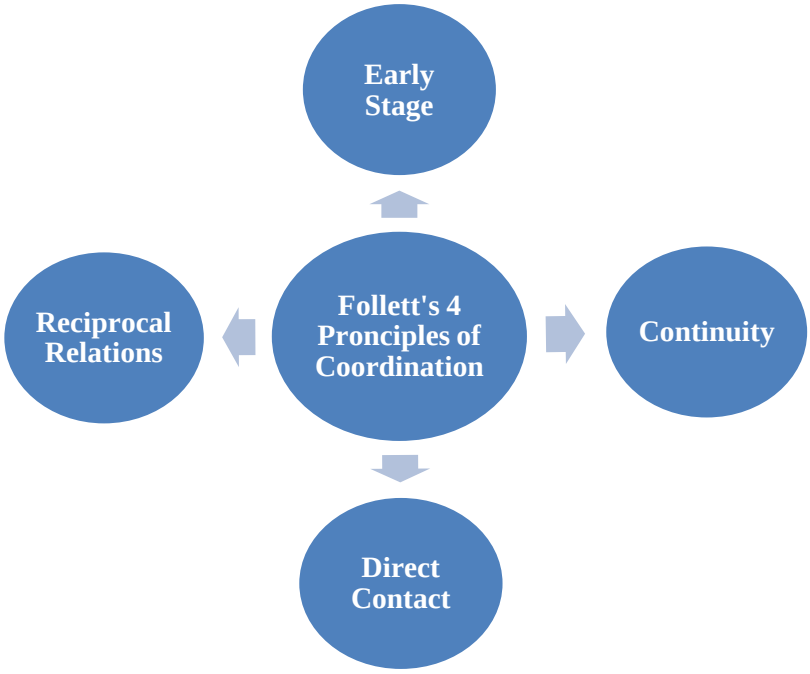
2.3.2 Principles of coordination

Follett , the prophet of Management, paid much attention to the function of organizing and coordination, and she thinks that organizing is controlling and controlling is coordinating; then, she puts forward the 'four principles' of organizing and coordinating (Jiang, 2012; Mourey, 2009):

1. Coordination as the reciprocal relating of all the factors in a situation, which is the principle of integral relevance, and it means that the essence of coordination is the interrelation of all the elements of an organization in a certain environment.
2. Coordination by direct contact of the responsible people concerned, which is the principle of direct relation, and it means that all the directors of each department interrelate by direct contact and then continually adjust their own behaviors. This kind of coordination is a process of mutual penetration which can make the organization become a harmonious and unified whole.

3. Coordination in the early stage which is the principle of the initial stage. She thinks that one way of resolving the resisting activities on the implementation of policies is to request the directors to discuss the solutions and advices of some questions before making suitable policies.
4. Coordination as a continuing process: the principle of continuity which means that coordination should work continuously all the time.

Figure 2.4: Mary Parker Follett's four principles of coordination



Source: Jiang 2012; Mourey 2009

2.3.3 Inter-organizational coordination

The concept of coordination has several dimensions(Chen et al., 2009; Lie, 2011):

1. Coordination within an organization.
2. Coordination between several organizations.

According to the previous definition of coordination, 'coordination is managing dependencies'. There are two categories of dependencies that must be managed in inter-organizational relationships which are concerning competitive or shared resources and those concerning sequential added value or organizations relationships. Dependencies concerning *competitive resources* occur between organizations that share some limited resource. *Sequential relationships* occur when one organization produces something that is

used by another organization. The producer activity must be completed before the consumer activity can begin (Hengst & Sol, 2001).

Hengst and Sol (2001) argued that, even there are six aspects that influence the way in which the inter-organizational coordination can be carried out and these are homogeneity, specificity, time pressure, value, frequency, and uncertainty, there is one aspect, the relationship of trust, that is often mentioned in the literature and that is not explicitly taken into account. The reason for this is that trust is considered a result of the aspects of the good or service: for high value goods or services that are under time pressure, that have a high frequency, and for which the level of uncertainty is high, trust is considered to be important. Long term arrangements prevail over short term arrangements to build a relationship of trust.

An inter-organizational coordination process involves the establishment of decision-making rules, policy discussions, exchanges of information and decision making. These, in turn, will also impinge on intra-organizational decisions and actions. Some issues, such as food safety issues, require inter-organizational coordination because there are always several organizations involved. Failure to coordinate may produce adverse outcomes (Bakvis et al., 2004; Lie, 2011).

Lie (2011) categorized coordination in terms of outcome, and said that coordination may be weak, medium or strong. Weak coordination means that inter-organizational decisions do not affect intra-organizational decisions or actions. Strong coordination, on the other hand, means that inter-organizational decisions do affect intra-organizational decisions and actions. Medium coordination means that inter-organizational decisions only affect some intra-organizational decisions and actions. And he argued that, strong inter-organizational coordination requires five elements which are:

1. A clear division of labor between ministries, and between ministries and the relevant agency. An unclear division of labor increases the likelihood of overlap or grey zones, which make coordination difficult.
2. Arenas in which civil servants may establish decision-making rules, exchange information, discuss policy and make decisions.
3. Organizations should not have significantly conflicting goals because such conflict may impede coordination.
4. Active leadership.

5. A clear obligation both to participate in inter-organizational coordination processes and to make them work efficiently.

2.3.4 Coordination mechanisms:

Ebner (2014, p. 47) defined the mechanisms of intra-organizational coordination as “any administrative tool for achieving integration among different units within an organization. While, Liu and Yu (2006) defined the inter-organizational coordination mechanisms as "a series of rules or norms adopted by participant organizations when managing the inter-organizational transactions".

1. Intra-organizational mechanisms:

Coordination mechanisms can generally be classified into two types: formal and informal mechanisms. The formal mechanisms are established intentionally and in a conscious way; and, informal mechanisms coordinate the individuals of an organization in a more spontaneous manner (Ebner, 2014, p. 48).

The study of coordination mechanisms has been changing over the last few years. While especially more formal mechanisms had been focused, today there is more and more appreciation of the more subtle and informal forms of coordination, such as acculturation and informal communication networks. Every organization has a certain degree and combination of specialization and differentiation among its units that longs for some kind of coordination across them. This is especially true for large companies (Ebner, 2014, p. 48).

In table (2.3) a summary of the major kinds of coordination mechanisms, put together from different organization theory scholars. As already mentioned before, they are divided into structural and formal mechanisms, and less formal and more subtle mechanisms.

Table (2.3): List of the most common mechanisms of coordination

List of the most common mechanisms of coordination
Structural and formal mechanisms 1. Departmentalization or grouping of organizational units, shaping the formal structure. 2. Centralization/decentralization of decision making through the hierarchy of formal authority. 3. Formalization and standardization: written policies, rules, job descriptions, and standard procedures, through instruments such as manuals, charts, etc. 4. Planning: strategic planning, budgeting, functional plan, scheduling, etc. 5. Output and behavior control: financial performance, technical reports, sales, and marketing data, et., and direct supervision. **Other mechanisms, more informal and subtle** 6. Lateral or cross-departmental relations: direct managerial contact, temporary or permanent teams, task forces, committees, integrators, and integrative departments. 7. Informal communication: personal contacts among managers, management trips, meetings, conferences, transfer of managers, etc. 8. Socialization: building an organizational culture of known and shared strategic objectives and values by training, transfer of managers, career path management, measurement and reward systems, etc.

Source :(Ebner, 2014, p.49)

2. Inter-organizational mechanisms:

The three most common known mechanisms of coordination are hierarchies, markets, and networks mechanisms (Jordan & Schout, 2006; Lie, 2011). Hierarchies, markets and networks may all contribute to coordination (Verhoest et al., 2007).

First, coordination through a *hierarchy* involves political and administrative leaders using instrumental authority to ensure control and to guide the formulation and achievement of goals. Such hierarchical coordination involves formulation of goals, budgeting, contracting, communication systems, formal reporting and hierarchical planning (Lie, 2011).

Vertical and horizontal

The conceptual distinction between vertical and horizontal coordination is particularly important in this context. Horizontal coordination refers to forms of coordination between organizations or units on the same hierarchical tier within the sector. By contrast, vertical coordination is the coordination by a higher-level organization or unit of lower-level actors' actions. In horizontal coordination, no actor can impose decisions on another actor by recourse to hierarchical authority. Therefore, horizontal coordination will have a predominantly voluntary nature, in contrast to vertical coordination. However, analytically this distinction is not necessarily straightforward (Verhoest et al., 2007).

The advantages of hierarchical coordination are lost in a world that is characterized by increasingly dense, extended and rapidly changing patterns of reciprocal interdependence, and by increasingly frequent, but ephemeral, interactions across all types of pre-established boundaries, intra- and inter-organizational, intra- and inter-sectoral, intra- and international (Jordan & Schout, 2006).

Second, coordination through a *market* involves actors exchanging goods and services through the price mechanism (Lie, 2011; Pollitt & Bouckaert, 2004; Verhoest et al., 2007). Market mechanisms, on the other hand, work rather differently. The assumption here is that the 'invisible hand' of the market will incentivizes the self-interest of participants to coordinate in a more effective way than the hard and blunt 'stick' of regulation. Advocates claim that markets do not require a conscious, organizing center. However, the market is not necessarily a realistic means of coordinating activities in all policy settings (Jordan & Schout, 2006).

Third, coordination through a *network* involves actors concluding agreements without using hierarchical instruments (Pollitt & Bouckaert, 2004). Such network coordination involves systems for information sharing, staff exchanges, inter-organizational decision-making structures and planning (Lie, 2011; Verhoest et al., 2007). Definitions and interpretations abound, but in essence, they are 'characterized by informal relationships between essentially equal agents or social agencies'. Through their informal interaction in networks, actors gradually identify common concerns and solutions to them. Coordination in networks is therefore built, above all, on trust and loyalty rather than administrative commands (hierarchy) or prices (markets)(Jordan & Schout, 2006).

Combining hierarchy and network elements creates a '*matrix structure'*, in which 'a position or subunit is subordinated to several superior units simultaneously' (Christensen et al., 2007, p. 26). Matrix structure may be:

1. Vertical or horizontal inter-organizational coordination

Inter-organizational coordination may also be vertical or horizontal (Christensen et al., 2007, p. 27). Horizontal inter-organizational coordination involves integrating tasks, distributed horizontally between several organizations at the same vertical level, such as between several ministries. Vertical inter-organizational coordination involves integrating

tasks distributed hierarchically between several organizations, such as between a ministry and a regulatory agency (Lie, 2011).

2. Formal or informal inter-organizational coordination

Formal inter-organizational coordination is linked to structural positions, and communication takes place through formal channels which are described by formal documents and organizational maps. In contrast, informal inter-organizational coordination processes are not linked to formal, structural positions, and communication occurs outside formal structures. The interaction between formal and informal inter-organizational coordination processes varies (Lie, 2011):

1. Formal inter-organizational coordination processes may supplement and depend on informal inter-organizational coordination processes working efficiently;
2. Informal inter-organizational coordination processes that are *not* compatible with formal ones may compete with them.

2.4 Clarity of roles and allocation of responsibilities

2.4.1 Role defining:

Role has been defined by a number of researchers as" a set of expectations about certain behaviors for a Specific position in a particular social context" (Bahlekeh et al., 2013). Boström et al. (2013) defined role as "the sum of norms related to a specific task or position". Armstrong and Baron (1995) noted that a role is "a set of obligations and rights one has in an organization". Bauer (2002) stated that role definitions covered the behavior aspects of work i.e. the competencies required in achieving expected levels of performance and contribution in addition to the task to be carried out or the results to be attained. Dobson et al. (2007) defined role as a "set of responsibilities possibly with a number of different authorities".

The concept of a role is concerned with what people do and how they do it to meet organizational goals and objectives .Armstrong and Baron (1995) have noted that a role stipulates the reason for existence of the incumbent in the organization. Bauer (2002) noted that role definitions had provided the basis for identifying competencies necessary to contribute to the organizational goals and mission, thus providing a basis for role clarity and motivation in an organization.

Bauer and Simmons (2000) described role as "a set of norms or expectations applied to the incumbents and the capacity in which they receive and understand information needed to perform their jobs". George (2012, p. 12) defined role as "a set of behaviors or tasks a person is expected to perform because of the position he/she holds in a group or organization". Bauer (2002) noted that role definitions cover the competencies required in achieving expected levels of performance and contribution in addition to the task to be carried out or the results to be attained. The role also allows valuing the parts people play in addition to the jobs they are required to do to meet organizational objectives. According to Whitaker et al. (2007), a role is defined as "a set of expectations or norms applied to the incumbent by others in the organization, and employees with high role clarity therefore possess a clearer understanding of their requirements".

2.4.2 Roles clarity:

Role clarity refers to the degree to which required information is provided about how the employee is expected to perform his/her job, and to the extent to which an individual receives and understands information required to do the job (Mukherjee & Malhotra, 2006). Role clarity is not only desirable in terms of customer satisfaction, but is also linked with employee's job satisfaction, organizational commitment and improved performance (De Ruyter et al., 2001).

Armstrong and Baron (1995) found that "role clarity addresses what incumbents do and how they do it in order to meet both organizational and individual objectives". Mukherjee and Malhotra (2006) noted that role clarity is the extent to which an individual receives and understands information required to do the job. Churchill et al. (1985) said that a lack of role clarity had a negative impact on job performance. Truckenbrodt (2000) reported that role clarity brought about commitment within employees, and discovered that committed employees are associated with better organizational performance.

Role clarity is "the degree to which an individual gets information about the expected results of the tasks to be done in specific terms"(Mukherjee & Malhotra, 2006). Role clarity increases the perception of being competent among individuals because they understand what they need to know, what they need to be able to do and how it will be done (Baron & Armstrong, 1998). If job roles are not clearly defined there is a possibility for individuals to assume responsibility that is not actually theirs while ignoring what they are supposed to do. This disparity between what one is supposed to do and what he/she

does creates role ambiguity and role conflict among employees (Nansubuga & Munene, 2013). Then, Role clarity can be interpreted as the lake of role ambiguity and role conflict. Role conflict is defined as a "condition of incompatible roles set for a person, and role ambiguity is lack of clarity in the set roles" (Nandal & Krishnan, 2000).

Role ambiguity is the term used when there is a lack of clarity on the part of an individual about the expectations of the organization and colleagues concerning his/ her role within the organization. Role ambiguity is most common in new positions or in positions undergoing change. The four most frequently cited instances of role ambiguity include (Wood, 2010):

1. Uncertainty about how work is evaluated.
2. Uncertainty about advancement opportunities.
3. Uncertainty about scope of responsibilities.
4. Uncertainty about others' performance expectations.

It is expected that a major work role transition such as an international assignment would have some role ambiguity. The basic under-standing is that the greater the role ambiguity, the less able individuals are to predict the outcomes of their behaviors (Wood, 2010).

Wood (2010) proposed three key areas for organizations to consider for *Reducing Role Ambiguity (i.e., improving role clarity)* which include:

1. Clear purpose and goals of the assignment.
2. Clear expectations and responsibilities.
3. Clear levels of Authority and decision-making capabilities.

2.4.3 Responsibilities

M. Follett was the first who made the managers think of responsibility, which is part of functions that are carried out by the worker (Kuznetsova, 2013). Ferrario et al. (2011) and Volle (2011) defined responsibility as "Duty or obligation to satisfactorily perform or complete a task (assigned by someone, or created by one's own promise or circumstances) that one must fulfill, and which has a consequent penalty for failure".

Consequently, responsibility includes obligation with respect to the performance and achieving goals in a satisfactory manner (Kondalkar, 2007, p. 22). This definition includes both the possible sources and the common consequences of responsibility. As

possible sources it mentions both an exogenous assignment (as in the case of delegation) and a promise coming from the same agent who's taking the responsibility (as in the case of commitment). If there is an exogenous assignment, the corresponding commitment is not necessary: for instance, a government may be responsible for the population's health without actually committing to it. In any case, the consequence of having 'undertaken' a responsibility is to become the bearer of an obligation that, if not fulfilled, would bring about a sanction (which is the last element of the definition above) (Ferrario et al., 2011).

Responsibility in the office has specially defined rules, plans, procedures, criteria and such-like are used as a framework for nominating responsibility, attributing blame, categorizing actions, making decisions and so forth. It is not the reasoning about responsibility that is any different. Instead, it is carried out in relation to explicitly defined and documented, criteria (Martin, 2007, p. 24).

Dewsbury and Dobson (2007)introduced two meanings of responsibility:

1. Causal responsibility, when an agent has an obligation to make something happen or prevent it from happening or to maintain a state.
2. Consequential responsibility, when an agent is answerable when something happens or does not happen or a state is not maintained.

These different responsibilities do not always rest on the same agent. Consequential responsibility may be held to rest with an organization as a whole; whereas, causal responsibility most usually can be traced to an individual or the fact that no particular individual at the time held the responsibility. Causal responsibility may sometimes be delegated, though some responsibility remains with the delegating agent (i.e. the responsibility for having chosen to delegate); whereas, consequential responsibility is not normally capable of delegation, though it may sometimes be transferred.

Problems with responsibilities often arise when the actions associated with a consequential responsibility or the activities for which a causal responsibility exist cut across organizational boundaries. These problems may arise because of differences in interpretation of responsibilities, because of differing priorities in time and resource allocation in different organizations, because of differences in competence, because of different organizational policies, etc. (Dewsbury & Dobson, 2007, p. 7).

2.4.4 Organizational clarity of roles and responsibilities

Pardo et al. (2009) have noted that clarity of roles and responsibilities influences the effectiveness and performance of both organizational and inter-organizational or cross-boundary group efforts. Focusing on the organizational level, Jackson and Schuler (1985) found that role clarity increases job satisfaction, commitment, and involvement and reduces tension and anxiety among organizational members, which has positive benefits including a reduction of staff turnover rates. At the inter-organizational level, Pardo et al. (2006) have shown that clarity of roles and responsibilities enables other important determinants of success in cross-boundary information sharing, such as building trust among members of cross-boundary information initiatives.

2.4.5 The influence of clarity of roles and responsibilities on inter-organizational collaborations

Clarity of roles and responsibilities has been found to be an important factor in inter-organizational collaboration. Clear roles and responsibilities decrease ambiguity and complexity, which are primary characteristics of any collaboration(Vangen & Huxham, 2003). At the beginning of such a collaboration, members from each participating organization work to understand their roles and to understand expectations of other organizations (Wakerman & Mitchell, 2005). Clarity of roles and responsibilities among participating organizations in the governmental context has been found to help achieving these collaborative goals by reducing uncertainty and facilitating trust building among the members of cross-boundary information initiatives (Pardo et al., 2006). Clarity of roles and responsibilities also has been found to reduce stress, and positively affects relational bonding among participants, thus increasing work effectiveness. As discussed in the literature, clarity of roles and responsibilities across the boundaries of participating organizations influences inter-organizational collaborations (Pardo et al., 2009).

2.4.6 Determinants of clarity of roles and responsibilities

The majority of studies described in the literature focus on the formalization of rules and procedures and regular and effective communication among participating organizations as determinants of clarity of roles and responsibilities for the participating organizations in an inter-organizational collaboration(Pardo et al., 2009). Kegerise (1999) stated that regular meetings, implementation plans, and formal agreements are necessary in order to establish and maintain clear roles and responsibilities in collaborations. Moreover,

Nidumolu (1995) found that formalization of rules and procedures for interactions is a crucial factor in the success of inter-organizational information systems because it brings clarity to roles and responsibilities. Similarly, Wakerman and Mitchell (2005) argue that roles of participating stakeholders should be clearly defined at the initiation of a collaborative effort in order to prevent power conflicts between participants.

Other studies focus on the formalization of communication as a strategy for preventing ambiguity in roles and responsibilities. Thomson et al. (2009) seem to concur with this need for more clear coordination and go further arguing that rather than relational contacts, routinized communication channels are important to achieve clarity of roles and responsibilities in collaborative efforts. Casey (2008) went a bit further and calls for coordination between partner organizations in order to prevent ambiguity in roles and responsibilities.

Other studies such as Luna-Reyes et al. (2008) focus on the experiential aspect of the process stating that when participants of an inter-organizational initiative begin to work together, they learn each other's roles, objectives and constraints. Hardy et al. (2005) approach collaboration from a discursive perspective, stating that members of a collaborative initiative define their roles and responsibilities through intensive conversation among participants. In addition, in a study of factors that affect role ambiguity and role conflict of top-level public administrators, Rogers and Molnar (1976)found that the more interactions public administrators had with other organizations at the inter-organizational level, the less role ambiguity and role conflict they experienced.

Pardo et al. (2009) focus on the context of public sector organizations, in particular on the role of information and information technologies in that context. They address the factors and the determinants of those factors that influence government cross-boundary information initiatives. They focus specifically on clarity of roles and responsibilities as one of the key factors influencing government cross-boundary information sharing and introduce three of the determinants of clarity of roles and responsibilities identified in the model: exercise of authority, diversity of participating organizations and their goals, and past experiences.

Gil-Garcia et al. (2010) stated that a clear sense of roles and responsibilities in government information sharing initiatives facilitated building trust relationships among

participants; provided participants with an understanding of their roles and what they should expect from other participants during an initiative. Moreover, having a clear sense of roles and responsibilities reduce the complexity of efforts to build information sharing within the complex cross-boundary government environment.

2.5 Financial resources management:

2.5.1 Defining financial management:

Financial management is an integral part of overall management. It is concerned with the duties of financial managers in the organization (Amoako et al., 2013). Interestingly there is no single definition of financial management, below are some selected definitions of the financial management:

In the past, the definition of financial management was (1) planning for and acquiring resources and (2) planning, monitoring, analyzing, and reporting the use of those resources (Bui, 2012, p. 3).

Latterly, Victoria (2004) defined financial management as the process of managing financial resources, including management decisions concerning accounting and financial reporting, forecasting, and budgeting, as well as capital budgeting decisions, which include decisions whether to lease or buy, and whether to issue debt or equity.

According to Kadam (2012) the financial management is concerned with procurement, allocation and control of financial resources of a concern. Financial Management means planning, organizing, directing and controlling the financial activities like procurement and utilization of funds of the venture. It means applying common management ideology to financial resources of the business organization.

Brealey (2011, p. 1) “Financial management is the process of putting the available funds to the best advantage from the long term point of view of business objectives. Broadly, financial management “is the operational activity of a business that is responsible for obtaining and effectively utilizing the funds necessary for efficient operations (Paramasivan, 2009, p. 3). Maheshwari (2011, p.1) defined financial management as being “concerned with raising financial resources and their effective utilization towards achieving the organizational goals”.

In conclusion, the financial management means applying common management ideology to financial resources of the organization; it is mainly concerned with obtaining and effectively utilizing and managing the financial resources to obtain the organizational goals.

2.5.2 The Role of Financial Effective Management in Organizations

The business goal can be achieved only with the help of effective management of finance. The roles of financial management according to Amoako et al. (2013) asserted that financial management carries out the following roles:

1. To ensure efficient usage of funds in all units of an organization;
2. To evaluate the financial implications of decisions made by management;
3. To monitor organizations' financial performance so as to minimize deviations from budgeted performance;
4. To determine to keep track on items of expenditure for which cash of an organization is used for;
5. To foster and maintain financial stability based on organization's cash flow;
6. To establish optimum capital structure as well as their sources of funding at the lowest cost and at their appropriate time.

2.5.3 Importance of Financial Management

Finance is the lifeblood of business organization. It needs to meet the requirement of the business concern. Each and every business concern must maintain adequate amount of finance for their smooth running of the business concern and also maintain the business carefully to achieve the goal of the business concern. The business goal can be achieved only with the help of effective management of finance. We can't neglect the importance of finance at any time at and at any situation. Some of the importance of the financial management is as follows (Paramasivan, 2009, pp. 9-10):

I. Financial Planning

Financial management helps to determine the financial requirement of the business concern and leads to take financial planning of the concern. Financial planning is an important part of the business concern, which helps to promotion of an enterprise.

II. Acquisition of Funds

Financial management involves the acquisition of required finance to the business concern. Acquiring needed funds play a major part of the financial management, which involve possible source of finance at minimum cost.

III. Proper Use of Funds

Proper use and allocation of funds leads to improve the operational efficiency of the business concern. When the finance manager uses the funds properly, they can reduce the cost of capital and increase the value of the firm.

IV. Financial Decision

Financial management helps to take sound financial decision in the business concern.

Financial decision will affect the entire business operation of the concern. Because there is a direct relationship with various department functions such as marketing, production personnel, etc.

V. Improve Profitability

Profitability of the concern purely depends on the effectiveness and proper utilization of funds by the business concern. Financial management helps to improve the profitability position of the concern with the help of strong financial control devices such as budgetary control, ratio analysis and cost volume profit analysis.

VI. Increase the Value of the Firm

Financial management is very important in the field of increasing the wealth of the investors and the business concern. Ultimate aim of any business concern will achieve the maximum profit and higher profitability leads to maximize the wealth of the investors as well as the nation.

VII. Promoting Savings

Savings are possible only when the business concern earns higher profitability and maximizing wealth. Effective financial management helps to promoting and mobilizing individual and corporate savings. Nowadays financial management is also popularly known as business finance or corporate finances. The business concern or corporate sectors cannot function without the importance of the financial management.

2.6 Soft and hard skills management

2.6.1 Defining Skill:

According to the previous literature, skill has many different definitions. Such as, Jouili and Chaabouni (2005) defined skill as “the whole body of knowledge and know-how

integrated and mobilized by the individual, depending on his personality and his attitude in an evolutionary context for socialization, uncertain and dynamic to successfully accomplish missions or stains order to satisfy the needs of clients".

While Ezzahra et al. (2014) defined skill as "the taking of initiative and responsibility of the individual for business situations that he confronts, it referrers above all to the person, that puts forward an operational know-how and includes participation to treatment of problems in group".Parakandi (2011) defined skill as "the ability, talent or competence to perform a task well or better than average."

2.6.2 Skills management

We are currently in the era of the "Management of skills", where all companies seek talents, men and women capable of autonomy and decision-making, able constantly to acquire and develop the necessary skills to the new products and new strategies. The qualified men of yesterday can become tomorrow's performers if their skills are enriched, transformed and adapted, also, the training becomes a key element of any discrepancies and management of human skills (Ezzahra et al., 2014).

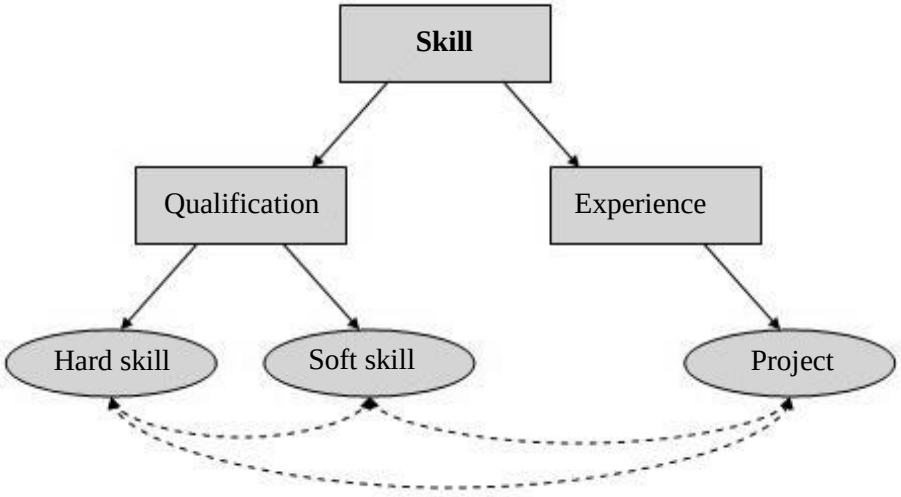
Hiermann and Höfferer (2005) argued that skill management is the development of the necessary skills to accomplish the organization, structuring and administration of implicit knowledge. While Beck (2003) defined skill management as "the management of the qualifications, experiences and knowledge of the employees", in order to allocate the appropriate skills at the correct place, at the right time, at optimal costs .

Dubois and Singh (2009) stated that, Skill management refers to an organization's ability to optimize the use of its workforce; skill management enables organizations to optimize patient outcomes while ensuring the most effective, flexible and cost-effective use of human resources.

2.6.3 Skill classification:

Many authors subdivide qualifications into two essential types of skills: soft skills (i.e., human) and hard skills (i.e., technical) (Hiermann & Höfferer, 2005; O'Driscoll et al., 2000; Parakandi, 2011). Hard skills are objectively judging qualifications (e.g.: by a test). Soft skill qualifications are subject to conditions of objective (own-) judgment and subjective (strange-) judgment (Hiermann & Höfferer, 2005).

Figure 2.5: Skill model



Source: (Hiermann&Höfferer, 2005)

Moreover, there is a wide range of how hard skills (i.e. technical) and soft skills are defined, often with some overlap. Laker and Powell (2011) defined hard skills as "those skills that involve working with equipment, data, and software". Additionally, they defined soft skills as "intrapersonal skills and how one handles interactions with others". Weber et al. (2013) describe soft skills as "those related to human and inter-personal actions whereas hard skills are related to the technical and administrative aspects of operating a business"; extending this, social networking involves the ability to effectively manage web-sites and social media including Facebook, Twitter, Linked In, etc. While interacting on these sites may very well have an interpersonal component there is also technical function to administering them.

Parakandi (2011) defined hard skills as "mechanical skills or technical skills that are the level of technical expertise such as anatomy for a doctor, programming language for a computer programmer, legal expertise for a lawyer, subject knowledge for a teacher etc. whereas soft skills are essentially the skills that make an individual smart in dealing with the self and other's; they are the non-technical, personality-specific skills that determine one’s strengths such as a leader, manager, communicator, listener, negotiator, conflict mediator etc. Every professional must have a proper blend of hard skills and soft skills for effective discharge of their duties and responsibilities in various roles.

While Hendarman and Tjakraatmadja (2012) stated that, Soft skills are personal attributes that enhance an individual's interactions and his/her job performance; unlike hard skills, which are about a person's skills set and ability to perform a certain type of task or activity, soft skills are interpersonal and broadly applicable.

Babić and Slavković (2011) summarized the differences between hard and soft skills as follows: 1) The majority of people differentiate hard (work with equipment or software) and soft skills (interpersonal or intrapersonal focus) with ease; 2) There is a considerable difference between transfer of hard and soft skills; 3) Most positions in an organization require not only possession of hard skills for successful execution of work tasks, but also proficiency in soft skills area.

Chapter 3

Water sector in Gaza strip

3.1Introduction:

This chapter focuses on water sector in Gaza strip. This chapter consists of four sections; first section focused on the water statues in Gaza strip, the second section focused on the current legal framework of water sector, third section discussed relevant water polices and strategies, the fourth section focused on the institutional framework of the water sector.

3.2Water Status in Gaza Strip

3.2.1 Introduction:

Gaza Strip is one of the semi-arid area where rainfall is falling in the winter season from September to April, the rate of rainfall is varying in the Gaza Strip and ranges between 200mm/year in the south to about 400mm/year in the north, while the long term average rainfall rate in all over the Gaza Strip is about 317mm/year. Groundwater aquifer is considered the main and only water supply source for all kind of human usage in the Gaza Strip (domestic, agricultural and industrial). This source has been faced a deterioration in both quality and quantity for many reasons, e.g. low rainfall, increased in the urban areas which led to a decrease in the recharge quantity of the aquifer, also increasing the population will deplete the groundwater aquifer and lead to seawater intrusion in some areas as a result in pressure differences between the groundwater elevation and sea water level.

The groundwater aquifer beneath Gaza Strip is limited in its area, while the natural boundary of this aquifer reach Haifa in the North and goes to Sinai in Egypt in the south, and it's also bounded from Hebron in the East till the Mediterranean Sea in the west. As the Israeli occupation practices along the years, the Gaza ground aquifer become limited in its fresh water production because the natural recharge from East and North is being trapped before reaching the political boundary of the Gaza Strip through drilling wells just at the Eastern and Northern Gaza borders. Added to that the dams which are being constructed along the upper stream of Gaza Wadi to stop the natural flow in the Wadi towards Gaza Strip, in which make the entire Wadi's in the Gaza Strip dry (CMWU, 2010a). The United Nations report has highlighted that Gaza aquifer will not be usable by 2016 and will be irreversibly damaged by 2020 (UNRWA, 2013).

3.2.2 Groundwater Quality

The groundwater quality is monitored through all municipal wells and some agricultural wells distributed all over the Gaza Strip. The agricultural monitoring wells are tested against chloride and nitrate ions twice a year by the Ministry of Agriculture (MoA), while the municipal wells are monitored through all the action's and anion's twice a year with the cooperation of both Ministry of Health (MOH) and CMWU. The groundwater quality is varies from place to another and from depth to another. The chloride ion concentration varies from less than 250mg/L in the sand dune areas as the northern and south-western area of the Gaza Strip to about more than 10,000mg/L where the seawater intrusion has occurred (CMWU, 2010a).

The source of the nitrate ion in the groundwater chemical components has resulted from different sources i.e. intensive use of agricultural pesticides beside the existence of septic tanks to dispose the domestic wastewater in the areas where there is no wastewater collection system. The nitrate ion concentration reaches a very high range in different areas of the Gaza Strip, while the World Health Organization (WHO) standard recommended nitrate concentration less than 50mg/L (CMWU, 2010a). 93.5% of the water produced in Gaza does not comply with WHO/EU drinking water standards due to high nitrate from human and agricultural pollution or chloride concentrations. The 1.7 million people living in the Gaza Strip are thereby exposed to an unacceptable high health risk (PICTOR, 2014).

3.2.3 Groundwater Quantity

Groundwater quantity in the groundwater aquifer can be determined if the aquifer thickness and its spatial distribution is known added to other hydrological parameters of the aquifer. The fresh groundwater area in the Gaza aquifer (CL≤ 250 mg/L) is about 37.8 km2 in 2010 with a decrease of 7 km2 compared to 2009, hence the fresh ground water volume will be in range of 80-380 million cubic meters if considering the aquifer porosity 20% and its thickness (Fresh water) is around 10-50m.

In year 2000, these values have been computed and found in a range of 450-600 MCM, which means there is an average of 300 MCM depleted amount from the aquifer in the last years, between 2000 and 2010. Knowing that, the extracted water for all purposes in the Gaza Strip has reached around 165 MCM in year 2010 (CMWU, 2010a). This decline in groundwater levels is a natural consequence of abstraction rates being significantly higher than the recharge rate of the coastal aquifer. The most serious declines

have been observed in the northern and southern parts of Gaza Strip as a result of intensive local pumping (PWA, 2011).

The calculated future water volume required based on two important factors, which are the improvement of the water distribution system and fairness distribution all over the Gaza Strip to reach 150L/C/D by year 2035. Those factors were calculated based on the current situation and expected future development to reach 80% water distribution efficiency by year 2035. Based on PWA records over the past eight years, the municipal water abstraction has been increasing based on the population growth as well as the increasing in water demand become bigger (CMWU, 2010b).

3.3 The Current Legal Framework of water sector

The water sector legislation was established after the 1995 Oslo Accords, with a by-law establishing the Palestinian Water Authority (EMWIS & PWA, 2008). A series of legal documents related to water sector were officially published and adopted by the relevant stockholders, some of them are:

1. **Interim Agreement on West Bank and Gaza Strip on 28/September/1995:**

This agreement includes three important issues:

- The recognition of Israel of the Palestinian water rights which will be negotiated in the final status negotiations.
- Commitment of the Israeli side to cooperate with the Palestinian side to develop additional water quantities for the Palestinians, these quantities were estimated to be around 70-80 MCM/yr during the Interim Period (September 1995-September 1999), 28.6 MCM/yr of this quantity as immediate needs.
- Cooperation between the two sides within a permanent Joint Water Committee to implement the Interim Agreement.

2. **Presidential Decree No. 90, 1995**

Presidential Decree No. 90 in 1995 established the Palestinian Water Authority. The decree's first article provides the formation of the Palestinian Water Authority, while the second article stipulates the appointment of its chairman(Palestinian Official Gazette,5th ed, 1995).

3. **Law No. 2, 1996**

This law states that an institution called "the Palestinian Water Authority" shall be established and shall enjoy independent legal status, exclusive budget, and be placed under

the direct supervision of the President of the PNA, who shall appoint its head (Palestinian Official Gazette,11th ed, 1996).

4. Bylaws of the Palestinian Water Authority No. 66, 1997

Articles No. 5, 6 and 7 of the Water Authority bylaws set forth its jurisdiction and responsibilities based on the PWA Establishment Law No. 2, 1996. Articles 8 and 9 have further defined the institutional structure of the Authority whereas Article No. (10) has defined the powers and responsibilities of PWA head (Palestinian Official Gazette,18th ed, 1997). The bylaws are a reflection of the Law on the establishment of Palestinian Water Authority No. (2) of the year 1996 and therefore was repealed in 2002. Due to the enactment of the Water Law No. 3, and the preparation of new draft bylaws which have not been approved to date by the Water Council, a gap arose in the PWA functions and operations. PWA functions have to reflect and become consistent with the new developments provided by the Water Law No. 3 through the "official" endorsement of bylaws for the Water Authority (AMAN, 2008).

5. Legal Status of the Coastal Water Utility in Gaza

On 30.10.2000 and based to law No. 1/1997 article 2 and article 15c on local councils in Palestine and according to the agreement between 25 municipalities, the Minister of local government (Mr. Saeb Aurikat) issued a decision to establish the Coastal Municipal Water Utility (CMWU) in Gaza. According to this decision, CMWU is operating the drinking water and wastewater facilities within Gaza Strip.

On 15.01.2005 another decision to establish the Coastal Municipal Water Utility (CMWU) in Gaza issued by the Minister of local government (Mr. Jamal Al-Shobaki) identified its board of directors and responsibilities according to article 6 and 10 of the bylaw for joint service councils (Sulyman, 2013*)*.

6. Palestinian Water Law No. 3, 2002

As stated in Article 2, the objective of this law is to "develop and manage the water resources, increasing their capacity, improving their quality and preserving and protecting them from pollution and depletion (Palestinian Official Gazette,43rd ed, 2002). This objective is fulfilled through sustainable development of water resources based on environmentally sound and enabling bases; the provision and satisfaction of societal and individual needs for water in an optimal and equitable way; and the protection of all water resources from pollution to secure water quality, an environment not harmful to human

health or well-being, and sufficient water for production and self-renewal (Daibes & Daibes-Murad, 2003).

Among other things, the law declares water as a public property and states that every person has the right to receive sufficient water of an adequate quality for basic water consumption and sanitation needs. However, water utilization, exploration, development, and any other activities affecting the water resources quantity or quality must be licensed. The law clarifies the responsibilities of relevant institutions like the Palestinian Water Authority (PWA). The National Water Council (NWC) is established in the document with the task to ratify policies, plans, and programs pertaining to the water resources. The document embodies the essence of the regulatory function of the law, licensing and tariffs, whereby it is stipulated that users must pay for a water license and that a unified tariff that encourages conservation and optimal utilization must be set. Chapter seven establishes the national water utilities, whose function is to provide water and wastewater services. Furthermore, the law controls environmental protection and the pollution of water resources.

In accordance with Article 6 of the Water Law, the Water Authority (PWA) shall be established as an official public institution with a recognizable juridical personality which budget is included within the PNA general budget. The same article indicates that PWA falls under the supervision of the President of the PNA who appoints its head. Article No. 2 of this law states the objective of the PWA as developing, managing and increasing the capacity of water resources in addition to improving their quality and preserving and protecting them against pollution and depletion. In accordance with Article 43 of the Water Law, the Water Authority Law No. 2, 1996, was repealed.

The Water Law provides for sector governance, including separation of resource management and regulation from resource use. The overall framework of water sector governance is set out in the Water Law, which provides for separation between water resources management and regulation (to be conducted by the PWA), and service providers. Under the Law, the National Water Council is the supreme decision making body, the PWA is responsible for water resources management and regulation, and monitoring the regional water utilities in Palestine (Palestinian Official Gazette,43rd ed, 2002).

3.4 Relevant Water Polices and Strategies

General water sector policies are set by the Palestinian Cabinet of Ministries and the National Water Council (NWC). According to the Water Law No. 3, the NWC has the task to ratify policies, plans, and programs concerning water resources in Palestine. The council has the Authority to suspend or dismantle the services of the board of directors of the regional water service providers. The members of the council include the main Palestinian ministries and other relevant stakeholders like the PWA and the PA. However, this vision is not reflected in the present organizational arrangements and the NWC has met once and has never functioned as intended.

The PWA acts as regulatory authority (Assaf et al., 2004), responsible for the legislation, monitoring and human resources development in the sector. The PWA is also in charge of water resources and wastewater management. It has the mandate to carry out regular inspections and to keep a register of all water related data and information. Moreover, the Authority shares responsibility for irrigation with the Ministry of Agriculture (MoA) and for environmental protection with the Environment Quality Authority (EQA) (EMWIS & PWA, 2008).

1. **Palestinian National Water Policy (1995)**

Following the signing of the Interim Agreement, the need for a comprehensive examination of water resources and their development strategies became the main concern for the PA. In 1995, a National Water Policy (NWP) was adopted, the first step in addressing the important issues of water resources management and planning. The NWP creates the concerning the structure and responsibilities of the water sector institutions. It also underpins the importance of the sustainable development of all water resources and establishes the principle of water resources as a public property. The policy aims at coordinating the development of the water resources of Palestine at the national level and carrying it out at the appropriate local level (Kawash, 2002).

Principles of the National Water Policy

The Palestinian Water Authority prepared on 1996 the main principles that form the basis of the water policy. This policy principles form the important frame that guides the Palestinian Water Authority perspectives as the regulator of the water sector. The Policy principles were used as the base for different aspects of the water resources management

including legal, regulatory, and administrative. The main principles of the Water Policy are (Kawash, 2002):

1. All sources of water should be a public property.
2. Water has a unique value for human survival and health, and all citizens have a right to water of good quality for personal consumption's at costs they can afford.
3. Water supply and domestics, industrial and agricultural development must be compatible with the available water resources and based on a sustainable development.
4. Water have social environmental and economic values. Therefore the damage resulting from the destruction of its usefulness (pollution) should be paid by the party causing the damage (polluter), polluter pays principle.
5. The development of the Palestinian water resources must be coordinated on the national level, and carried out on the appropriate local level.
6. The national water sector management should be carried out by one responsible body; with the separation of institutional responsibility for policy and regulatory functions from the service delivery functions.
7. Public participation in water sector management should be ensured.
8. Water management at all levels should integrate water quality and quantity.
9. Water supply and wastewater management should be integrated at all administrative levels.
10. The optimal development of water supply must be complemented by a consistent water demand management.
11. Protection and pollution control of water resources should be ensured.
12. Conservation and optimum utilization of water resources should be promoted and enhanced.
13. Pursue the Palestinians interest in connections with obtaining the right of water resources shared by other countries.
14. The Government will co-operate with regional and extra-regional parties to promote the optimum utilization of water resources, to identify and develop new and additional supplies, and to collect and share relevant information and data.

2. Water Resources Management Strategy (1998)

The objective of the Water Management Strategy was to translate the messages from the NWP into strategic imperatives. The strategy emphasizes essential aspects of water development like the establishment of a comprehensive framework for the

sustainable management of water resources and the development of an appropriate institutional unit for reform and support of the water sector in coordination with relevant stakeholders (Diabes-Murad, 2004). This long-term and coordinated strategy for the water sector is intended to be used as an overall foundation for further planning regarding the activities and responsibilities associated with the water division and with the main goal of securing a sound management of the water resources. There are eight key elements in the Water Resources Management Strategy: (1) secure the Palestinian water rights, (2) strengthen national policies and regulations, (3) develop institutional capacity and human resources, (4) improve information services and assessment of water resources, (5) regulate and coordinate integrated water and wastewater investments and operations, (6) enforce water pollution control and protection of water resources, (7) develop public awareness and participation, and (8) promote regional and international cooperation(Stephan, 2007) .

3. National Water Plan:

The Palestinian Water Authority prepared a package of complete references for comprehensive water planning which included an evaluation for water resources and their status in both quantity and quality and its availability, uses and quantities controlled by the Israelis for West Bank (IWRM,2003) and Gaza Strip (The CAMP Study, 2003).

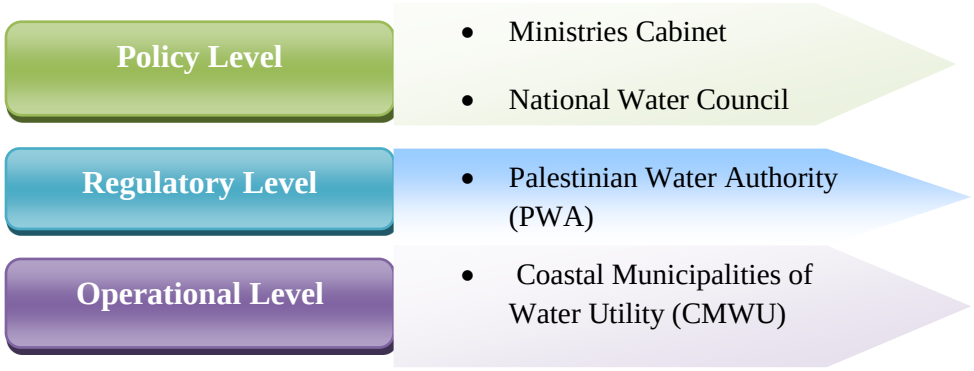
The National Water Plan of 2000 is the strategic plan for the water sector. It sets the direction to the year 2020, and it proposes actions to be taken to achieve these goals. The document describes the role of service providers. It says that Regional water Utilities will be responsible for the following services: preliminary investigations and design; construction and/or rehabilitation; research; repairs; operations and maintenance. Moreover it states that services would cover the fields of municipal and industrial water supply; waste water collection treatment and re-use; storm-water collection, treatment and re-use; water and treated wastewater supplies for irrigation. Regional Water Utility assets will remain government owned, with a community representation on their board. Employees will be seconded to a competitively selected private operator, who will be contracted for a set term to manage, operate and maintain all infrastructure and related services for a fee. All billing and collection procedures will also be placed in the care of the operator. The utilities will be administratively and fiscally autonomous, although tariffs will be reviewed, and water abstraction and discharge will be licensed and monitored by PWA. The regional water utilities will be required to seek full cost recovery in their operations and develop a customer charter (Husseini, 2004).

3.5 The Institutional Framework of the Water Sector in Palestine

According to the Water Law 3/2002 the institutional structure for water sector should have the following three levels:

1) The Policy Level (Ministers Cabinet and National Water Council): Ratification of water policies.
2) The Regulatory Level (Palestinian Water Authority): Implementation of the water policies.
3) The Operational Level (Coastal Municipalities of Water Utility): Providing water supply and services.

Figure 3.1: The institutional framework



Source: according to the Water Law 3 (2002)

3.5.1 The Policy Level

a) **The Palestinian Ministers' Council**

The Council of Ministers has the Authority to authenticate and issue all related bylaws in order to implement the water law. All water-related bylaws shall be approved and submitted to the Ministers' Council through the National Water Council.

b) **The National Water Council (NWC)**

The NWC (National Water Council) is the policymaking institution which is formed according to Article 8 of Water Law No. 3, for the year 2002. President of the PNA as Head, and twelve other members that make the council, the ministers of Agriculture, Finance, Local Government, Health, and Planning and International Cooperation in addition to the heads of the Environment and Water Authorities, the Secretary-General of Jerusalem, the representative of the president of the Association of Palestinian Local Authorities, and one representative of the Palestinian universities, water associations and unions, and regional water utilities (AMAN, 2008).

The NWC mandate and functions are as follows:

- Public water policy
- Policy for the development and utilization of water resources for different usages
- Plans and programs aiming at the regulation and counseling on water usage and consumption without wastage
- Tariff policy
- Periodic reports on PWA activities and performance
- PWA regulations
- Bylaws governing PWA management and operations
- PWA annual budget and its presentation to the Cabinet for endorsement
- Appointment of the board of directors of regional water undertakings
- Allocation of funds for investment in the water sector
- Application of PNA financial regulations
- NWC meetings are legal only when attended by its chairperson or his deputy, which minimizes the opportunities for the head to preside over NWC meetings. In addition, NWC members are ministers occupied with their own duties, making it difficult to achieve quorum for NWC meetings.

Duties and Responsibilities of the National Water Council

(Based on Article No.9 of the Water Law no.3/2002)

- Sanction the general water policy;
- Sanction the policy for development and utilization of water resources and the different usage;
- Ratify plans and programs aimed at organizing the usage of water, the preventing wastage, and directing consumption;
- Ratify the tariff policy;
- Confirming the allocation of funds for investment in the water sector;
- Approving the periodic reports concerning the activities of the Authority and its work;
- Approving the Authority's guidelines and confirming the international regulations that govern its administrations and operations;
- Confirming the appointment of the Board of Directors of the regional utilities;

- Approving the annual budget of the Authority and presenting it to the Council of Ministers to confirm it;
- Implementing the financial regulations prevailing in the Palestinian National Authority;
- Any other tasks, which are delegated to it according to the provisions of this law.

3.5.2 The Regulatory level: the Palestinian Water Authority

In 1995, the Palestinian Authority established the PWA under Presidential Order No. 90. In 1996, By-law No. 2 identified the mandate and Authority of the PWA to achieve the efficient management of water resources, to implement a National Water Policy, to establish and supervise water resource projects, and to initiate cooperation between the parties affected by water management issues. Since that time, the PWA has established an organizational structure and is in the process of developing a functioning Authority capable of carrying out their mandate.

The PWA should be financially supported and guided by the National Water Council. The National Water Council was established under By-law No. 2 in1996 in order to establish and approve a National Water Policy and to guide the PWA. The Council consists of the President of the National Authority and members from several ministries.

Serving under the PWA, the West Bank Water Department is responsible for selling water in bulk, operating pumping stations, and maintaining the main trunk lines in the West Bank. Regional water utilities, which can include regional utilities, municipal departments, village committees, or local United Nations Relief and Works Agency (UNRWA) offices, are then responsible for running drinking water distribution at the service delivery level.

PWA developed a relatively strong presence in Gaza, which is now effectively suspended with the takeover of PWA offices in June 2008. PWA has ceased licensing activity and staff is no longer empowered to carry out the inspection of the utilities that was required by the PA in order to allow payment of the diesel bills.

Palestinian Water Authority Mission is:

"To develop the water resources in a sustainable manner based on solid environmental and economical basis through efficient and equitable management".

Head of the Palestinian Water Authority

Article 15 of the Water Law specifies the duties and responsibilities of the PWA chairperson, which include the management of PWA and supervision of its employees and directorates. The Chairman is also tasked with the preparation of the PWA budget and financial reports for submission to relevant PNA parties. The responsibilities extend to activities aimed at strengthening regional and international cooperation in the field of water and sewage, and the preparation of periodic reports on PWA activities and performance and the proposal of solutions for the constraints and difficulties encountered in the course of work.

Roles and Responsibilities of the Palestinian Water Authority

(Based on Article No.7 of the Water Law no.3/2002)

1. It shall have full responsibility for managing the water resources and wastewater in Palestine.
2. Setting the general water policy and working to implement it in coordination and cooperation with the relevant parties, and presenting periodic reports concerning the water status to the Council.
3. Surveying the different water resources, and suggesting allocations of water and determining the priorities of usage.
4. Creating reservation areas for protection from the danger of pollution, and exercising oversight and supervision over such areas, and approvals for transfer of water between the different geographic areas.
5. Licensing the exploitation of water resources including the construction of public and private wells, regulating them, water exploration, drilling exploratory, testing and production wells, and any other matters or activities relating to water or wastewater, in cooperation and coordination with the relevant parties.
6. Studying water and wastewater projects, and projects that integrate them, and setting design standards, and quality assurance, and technical specifications, and work to control its implementation.
7. Rehabilitating and developing water departments for the bulk water supply at the level of the different national governorates, considering them national water utilities, and setting their tasks and responsibilities in accordance with regulations that are issued by the Cabinet of Ministers for this purpose.

8. Coordination and cooperation with the relevant parties to set plans, and programs for regulating the use of water, and preventing wastage, and conserve consumption, and carrying out public awareness campaigns regarding this aspect.
9. Supervising the profession of well drilling and qualifying contractors in the field of constructing water facilities in accordance with procedures that are set by the law.
10. Setting plans and programs for training the technical staff working in the water sector to develop the management of water resources and supervise its implementation and development.
11. Working towards achieving a fair distribution and optimal utilization in order to ensure the sustainability of ground and surface water resources through cooperation and coordination with the relevant parties and finding solutions and suitable alternatives in case of emergencies.
12. Regulating and supervising research and studies relating to water and wastewater, and following up with the concerned and specialized parties.
13. Rehabilitating the centers for researches, studies, and training working in the water sector in accordance to the procedures to be set by the regulations referred to in paragraph 7.
14. Participating in setting approved standards for the water quality for the different usages in cooperation with the relevant parties and insuring promulgation.
15. Working to develop and coordinate programs for international, regional, and bi-lateral technical cooperation in the field of water resources; holding conferences, and seminars, and representing Palestine in regional and international meetings in this field.
16. Preparing draft laws and regulations and issuing directives concerning water resources and executing them, and giving opinions with regard to the technical aspect in all disputes relating to water resources.

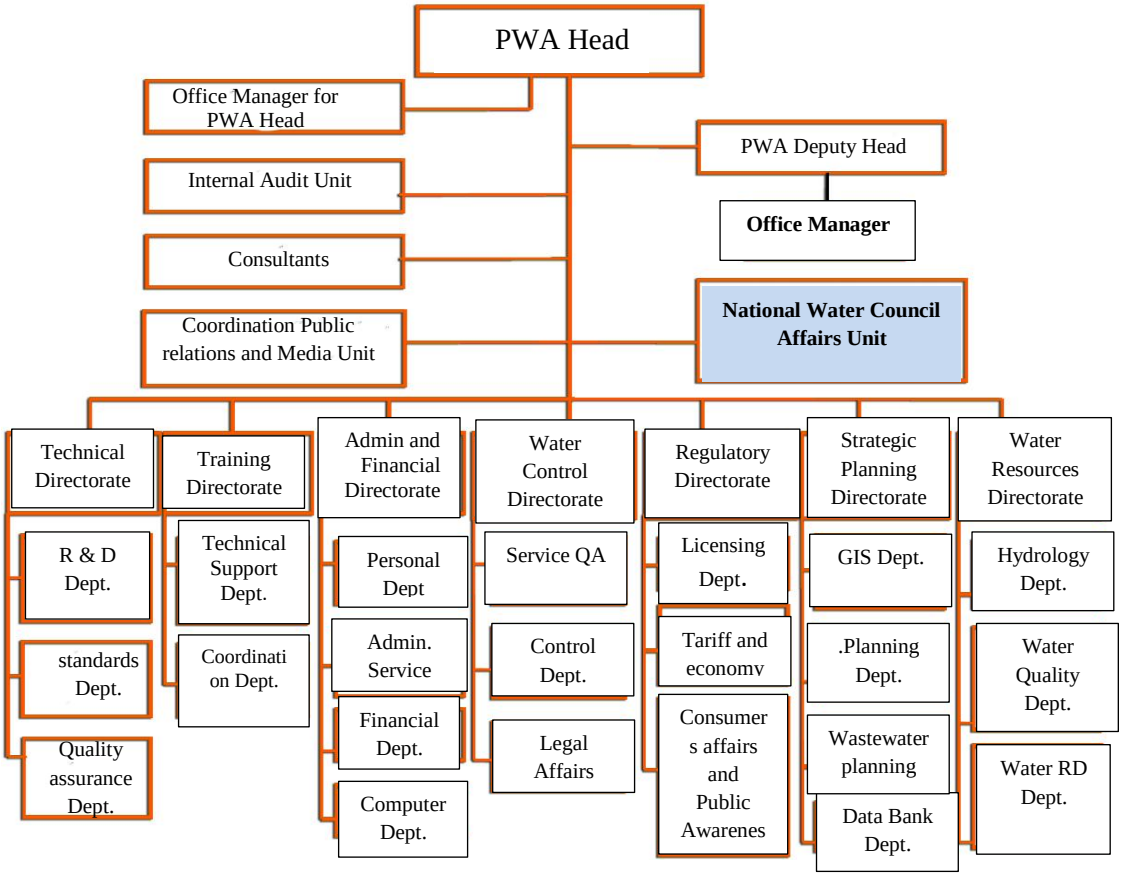
The Organizational Structure of Palestinian Water Authority

According to Article 8 of the old PWA internal regulations, the structure of the water Authority consists of a head, a deputy, a general director, a public relation committee, a coordination and cooperation committee, and advisory committees.

On 26 April 2005, the Cabinet of Ministers adopted the PWA development plan and organizational structure which introduced amendments to the structure to comprise seven administrative departments, as follows (AMAN, 2008):

- Administrative and Financial Affairs
- Technical Affairs
- Management/Organizational Affairs
- Water Resources and Planning
- Water Monitoring
- Planning
- Training Affairs

Figure 3.2: Organizational structure for PWA



Source: (AMAN, 2008)

In addition, the PWA created units to fulfill temporary project-related needs, such as the Projects Management Unit supervised by the PWA senior management. This unit was created to separate between PWA functions as the administrator of the public water sector, and its interim tasks, and in response to donor countries objecting to interference between organizational, operational and developmental functions.

The PWA's additional tasks in the execution of water and sewage projects are not part of its mandate. PWA execution of periodic projects is one of its main functions, and

leads to additional financial burdens as a result of salaries paid to project-based contractual employees responsible for implementing water projects (AMAN, 2008).

3.5.3 Operational Level: Coastal Municipalities of Water Utility (CMWU)

Coastal Municipalities of Water Utility (CMWU)

CMWU is a Common Council of Services (CCS) for the administration of water and sewage entities of the south governorates of Palestine. Efforts started since 1996 to establish the CMWU. After signing the agreement by the existing 25 municipal entities in Gaza Strip in 2000, CMWU was established as a council with the same duties of the local municipal entities in the Strip concerning management of the water and sewage sub sectors. And in accordance to the authorities and powers vested to the Minister of Local Government under Article.15 Point. C of the Local Organizations Law No.1/1997, the Basic Law of CMWU was issued then approved by the minister in 2005.

As stated in Article.6 of the Basic Law, the Council of CMWU has the following duties and goals:

1. Pumping out water, providing water and sewage services; disposition, supply and distribution of water resources to consumers for household, commercial, industrial, agricultural purposes and to any other party.
2. Taking all actions needed to dispose of and distribute water supplies according to the standards set by the competent parties and pursuant to effective laws.
3. Management and promotion of the water, drainage and sewage utilities; including the treatment of sewage and rain water in accordance with technical standards and with available resources.
4. Collection and utilization of runoff water
5. Owning and operation of water and sewage utilities and establishment of any other facilities necessary to accomplish the Council's goals.
6. Making appropriate plans and putting into use any means that would reduce water and environmental pollution hazards.
7. Transference of title to the assets of local organizations related to water and sewage to the Common Council of Services.
8. Abiding by the quality standards greed upon with competent parties in the water and sewage sectors

9. Importing all equipment and machinery needed to pump out and distribute water or to treat and recycle water and sewage; as well as setting up, service and maintain the water and sewage infrastructure.
10. Entering into agreements with national, international and regional parties as a means of accomplishing set objectives as well as attaining any rights, concessions and licenses it deems necessary; as well as executing such agreements and making use of rights, concessions and licenses in conformity with the law.
11. Investing surplus proceeds from the water and sewage sector in the manner it sees fit and in consistence with the goals of the Council subject to applicable laws.
12. Engaging in any other acts decided by the Council towards accomplishing its objectives and best interests.

The Council of CMWU shall be composed of all local organizations in the south governorates of Palestine according to Article.8 of Chapter Two of the basic law of the CMWU. These organizations shall be the 25 municipal entities who signed the agreement in 2000. And, it was planned that the municipalities will receive technical support services from the CWMU, and will progressively transfer their staff and assets to CWMU. But according to the current turbulent political situation, 10 municipalities retreated from the agreement since 2007, and the rest 15 still authorized CMWU as operational institute in their area. Table (3.1) shows the retreated the non-retreated municipalities.

Table (3.1): Retreated and Non-Retreated Municipalities from the Agreement with CMWU.

Municipalities Authorized CMWU as operational institute in their areas		**Municipalities retreated from CMWU agreement since 2007**	
Name	**Population**	**Name**	**Population**
Rafah	156,332	Gaza	483,869
Al-Nnaser (Al Bayuk)	6,308	Um Al-Nnaser	2,811
Shokat as Sufi	10,732	Jabalia	164,931
Khan-Yunis	180,342	Al Bureij	33,855
Bani Suheila	31,703	'Abasan al Jadida	6,066
Khuza'a	9,147	'Abasan al Kabira	18,413
Al Fukhkhari	5,539	Al Qarara	19,769
Az Zawayda	16,939	An Nuseirat	64,759
Al Maghazi	22,612	Beit Lahiya	64,457
Deir al Balah	60,877	Beit Hanun	38,047
Al Musaddar	1,873		
Wadi as Salqa	4,620		
Madinat Ezahra	3,085		
Al Mughraqa	6,537		
Wadi Gaza (Juhor ad Dik)	2,920		

Source: (Sulyman, 2013)

CMWU should act as service provider for different consumers. But according to the above table, the served population by CMWU is 519,566 which are only 36.7% of the total population in the Strip. But the rest 896,977 populations (63.3%) are still served by the municipal entities. This mean that the CMWU lost its control over a high percentage of water and sewage facilities in Gaza Strip, which reducing its functions as service provider on the ground, and ensuring the ability of the municipalities to have the responsibility for service delivery to the municipal purposes and to any other party, and keep CMWU functions limited to the technical supporting for these entities.

As Operator, CMWU should operate all of the water, drainage and sewage utilities, and should provide the necessary technical maintenance for all local entities. But based on table (3.1), CMWU is fully commissioned to act as operator only inside the areas of the same 15 municipal entities authorized CMWU as service provider in their regions. But, CMWU lose its function as operator within the areas of the other 10 municipal entities. In cases of the inability and incapability of the municipal entities to operate and maintain of these facilities, the entities resort to sign agreements with CMWU especially for operation and maintenance (O&M) these facilities as the case in 2008, when Jabalia and Beit Hanun municipalities signed an agreement for CMWU to operate the Northern WWTP and infiltration basin in their areas.

In addition, the first component of CMWU personnel should be the employees working in the water and sewage utilities in all local municipal entities and should be affiliated with the CMWU as stated in Article.7 of Chapter One of the Basic Law of CMWU. But based on the current situation, the employees of 10 municipal entities are not within the structure of the various technical departments of water and sewage services of CMWU.

The board of director of CMWU shall be consisting of nine members. The first component of the board is the five permanent members who represent the five local organizations in Gaza governorates; i.e. Gaza, the North, the Central, Khan Yunis and Rafah, and Gaza Municipality is the Vice-Chairman of the board for the interim period as stated by Article.9 of the Basic Law of the CMWU. But, the Vice-Chairman of the board of CMWU was retreated from the agreement and considered out of the board. This cause that the vice-chairman post falls vacant and the board shall call to convene to select a Vice-

Chairman from amongst its members according to Point.6 of Article.9 of the basic law of CMWU.

The duties of the board of directors were stated by Article.10 of the basic law of CMWU. Two of the main responsibilities are:

1. Issuing and ratifying any regulations in connection with water import and supply, fixing fees and cost of water and sewage subscriptions and putting them into effect after obtaining the approval of the Minister of Local Government.
2. Drafting and issuance of regulations on the price and cost of water by cubic meter and putting them into effect after obtaining the approval of the Minister of Local Government

According to Article.26 of the Water Law, the regional utilities hall set the prices of water for different usage, in accordance with the approved tariff system. This Tariff system is a Unified tariff system for water shall be set by PWA according to Article.20 of the Water Law, and shall be approved by the NWC according to Point.4 of Article.9 of the Water Law. And according to Article.1 of the Water Law, the Water Tariff System is a system based on studied standards in order to set a water tariff. So, these two points mainly shall be set in close cooperation and approved mainly by PWA.

About the General assembly of the CMWU, the Basic Law stated in Article.17 that the General Assembly shall consist of all 25 local organizations participatory to the Council. But the General Assembly of the CMWU is considered incomplete since 10 out of 25 municipalities out of the agreement and considered out of the General Assembly including Gaza Municipality which has the highest number of the General Assembly votes among all the municipalities with 14 votes. This certainly negatively affects the legal composition and the ability of the General Assembly to shoulder its functions and responsibilities.

About the role of the PWA and its relation with the CMWU, the Basic Law of the CMWU stated on Point.7 of Article.22 that the PWA in addition to the Ministry of Local Government (MoLG) shall supervise the General Assembly electoral process only. But, the PWA shall have the right to supervise and control regional utilities, in cooperation and coordination with the relevant parties, and to take all the procedures necessary regarding them for violating the provisions of this Law or the regulations or directives issued thereunder as stated by Article.28 of the Water Law. In addition, the National Water

Utilities will be established based on the desire of local committees By virtue of the Water Law according to Article.25 of the Water Law. Accordingly, the Basic Law of the CMWU shall be redrafted to contain clear articles about the duties of the PWA to supervise and control the regional utilities according to the Water Law mainly and any other relevant laws.

Based on these facts on the ground and according to the external political factors disrupt the performance of CMWU at least partially, the Basic Law of CMWU shall be flexible and adapted with the current situation, with retaining of the main function of CMWU to provide the technical support and the administration of water and sewage departments within the municipal entities of the South Governorates in Palestine. For-that, the area of interests and the workspace of the CMWU should be reduced to be limited to build, operate and maintain of water, wastewater and storm-water municipal networks, water wells, and pumping stations. This will keep CMWU as operator and service provider for domestic water supply and sewage collection at the household (HH) level within the areas of the 25 municipal entities in Gaza Strip which is the main purpose of establishing this council.

In the other hand, if the legal shape of CMWU will be changed in the future from CCS to be one of the four regional utilities, the current basic law of CMWU shall be changed to include the provisions of the water law as main reference for its working, and increasing the legal powers of PWA as regulator for the water and wastewater sector under the provisions of the water law.

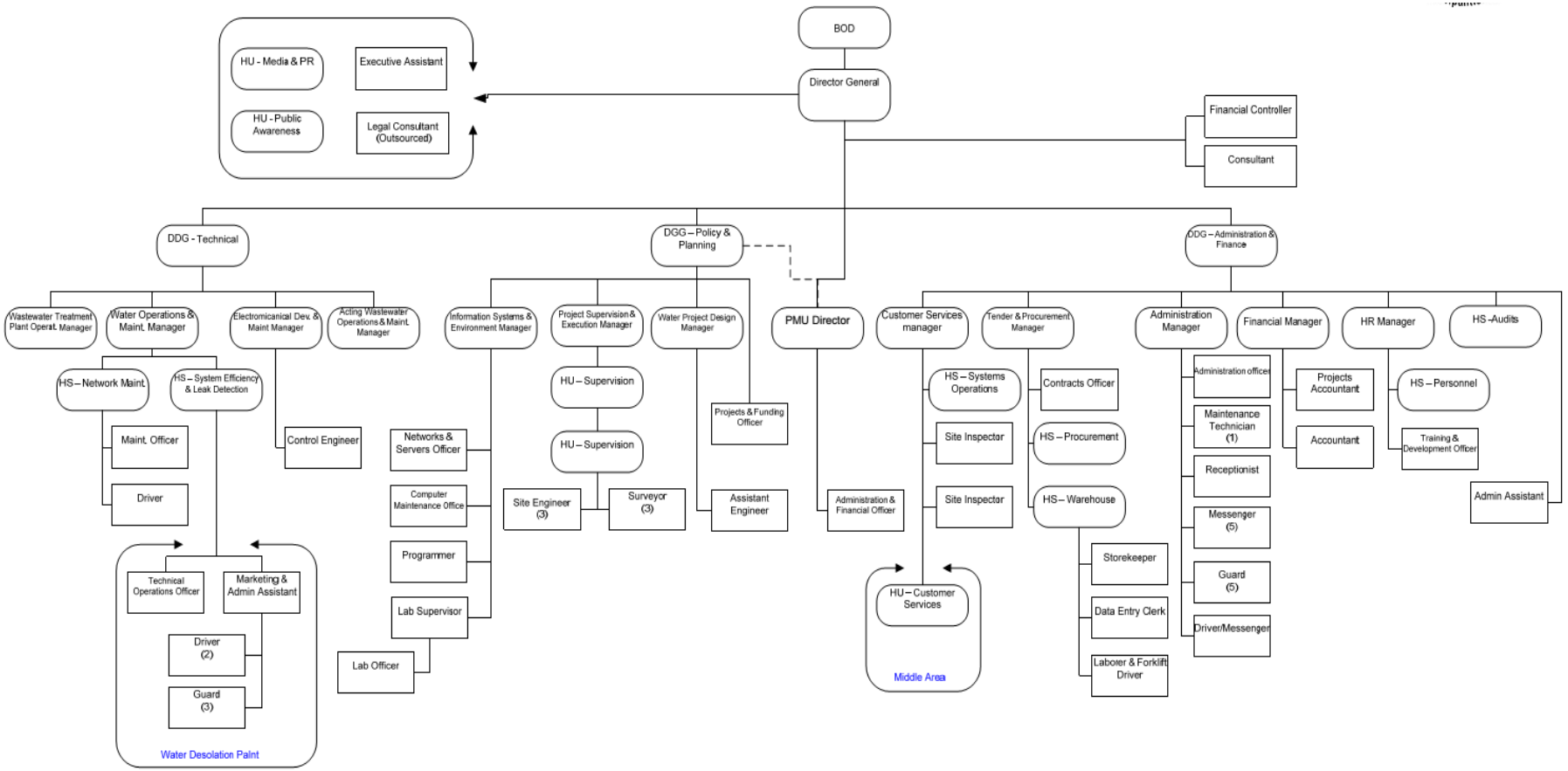
Now, with the current position of CMWU as CCS it shall have five regional offices in the five governorates in Gaza Strip. Headquarter of CMWU will be in Gaza governorate and will be responsible for service providing within the governorate in addition to its position as headquarter for the other four regional office. Each of these offices will be responsible for service providing within the regional limits of each governorate and all the municipal or local councils within the governorate will follow and will be part of this office (Sulyman, 2013).

The Organizational Structure of Coastal Municipalities of Water Utility (CMWU)

The CMWU is managed by a Director General and assisted by three Deputies; Technical, Planning, and Administrative. It has 210 employees spread over Gaza Strip. The

Technical directorate has a “Quality Control Department” that dedicated for water quality control and Water Distillation inspection. Figure 3.3 below represents the 2012 organizational structures within the CMWU.

Figure 3.3: CMWU Institutional Structure



Source: (CMWU, 2012)

3.6 The Interface in the Institutional Framework of the Water Sector in Palestine

3.6.1 The interface in the Policy Level:

The Palestinian water sector is governed by the Palestinian Water Law Number 3 that was issued in 2002. The participation of stakeholders is mentioned in only a few articles (i.e., PWL Article 7), and only in terms of coordination and cooperation with no identification or definition of the "concerned bodies," which means the roles and responsibilities of different actors are not coherently articulated.

The Palestinian Water Law put the monitoring function under the authority of the NWC, and the MC at certain levels. The NWC does not perform such functions due to the fact that it is not acting and the MC has a limited willingness to carry out such monitoring. There are no Presidential decrees (PD) that regulate such factions and it resorts to dealing with more active bodies. Due to this misuse of power, the accountability over the water sector institutions is grossly undermined.

The law missed a few very basic elements for the integrity system that was developed, such as:

- The guarantee of the right of the public in exercising the Information Act, and clear principles of participation of different stakeholders and key actors.
- The PWL fails to clarify the relationship between the PWA and other parties directly or indirectly related to the management of the water sector.
- The PWL provides many overlapping between roles and responsibilities of the reference bodies, such as the NWC and MC.

The Palestinian Legislative Council (PLC) has not been active recently, and when it was active, the role they were supposed to do as the monitoring body of legislation was not carried out in an efficient way. Also, The NWC is not active which results in the functions of the NWC (endorsement and monitoring) not being activated at the water governance level.

Neither the NWC nor MC (the authorised bodies) use the power delegated to them by law and in turn there is a huge gap in the endorsed policies and systems needed to guide the work in the water sector. The absence of endorsed policies and systems leads to chaos within all aspects of the water sector.

There is a clear gap in the endorsement and supervision (monitoring) roles the PLC and NWC are supposed to have over PWA legislative functions. This negatively affects the legislation process and hinders the formulation and adaptations of new laws. In addition, there is a lack of monitoring bodies and accountability which greatly contributes to an increased corruption risk within the water governance system and can greatly affect its integrity. A weak integrity system at the governance level will affect the Integrity Indices at other levels of the water sector.

3.6.2 The interface in the Regulatory Level:

The PWA and other water institutions are acting with an absence of endorsed explanatory notes (EN), working procedures (WP) and internal bylaws. The NWC is currently not functioning for the purpose of endorsing the WP (PWL Article 9, Clause 7) and the MC, who has the actual authority (PWL Article 42), is negating its responsibilities.

Based on Palestinian Water Law No. 3 of 2002, the PWA is responsible for drafting and enforcing laws, policies, internal regulations and systems, and explanatory notes. Based on Chapter 2 Article 7 Clause 2 of the Water Law, the NWC endorses these policies, procedures, and explanatory notes.

Analysis of the articles of the law in this regard reveals that there are some contradictory notes regarding the PWA reference body; the law states that the PWA is under the direct supervision of the president, but in other articles it is mentioned that the PWA should refer to the Ministerial Cabinet.

The PWA is the legally responsible body for regulating and monitoring the water resources. It is clear that the PWA is acting at different levels simultaneously either directly or through its different departments. It manages the resources, checks the technical specifications of the water projects, and provides the licenses. At the same time, it monitors the processes of the licensing and the utilisation of these licenses.

The loose application of the law articles brings up several gaps in the integrity system at the legislation level, such as a weak oversight of the authorised and delegated bodies (NWC, MC) over the implementation of the law and over the performance of the PWA in implementing the law. This loose implementation of the law leads the PWA to act in different areas than those it is entitled to do so by the PWL as a regulator and policy maker. In reality, the PWA acts as project manager and implementer, among other tasks.

In addition to the above mentioned gaps and risks, the water sector project and program is subject to a clear conflict of interest of the PWA's roles. It is a problem that the PWA designs, implements, supervises the implementation, and conducts the monitoring process. This provides fertile ground for the risk of corruption as the PWA acts with no external oversight.

The procurement procedures related to financial and human resources management adhere to the official PNA endorsed mechanisms. Consequently, the risk for potential corruption is minimal as there is a system; the only risk that exists is if the system is violated. There are no clear plans for human resources development. The capacity building activities are based on available opportunities through donors and partner organisations, which present a potential risk area for corruption.

The PWA, as previously mentioned, is carrying out many overlapping functions at the same time: it is the manager of the resources, the licensing body, the regulator, and the monitoring authority without regular coordination with other official bodies such as the EQA, MOA, and MoLG. The PWA does not, as a regulatory body, have the mechanism or tools for regular monitoring over the application of the regulations and systems. There are no measures taken to enforce stakeholders (Line ministries, LGUs, WSSA, JWU, NGOs, etc.) to report regularly to the PWA on their application of the regulations, systems, or standards.

Transparency in the water sector is weak. This weakness referees to the fact that there is no endorsed national plan, the accessibility of the stakeholders to the developed plans are limited, and they have almost no access to the information about the allocated budgets for water.

Also, Participation in the water sector is weak. This weakness referees to the fact that the stakeholders were not involved to a satisfactory level in the developing or the drafting of national water and wastewater plans, in conducting the evaluation for implementation of such plans, or to provide budgets allocated to such draft plans.

In addition to that, the limited capacities of the PWA and the absent role of the NWC are additional reasons for the poor management system. The recent status of the PWA and NWC hinders policy making and planning processes that are needed to guide the management processes of the water sector effectively and efficiently. Also, their ability to

allocate water in an equitable way is greatly hindered due to this framework. Consequently, this cause poor monitoring of the water service providers' performance in managing their water resources or their allocation of bulk water, which results in a high rate of losses of unpaid water, which is considered by AMAN as a form of corruption (loss of public money).

3.6.3 The interface in The Operational Level:

CMWU is responsible for the management and usage of its own underground water wells, springs, and wastewater treatment plants.

The monitoring provided by the PWA for implementation of water related programs and projects is very weak and there are almost no reports submitted about progress to the PWA. LGUs are reporting to the MoLG, but the PWL provides the authorisation to the PWA to monitor and oversee the service providers at the local level. The service providers are using individual pricing and tariff systems that are hardly based on a cost recovery approach and the monitoring of the PWA to such systems is very weak.

Knowledge of the pricing and tariff system is non-existent among different stakeholders, including the PWA. Transparency of water related projects and programs at the implementation level is extremely weak and in many cases non-existent. Furthermore, the level of participation of different stakeholders, including the PWA, in developing the pricing and tariff system is very poor. For example, PWL Article 20 gives the PWA the authorisation to impose unified tariff systems for water, and service providers (PWL Article 26) are supposed to do their own system upon the PWA's endorsed system. In reality, each service provider has its own pricing system, with huge differences in their water price.

Under the PWL Article 28, the PWA is authorised to monitor and supervise the work of service providers, including the implementation of water related projects and programs. This includes acquiring approval on the specifications. In reality, the PWA and service providers are not committed to these articles and the connection involved between them is limited to just the coordination level. PWL Article 33.2 obliges service providers to report to the PWA about water related issues in their service areas and it also authorises the PWA to conduct inspection of these service areas. PWL Articles 33.3 and 35 give the

authority to protect resources, even those within the management level or utilised by service providers to the PWA.

CMWU is responsible for the local water development plan and the local water budgeting. While the MoLG and the PWA approve the plans and budget, the MoLG, General Assembly, and PWA are the monitoring bodies. The PWA supplies bulk water, either from groundwater wells or from Mekerot. This water is distributed by CMWU and is inspected by the PWA.

Regulation on water consumption is broken down into regulations on water used for domestic and agricultural use and regulations on water quality. Water, both for domestic and agricultural use is distributed by CMWU or the private sector. Water for domestic or agricultural use is inspected by the PWA, while water quality in inspected by the MoH.

Operation and maintenance of the water distribution systems is the responsibility of CMWU and is monitored by the PWA. Groundwater wells' and water reservoir operation and maintenance is the responsibility of the well's or reservoir's owner (PWA and CMWU) and is monitored by the PWA. While the owner of an irrigation water distribution system is responsible for its operation and maintenance, there is no monitoring body. The regulation of water connections and illegal connections is the responsibility of the service providers and, in a few cases, the judicial system (regarding illegal connections). Other than the direct supervision of the service providers, there is no external supervision (UNDP, 2012).

Chapter 4

Methodology

4.1 Introduction:

This chapter describes the methodology that was used in this research. The adopted methodology to accomplish this study uses the following techniques: the information about the research design, research population, questionnaire design, statistical data analysis and the content validity and reliability.

4.2 Research Method

The study is a descriptive analytical one since it will best achieve the objective of the research. The main objective is to evaluate the management of interface between Palestinian water Authority and costal municipalities water Utility of water sector in Gaza strip. The research used types of data: primary and secondary resources. The primary resources are mainly through using a questionnaire which was specifically designed for this study. The interviews were also used to discuss the results of the questionnaire and data analysis and find out the suitable justifications for such results. The secondary resources include academic works such as articles, reports, books, special studies and other library housed material. The internet was also used to get recent information about the management of interface.

4.3 Research Population and sample

The population of research was the employees in managerial positions in Palestinian water Authority (PWA) and costal municipalities water Utility (CMWU) that are working in water sector in Gaza Strip. The research used comprehensive survey for all these employees. Therefore the number of employees being surveyed was 89. The details of the sample as shown in table (4.1)

Table (4.1): Number of employees in managerial positions in PWA and CMWU

Title	No. of PWA employees	No. of CMWU employees
Director general	-	1
Deputy Director-General	1	5
Director of Department	11	27
Head of department	2	25
Head of section	2	15
Total	**16**	**73**

Source: (El-Shikh, 2013; Elashy, 2013)

The research population was selected from the staff with managerial positions because they have good experience related to the research topic and they are most capable

to give accurate answers of the research questions. 89 questionnaires were distributed to the research population and 74 questionnaires are received. The response rate was 83.14%.

4.4 The Questionnaire Design

The questionnaire was designed in Arabic language as some members of the target population were unfamiliar with English language and to be more understandable (Appendix A). An English version was attached in (Appendix B). Unnecessary personal data, complex and duplicated questions were avoided. The questionnaire was provided with a covering letter which explained the purpose of the study, the way of responding, the aim of the research and the security of the information in order to encourage high response. A structured questionnaire was specially designed for the study and it consisted of two main sections:

I. The first section was general information about the respondent.

II. The second section was the main body of the questionnaire and it was divided into 5 sub-sections related to the aspects of the management of interface, which are:

1. Communication mechanism and style.
2. The level of Coordination.
3. The clarity of roles and the allocation of responsibilities.
4. Financial resources.
5. Soft and hard skills.

4.5 Pilot Study

A pilot study for the questionnaire was conducted before distributing the questionnaire to all of the study population. A total of 20 questionnaires were distributed to make sure that the questionnaire will give good results to the research; in addition, these questionnaires were used in the analysis, because the number of the employees in managerial positions is small.

4.6 Data Measurement

In order to be able to select the appropriate method of analysis, the level of measurement must be understood. Numerical scale 1-10 was used, where "1" indicates high disagree while "10" indicates strong agree.

4.7 Statistical analysis Tools

The researcher used data analysis both qualitative and quantitative data analysis methods. The Data analysis was made utilizing (SPSS 21). The researcher utilized the following statistical tools:

1) Kolmogorzov-Smirnov test of normality.
2) Pearson correlation coefficient for Validity.
3) Cronbach's Alpha for Reliability Statistics.
4) Frequency and Descriptive analysis.
5) Parametric Tests (One-sample T test, Independent Samples T-test and Analysis of Variance).

4.7.1 Test of Normality

The One-Sample Kolmogorov-Smirnov Test procedure compares the observed cumulative distribution function for a variable with a specified theoretical distribution, which may be normal, uniform, Poisson, or exponential. The Kolmogorov-Smirnov Z is computed from the largest difference (in absolute value) between the observed and theoretical cumulative distribution functions. This goodness-of-fit test tests whether the observations could reasonably have come from the specified distribution. Many parametric tests require normally distributed variables. The one-sample Kolmogorov-Smirnov test can be used to test that a variable of interest is normally distributed (Thode, 2002).

Table (4.2) shows the results for Kolmogorov-Smirnov test of normality. From Table (4.2), the p-value for each variable is greater than 0.05 level of significance, then the distributions for these variables are normally distributed. Consequently, parametric tests will be used to perform the statistical data analysis.

Table (4.2): Kolmogorov-Smirnov test

Field	Kolmogorov-Smirnov	
	Statistic	P-value
Communication mechanism and style	0.838	0.484
The level of coordination	0.732	0.658
The clarity of roles and the allocation of responsibilities	0.957	0.319
Financial resources	0.847	0.470
soft and hard skills	1.127	0.158
All paragraphs of the questionnaire	**0.864**	**0.444**

4.7.2 Validity and reliability of the study tool:

4.7.2.1 First: Validity of referees:

The initial questionnaire has been given to a group of referees to judge the validity of it according to its content, the clarity of its items meaning, and suitability to avoid any misunderstanding and to assure its linkage with the main study aims. After a detailed feedback from the referees, the possible adaptation has been done to meet their suggestions. (See table 4.3)

Table (4.3): The number of the questionnaire's items specified according to each aspect

No.	Aspect	Number of items
1	Communication mechanism and style	12
2	The level of Coordination	11
3	The clarity of roles and the allocation of responsibilities	9
4	Financial resources	12
5	Soft and hard skills	12
Total		**56**

4.7.2.2 Second: The validity of the questionnaire

Validity refers to the degree to which an instrument measures what it is supposed to be measuring(Polit & Hungler, 1985). Validity has a number of different aspects and assessment approaches. Statistical validity is used to evaluate instrument validity, which include internal validity and structure validity.

To insure the validity of the questionnaire, two statistical tests should be applied. The first test is Criterion-related validity test (Pearson test) which measures the correlation coefficient between each paragraph in one field and the whole field. The second test is structure validity test (Pearson test) that used to test the validity of the questionnaire structure by testing the validity of each field and the validity of the whole questionnaire. It measures the correlation coefficient between one field and all the fields of the questionnaire.

4.7.2.2.1 Internal Validity

Internal validity of the questionnaire is the first statistical test that used to test the validity of the questionnaire. It is measuring the correlation coefficients between each paragraph in one field and the whole field.

Table (4.4) clarifies the correlation coefficient for each paragraph of the "Communication mechanism and style" and the total of the field. The p-values (Sig.) are less than 0.05, so the correlation coefficients of this field are significant at $\alpha = 0.05$, so it can be said that the paragraphs of this field are consistent and valid to be measure what it was set for.

Table (4.4): Correlation coefficient of each paragraph of "Communication mechanism and style" and the total of this field

No.	Paragraph	Pearson Correlation Coefficient	P-Value (Sig.)
1.	There is ease of communication and exchange of information and transfer of ideas from the lower levels to the higher levels in the organization, and vice versa	.786	0.000*
2.	The combination of horizontal and vertical communication is prevailing in the organization	.789	0.000*
3.	The use of formal communication between the various levels of management across the hierarchy is prevailing in the organization	.746	0.000*
4.	The organization relies on the combination of the formal and informal communication to exchange information	.601	0.000*
5.	The use of direct oral communication between the various levels of management is prevailing in the organization (direct meetings)	.667	0.000*
6.	There is a diversification in the use of means of communication between the various levels of management within the organization	.792	0.000*
7.	The organizational structure (hierarchical or horizontal) helps in the communication process effectiveness between the Authority and the Utility	.778	0.000*
8.	The used technology helps the communication process effectiveness between the Authority and the Utility	.807	0.000*
9.	The formal communication is used between the Authority and Utility employees to exchange information	.711	0.000*
10.	The informal communication is used between the Authority and the Utility employees to exchange information	.476	0.000*
11.	The use of direct oral communication between the Authority and the Utility is prevailing to exchange information	.654	0.000*
12.	There is a diversification in the use of communication means between the Authority and the Utility	.799	0.000*

* Correlation is significant at the 0.05 level

Table (4.5) clarifies the correlation coefficient for each paragraph of the "The level of coordination" and the total of the field. The p-values (Sig.) are less than 0.05, so the

correlation coefficients of this field are significant at α = 0.05, so it can be said that the paragraphs of this field are consistent and valid to be measure what it was set for.

Table (4.5): Correlation coefficient of each paragraph of "The level of coordination" and the total of this field

No.	Paragraph	Pearson Correlation Coefficient	P-Value (Sig.)
1.	There is a clear commitment by the administration to participate in the coordination processes within the organization.	.622	0.000*
2.	All managers / officials of the organization are linked through a unified database	.730	0.000*
3.	In the early stages of the development of new policies, managers discuss them before adopting the appropriate policies within the organization.	.693	0.000*
4.	There is an accurate specification for the work duties and responsibilities among the staff of the organization	.763	0.000*
5.	All managers / officials of the Authority and the Utility are linked through a unified database through a joint database	.708	0.000*
6.	In the early stages of the development of new policies, managers discuss them before adopting the appropriate policies between the Authority and the Utility	.748	0.000*
7.	There is an accurate identification for the work duties and responsibilities between the Authority and the Utility	.881	0.000*
8.	The Authority and the Utility managers meet on a regular basis to exchange information, and make joint decisions.	.753	0.000*
9.	There is harmony in the goals the Authority and the Utility	.790	0.000*
10.	There is a good coordination between the Authority and the Utility to achieve the goals	.884	0.000*
11.	There is a clear commitment in both to participate in joint coordination processes between the Authority and the Utility and to make them work efficiently	.833	0.000*

* Correlation is significant at the 0.05 level

Table (4.6) clarifies the correlation coefficient for each paragraph of the "The clarity of roles and the allocation of responsibilities" and the total of the field. The p-values (Sig.) are less than 0.05, so the correlation coefficients of this field are significant at α = 0.05, so it can be said that the paragraphs of this field are consistent and valid to be measure what it was set for.

Table (4.6): Correlation coefficient of each paragraph of "The clarity of roles and the allocation of responsibilities" and the total of this field

No.	Paragraph	Pearson Correlation Coefficient	P-Value (Sig.)
1.	The purposes and objectives of each functional task are clearly specified within the organization	.828	0.000*
2.	Every employee knows his role and duties accurately in the organization	.743	0.000*
3.	Employees within the organization are committed to the job description and organizational structure and systems	.742	0.000*
4.	There are formal rules and procedures that identify the role and responsibility of every employee in the organization	.870	0.000*
5.	There is a regular and effective communication process which helps roles and responsibilities clarity of each employee in the organization	.745	0.000*
6.	There are formal rules and procedures that clarify role and responsibility of both the Authority and the Utility	.742	0.000*
7.	There is a regular and effective communication process which helps roles and responsibilities clarity of both the Authority and the Utility	.867	0.000*
8.	The existing organizational structure of the Authority and the Utility helps in the clarity of roles and in the identification of responsibilities between them	.823	0.000*
9.	There are laws and legislation that identify the roles and responsibilities of the Authority and the Utility accurately	.694	0.000*

* Correlation is significant at the 0.05 level

Table (4.7) clarifies the correlation coefficient for each paragraph of the "Financial resources" and the total of the field. The p-values (Sig.) are less than 0.05, so the correlation coefficients of this field are significant at $\alpha = 0.05$, so it can be said that the paragraphs of this field are consistent and valid to be measure what it was set for.

Table (4.7): Correlation coefficient of each paragraph of "Financial resources" and the total of this field

No.	Paragraph	Pearson Correlation Coefficient	P-Value (Sig.)
1.	There are clear procedures and policies for the use of financial resources in the organization	.854	0.000*
2.	The financial reports are prepared to management periodically and regularly (for example, every month) at a good degree	.865	0.000*
3.	The financial resources are properly distributed at projects	.857	0.000*
4.	There is a transparency in the use of financial resources in the organization	.890	0.000*
5.	There is an allocation for the necessary funds for the implementation of future projects at a good degree	.772	0.000*
6.	The financial reports allow to compare account balances with estimates or estimated budgets	.860	0.000*
7.	The financial statements are subject to a comprehensive and periodic reviews, including comparisons with the previous period and the amounts of estimated budgets	.855	0.000*
8.	There is a good financial transparency between the two organizations	.816	0.000*
9.	There is a good coordination between the Authority and the Utility to achieve optimal use of available resources	.857	0.000*
10.	There is a good coordination between the Authority and the Utility to support the long term strategic funding and the priorities of funding requirements	.815	0.000*
11.	There are laws and legislations that organize the use of financial resource between the two organizations	.832	0.000*
12.	The two organizations publish financial reports periodically	.846	0.000*

* Correlation is significant at the 0.05 level

Table (4.8) clarifies the correlation coefficient for each paragraph of the "Soft and hard skills" and the total of the field. The p-values (Sig.) are less than 0.05, so the correlation coefficients of this field are significant at $\alpha = 0.05$, so it can be said that the paragraphs of this field are consistent and valid to be measure what it was set for.

Table (4.8): Correlation coefficient of each paragraph of " Soft and hard skills " and the total of this field

No.	Paragraph	Pearson Correlation Coefficient	P-Value (Sig.)
1.	The manager / official can use written and verbal communication skills including listening easily	.861	0.000*
2.	The manager / official can make decisions which affect him or others	.877	0.000*
3.	The manager / official delegates Authority to others to help them learn	.850	0.000*
4.	The manager / official can put goals and long term vision to all tasks, and can help others to do the same thing	.859	0.000*
5.	The manager / official possess the skill of dealing with the used computer programs easily	.789	0.000*
6.	The manager / official possess the skill of improving water quality standard	.851	0.000*
7.	The manager / official possess the skill of preserving the surrounding environment quality	.902	0.000*
8.	The managers / officials of the Authority and the Utility have written and oral communication skills that facilitate communication process between them	.747	0.000*
9.	The managers / officials of the Authority and the Utility have the skill of ability of joint problem solving effectively	.837	0.000*
10.	The managers / officials of the Authority and the Utility can set goals and long term vision for all joint tasks, and they can help others to do the same thing	.874	0.000*
11.	The managers / officials of the Authority and the Utility possess the skill of setting joint development programs to develop water system	.899	0.000*
12.	There are joint training programs between the Authority and the Utility which enhance the completion of the joint work effectively	.784	0.000*

* Correlation is significant at the 0.05 level

4.7.2.2.2 Structure Validity of the Questionnaire

Structure validity is the second statistical test that used to test the validity of the questionnaire structure by testing the validity of each field and the validity of the whole questionnaire. It measures the correlation coefficient between one field and all the fields of the questionnaire that have the same level of liker scale.

Table (4.9) clarifies the correlation coefficient for each field and the whole questionnaire. The p-values (Sig.) are less than 0.05, so the correlation coefficients of all the fields are significant at $\alpha = 0.05$, so it can be said that the fields are valid to be measured what it was set for to achieve the main aim of the study.

Table 4.9: Correlation coefficient of each field and the whole of questionnaire

No.	Field	Pearson Correlation Coefficient	P-Value (Sig.)
1.	Communication mechanism and style	.819	0.000*
2.	The level of coordination	.940	0.000*
3.	The clarity of roles and the allocation of responsibilities	.880	0.000*
4.	Financial resources	.875	0.000*
5.	Soft and hard skills	.856	0.000*

* Correlation is significant at the 0.05 level

4.7.2.3 Third: The reliability of the research

The reliability of an instrument is the degree of consistency which measures the attribute; it is supposed to be measuring. The less variation an instrument produces in repeated measurements of an attribute, the higher its reliability. Reliability can be equated with the stability, consistency, or dependability of a measuring tool. The test is repeated to the same sample of people on two occasions and then compares the scores obtained by computing a reliability coefficient. To insure the reliability of the questionnaire, Cronbach's Coefficient Alpha should be applied.

Cronbach's Coefficient Alpha

This method is used to measure the reliability of the questionnaire between each field and the mean of the whole fields of the questionnaire. The normal range of Cronbach's coefficient alpha value between 0.0 and + 1.0, and the higher values reflects a higher degree of internal consistency. The Cronbach's coefficient alpha was calculated for each field of the questionnaire.

Table (4.10) shows the values of Cronbach's Alpha for each field of the questionnaire and the entire questionnaire. For the fields, values of Cronbach's Alpha were in the range from 0.909 and 0.962. This range is considered high; the result ensures the reliability of each field of the questionnaire. Cronbach's Alpha equals 0.979 for the entire questionnaire which indicates an excellent reliability of the entire questionnaire.

Table (4.10): Cronbach's Alpha for each field of the questionnaire

No.	Field	Cronbach's Alpha
1.	Communication mechanism and style	0.909
2.	The level of coordination	0.927
3.	The clarity of roles and the allocation of responsibilities	0.919
4.	Financial resources	0.961
5.	Soft and hard skills	0.962
	All paragraphs of the questionnaire	**0.979**

Thereby, it can be said that the researcher proved that the questionnaire was valid, reliable, and ready for distribution for the population sample.

Chapter 5

Data Analysis and Discussion

5.1 Introduction:

In this chapter the results of the data analysis which has been conducted on the study sample have been explained. Then the results were analyzed and discussed to evaluate the management of interface between Palestinian water Authority and costal municipalities water Utility of water sector in Gaza strip. This chapter has been divided to two sections: 1) Analyzing the properties of the sample. 2) Discussion of research dimensions and hypothesis testing.

1. Gender

Table No. (5.1) shows that 82.4% of the sample are Males and 17.6% of the sample are Females. It is clear that the gap between males and females is still great to participate in the workforce, reaching 69.0% for males and 17.1% for females in aPalestine (Palestinian Central Bureau of Statistics, 2013). It is noticed that the ratio of females of the sample is almost the same ratio as in the employed female in the Palestinian society in Gaza strip. Also, the researcher attributes that to work nature which requires employing males more than females.

Table (5.1): Gender

Gender	Frequency	Percent
Male	61	82.4
Female	13	17.6
Total	74	100.0

2. Age

Table No.(5.2) shows that 2.7% of the sample are " Less than 30 ", 50.0% of the sample are of "30 – Less than 40 years ", 27.0% of the sample are of "40 – Less than 50 " and 20.3% of the sample are of "50 years and more ". It is noticed that most of respondents are 30 to less than 40. This indicates that most of managers are comparatively young. The researcher attributes that to the recent establishment of both organizations.

Table (5.2): Age

Age	Frequency	Percent
Less than 30	2	2.7
30 – Less than 40	37	50.0
40 – Less than 50	20	27.0
50 years and more	15	20.3
Total	74	100.0

3. Years of Experience

Table No.(5.3) shows that 1.4% of the sample have experience " Less than 3 years",14.9% of the sample have experience "3 – Less than 6 year ", 23.0% of the sample have experience "6- less than 10 years " and 60.8% of the sample have experience " 10 years and more " . Most of respondents have long years of experience that allows them to accomplish the work effectively. This is probably because reaching a senior position in the system depends mainly on the length of experience. Also, managers have been working in the PWA and CMWU since their establishment that's why they gained experience.

Table (5.3): Years of Experience

Years of Experience	Frequency	Percent
Less than 3 year	1	1.4
3 – Less than 6 year	11	14.9
6- less than 10 years	17	23.0
10 years and more	45	60.8
Total	74	100.0

4. Job title

Table No.(5.4) shows that 8.1% of the sample are " Deputy Director-General ", 43.2% of the sample are " Director of Department ", 28.4% of the sample are " Head of Department " and 20.3% of the sample are " Head of section ". The researcher attributes that this result commensurate with the nature of hierarchical structure, where there are fewer managers in the upper levels of the hierarchical structure, and there are more supervisors and heads of sections in lower levels.

Table (5.4): Job title

Job title	Frequency	Percent
Director-General	-	-
Deputy Director-General	6	8.1
Director of Department	32	43.2
Head of Department	21	28.4
Head of Section	15	20.3
Total	74	100.0

5. Qualification

Table No.(5.5) shows that 60.6% of the sample are " Bachelor " holders, 37.8% of the sample are " Master " holders and 1.4% of the sample are " PH.D " holders . The ratio of high educated employee (bachelor degree and post graduate) here is much higher than their ratio in the Palestinian society which equals 14.2% only (Palestinian Central Bureau of Statistics, 2013). The researcher attributes that to the most of the sample have

the bachelor degree which match the work requirement and allow them to perform the work effectively.

Table (5.5): Qualification

Qualification	Frequency	Percent
High school	-	-
Diploma	-	-
Bachelor	45	60.8
Master	28	37.8
PH.D	1	1.4
Total	74	100.0

6. Name of organization

Table No.(5.6) shows that 21.6% of the sample are " Palestinian water Authority " and 78.4% of the sample are " Coastal Municipalities Water Utility " employee . The majority of respondents from Coastal Municipalities Water Utility and the reason here is due to the current political situation. Also, it may reflect that the role of PWA is to draw policies, monitoring and supervising, therefore it does not need a large number of employees.

Table (5.6): Name of organization

Name of organization	Frequency	Percent
Palestinian water authority	16	21.6
Coastal Municipalities Water Utility	58	78.4
Total	74	100.0

5.2 Discussion of research dimensions and hypothesis testing

1. The Management of interface is influenced by the communication mechanism style.

I. Communication mechanism and style – internal

Table (5.7) shows the following results:

- The mean of paragraph #6 “There is a diversification in the use of means of communication between the various levels of management within the organization” equals 7.68 (76.76%), Test-value = 8.70, and P-value = 0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this paragraph is significantly greater than the hypothesized value 6. As a result, the respondents agree to this paragraph. In other words, most of study respondents agree that their organizations use a variety of means of communication between the various

levels of management in the organization. The result may indicate that the use of different communication means speeds up the decision making process and will make decisions more efficient and sufficient.

- The mean of paragraph #2 “The combination of horizontal and vertical communication is prevailing in the organization” equals 7.03 (70.27%), Test-value = 4.51, and P-value = 0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this paragraph is significantly greater than the hypothesized value 6. As a result, the respondents agree to this paragraph. In other words, most of study respondents agree that their organizations use both horizontal and vertical communication. This result indicates that there is a combination of horizontal and vertical communication in the two organizations which strengthens the relationship between all managers in the various levels of the hierarchal structure.
- The mean of the field “Communication mechanism and style- internal” equals 7.45 (74.51%), Test-value = 9.44, and P-value=0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this field is significantly greater than the hypothesized value 6. As a result, the respondents agree to field of “Communication mechanism and style- internal ". The result indicates an overall good level of the internal Communication mechanism and style in the two organizations. The result may reflect that there is an ease of communication process across the organizational structure, using different means and mechanisms of communication and the good relationship between the employees in the organizations. Also, the managers know the importance of communication in the efficiency and sufficiency of decisions making process which helps in accomplishing the organization goals.

Table (5.7): Means and Test values for "Communication mechanism and style-internal"

No.	Item	Mean	Proportional mean (%)	Test value	P-value (Sig.)	Rank
1.	There is ease of communication and exchange of information and transfer of ideas from the lower levels to the higher levels in the organization, and vice versa	7.16	71.62	5.68	0.000*	5
2.	The combination of horizontal and vertical communication is prevailing in the organization	7.03	70.27	4.51	0.000*	6
3.	The use of formal communication between the various levels of management across the hierarchy is prevailing in the organization	7.65	76.49	10.00	0.000*	2
4.	The organization relies on the combination of the formal and informal communication to exchange information	7.63	76.30	9.37	0.000*	3
5.	The use of direct oral communication between the various levels of management is prevailing in the organization (direct meetings)	7.61	76.08	8.82	0.000*	4
6.	There is a diversification in the use of means of communication between the various levels of management within the organization	7.68	76.76	8.70	0.000*	1
	All paragraphs of the field	7.45	74.51	9.44	0.000*	

* The mean is significantly different from 6

II. Communication mechanism and style - external

Table (5.8) shows the following results:

- The mean of paragraph #3 "The formal communication is used between the Authority and Utility employees to exchange information" equals 7.24 (72.43%), Test-value = 6.50, and P-value = 0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this paragraph is significantly greater than the hypothesized value 6. As a result, the respondents agree to this paragraph. In other words, most of study respondents agree that the communications between the Authority and the Utility occur in a formal way. This result reflects that there is no social relationship between the managers of the two organizations and the relation is only for work which reflects the nature of the relationship between them, and because the external communication is typically formal (Krizan et al., 2008, p.9).

- The mean of paragraph #4 “The informal communication is used between the Authority and the Utility employees to exchange information” equals 6.08 (60.81%), Test-value = 0.32, and P-value = 0.376 which is greater than the level of significance $\alpha = 0.05$. Then the mean of this paragraph is insignificantly different from the hypothesized value 6. As a result, that the respondents (Do not know, neutral) to this paragraph. In other words, most of study respondents moderately agree that the communication between the Authority and the Utility occur in informal way. It also reflects the nature of the relationship between the mangers of the Authority and the Utility.
- The mean of the field “Communication mechanism and style- external” equals 6.87 (68.68%), Test-value = 5.67, and P-value=0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this field is significantly greater than the hypothesized value 6. As a result, the respondents agree to field of “Communication mechanism and style - external ".The result indicates an overall acceptable level of the external Communication mechanism and style between the two organizations. The results reflect that the communication mechanism and style needs to be improved between the Authority and the Utility. There is a need to use variety of communication means and improve the use of technology, the organizational structure and informal relationship to ease the communication, to develop the services speed up and the decision making process between the Authority and the Utility.

Table (5.8): Means and Test values for "Communication mechanism and style - external"

No.	Item	Mean	Proportional mean (%)	Test value	P-value (Sig.)	Rank
1.	The organizational structure (hierarchical or horizontal) helps in the communication process effectiveness between the Authority and the Utility	7.14	71.35	6.46	0.000*	3
2.	The used technology helps the communication process effectiveness between the Authority and the Utility	7.19	71.89	6.01	0.000*	2
3.	The formal communication is used between the Authority and Utility employees to exchange information	7.24	72.43	6.50	0.000*	1
4.	The informal communication is used between the Authority and the Utility employees to exchange information	6.08	60.81	0.32	0.376	6
5.	The use of direct oral communication between the Authority and the Utility is prevailing to exchange information	6.82	68.19	4.06	0.000*	4
6.	There is a diversification in the use of communication means between the Authority and the Utility	6.74	67.43	3.67	0.000*	5
	All paragraphs of the field	6.87	68.68	5.67	0.000*	

* The mean is significantly different from 6

III. Communication mechanism and style

The mean of the field "Communication mechanism and style" equals 7.16 (71.60%), Test-value = 8.23, and P-value=0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this field is significantly greater than the hypothesized value 6. As a result, the respondents agree to field of "Communication mechanism and style ".

The results of this field show that there is an overall good communication mechanism and style. The result may reflect the need to develop and improve the communication mechanism and style in the two organizations and between them. The research result agrees with McCarney and Gibb (2012), they found that the open communication between all stakeholders is essential to resolve organizational interfaces issues. Moreover, Shokri et al (2012) found that mega projects face conflicts and issues

because of misalignment between stakeholders, and insufficient communication process between them. Chen et al (2007) concluded that there is a need to build and maintain desirable relationships and interaction channels among project participants to achieve timely communication. While, the result of this research disagrees with the study of Mortaheb et al (2010) which highlighted that there is a poor communication between contractors and Other Parties (The Owner, Engineering Parties, and Consultants). Chen et al. (2008) highlighted that the lack of communication often results from unknown information needs. (Rong-Yau et al., 2008), Ku et al. (2010) and Weshah et al. (2013) found that there is lack of effective communication among relevant parties involved in the project.

So, we can conclude that better communication mechanism and style has a directly positive influence on better management of interface, with statistically significant results.

Table (5.9): Means and Test values for Communication mechanism and style

Field	Mean	Proportional mean (%)	Test value	P-value (Sig.)
Communication mechanism and style	7.16	71.60	8.23	0.000*

*The mean is significantly different from 6

2. The Management of interface is influenced by the level of Coordination.

I. The level of coordination - internal

Table (5.10) shows the following results:

- The mean of paragraph #1 "There is a clear commitment by the administration to participate in the coordination processes within the organization" equals 7.23 (72.30%), Test-value = 5.62 and P-value = 0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this paragraph is significantly greater than the hypothesized value 6. We conclude that the respondents agree to this paragraph. In other words, most of study respondents agree that the administration of their organizations have a clear commitment to participate in the coordination processes within their organizations. It reflects the understanding of the administration to the coordination processes inside the organization.

- The mean of paragraph #2 "All managers / officials of the organization are linked through a unified database" equals 6.24 (62.43%), Test-value = 0.98, and P-value = 0.164 which is greater than the level of significance $\alpha = 0.05$. Then the mean of this paragraph is insignificantly different from the hypothesized value 6. As a result, the respondents (Do not know, neutral) to this paragraph. In other words, most of study respondents moderately agree that there is a linkage through a unified database between the managers in the organization. It reflects the absence of the technology in the coordination process in the organizations.
- The mean of the field "The level of coordination- internal" equals 6.76 (67.64%), Test-value = 4.44, and P-value=0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this field is significantly greater than the hypothesized value 6. As a result, the respondents agree to field of "The level of coordination - internal ".The result indicates an overall acceptable level of the internal coordination in the two organizations. This result may indicate the good interrelation between all the directors of each department. The result reflects the need to improve the level of coordination in the two organizations. There is a need to use the technology to ease the access to the information to facilitate the coordination process.

Table (5.10): Means and Test values for "The level of coordination- internal"

No.	Item	Mean	Proportional mean (%)	Test value	P-value (Sig.)	Rank
1.	There is a clear commitment by the administration to participate in the coordination processes within the organization.	7.23	72.30	5.62	0.000*	1
2.	All managers / officials of the organization are linked through a unified database	6.24	62.43	0.98	0.164	4
3.	In the early stages of the development of new policies, managers discuss them before adopting the appropriate policies within the organization.	7.04	70.41	5.19	0.000*	2
4.	There is an accurate specification for the work duties and responsibilities among the staff of the organization	6.54	65.41	2.46	0.008*	3
	All paragraphs of the field	6.76	67.64	4.44	0.000*	

* The mean is significantly different from 6

II. The level of coordination – external

Table (5.11) shows the following results:

- The mean of paragraph #7 "There is a clear commitment in both to participate in joint coordination processes between the Authority and the Utility and to make them work efficiently" equals 6.85 (68.51%), Test-value = 3.74 and P-value = 0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this paragraph is significantly greater than the hypothesized value 6. As a result, the respondents agree to this paragraph. In other words, most of study respondents agree that there is a clear commitment in both to participate in joint coordination processes between the Authority and the Utility and to make them work efficiently. It may reflect the understanding of the managers of the Authority and the Utility to participate in joint coordination processes between them.
- The mean of paragraph #1 "All managers / officials of the Authority and the Utility are linked through a unified database through a joint database" equals 4.70 (47.03%), Test-value = -4.39, and P-value = 0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is negative, so the mean of this paragraph is significantly smaller than the hypothesized value 6. As a result, the respondents disagree to this paragraph. In other words, most of study respondents do not agree that there is a linkage through a unified database through a joint database between the Authority and the Utility. It may reflect that the two organizations are still using the traditional means in coordination between the Authority and the Utility and the managers are still not aware of the importance of a unified database.
- The mean of the field "The level of coordination- external" equals 6.20 (61.99%), Test-value = 1.02, and P-value=0.312 which is greater than the level of significance $\alpha = 0.05$. The mean of this field is insignificantly different from hypothesized value 6. We conclude that the respondents (Do not know, neutral) to field of "The level of coordination - external ". The result indicates an overall moderate level of coordination between the two organizations. It may reflect that there is no clear obligation between both organizations to participate in the coordination process. The result reflects the need to improve the level of coordination between the two organizations. There is a need to use the technology to ease the access to the information to facilitate the coordination process.

Table (5.11): Means and Test values for "The level of coordination- external"

No.	Item	Mean	Proportional mean (%)	Test value	P-value (Sig.)	Rank
1.	All managers / officials of the Authority and the Utility are linked through a unified database through a joint database	4.70	47.03	-4.39	0.000*	7
2.	In the early stages of the development of new policies, managers discuss them before adopting the appropriate policies between the Authority and the Utility	6.01	60.14	0.05	0.479	6
3.	There is an accurate identification for the work duties and responsibilities between the Authority and the Utility	6.22	62.16	0.94	0.175	5
4.	The Authority and the Utility managers meet on a regular basis to exchange information, and make joint decisions.	6.28	62.84	1.26	0.105	4
5.	There is harmony in the goals the Authority and the Utility	6.66	66.62	2.91	0.002*	2
6.	There is a good coordination between the Authority and the Utility to achieve the goals	6.66	66.62	3.00	0.002*	2
7.	There is a clear commitment in both to participate in joint coordination processes between the Authority and the Utility and to make them work efficiently	6.85	68.51	3.74	0.000*	1
	All paragraphs of the field	**6.20**	**61.99**	**1.02**	**0.312**	

* The mean is significantly different from 6

III. The level of coordination

The mean of the field "The level of coordination" equals 6.40 (64.04%), Test-value = 2.27, and P-value=0.013 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this field is significantly greater than the hypothesized value 6 but with small amount. As a result, the respondents agree to field of "The level of coordination". The result indicates an overall acceptable level of coordination between the two organizations. However, the result identifies the necessary to develop the level of coordination. This is in agreement with Kelly & Berger (2006) study which highlighted the importance of the interactions between people to be managed and carefully coordinated to avoid incidents resulting from misunderstandings and lack of information. While, Mortaheb et al (2010) found that there is poor contractor's coordination with other parties in the project. Chen et al (2007) concluded that the use of interface management

can build and maintain desirable relationships and interaction channels among project participants to achieve timely coordination, and cooperation. McCarney and Gibb (2012) found that the importance of early engagement of the contractor in the design process is essential to resolve organizational interfaces issues. (Rong-Yau et al., 2008) highlighted that there is hardship of coordination between interfaces Parties' different opinions on mutual views and needs. Weshah et al. (2013) found that there is lack of enough coordination among relevant parties involved in the project. Chen et al. (2008) found that the currently prevailing project delivery methods (except Design-build) could not enable coordination between designers and contractors. The same issue exists among specialty subcontractors without a direct contracting relationship to each other. Also he stated seven minor causes for poor coordination.

So, we can conclude that better level of coordination has a directly positive influence on better management of interface, with statistically significant results.

Table (5.12): Means and Test values for "The level of coordination"

Field	Mean	Proportional mean (%)	Test value	P-value (Sig.)
The level of coordination	6.40	64.04	2.27	0.013*

*The mean is significantly different from 6

3. The Management of interface is influenced by the clarity of roles and the allocation of responsibilities.

I. The clarity of roles and the allocation of responsibilities- internal

Table (5.13) shows the following results:

- The mean of paragraph #2 "Every employee knows his role and duties accurately in the organization" equals 7.36 (73.65%), Test-value = 7.85, and P-value = 0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this paragraph is significantly greater than the hypothesized value 6. We conclude that the respondents agree to this paragraph. In other words, most of study respondents agree that employees know their roles and duties accurately on the organization at a good degree. It reflects that the employees good understanding of their roles and duties is due to the clear polices and the by-laws in the two organizations.

- The mean of paragraph #5 “There is a regular and effective communication process which helps roles and responsibilities clarity of each employee in the organization” equals 6.76 (67.57%), Test-value = 3.96, and P-value = 0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this paragraph is significantly greater than the hypothesized value 6. We conclude that the respondents agree to this paragraph. In other words, most of study respondents agree that there is a regular and effective communication process which helps roles and responsibilities clarity of each employee in the organization. It may reflect that managers are aware of the importance of communication in identifying roles and responsibilities.
- The mean of the field “The clarity of roles and the allocation of responsibilities-internal” equals 7.13 (71.32%), Test-value = 7.29, and P-value=0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this field is significantly greater than the hypothesized value 6. We conclude that the respondents agree to field of “The clarity of roles and the allocation of responsibilities - internal ".The result indicates an overall good level of the clarity of roles and the allocation of responsibilities in the two organizations. The result reflects the need to improve the clarity of roles and the allocation of responsibilities in the two organizations. This result may reflect that there is clear purpose and goals of the assignment in the two organizations. However, there is a need to improve the organizational structure in the two organizations to guarantee that every employee have a knowledge about his role and duties and do it effectively. Also, there is a need to improve the communication process to help more in the clarity of the roles and responsibilities for every employee.

Table (5.13): Means and Test values for "The clarity of roles and the allocation of responsibilities- internal"

No.	Item	Mean	Proportional mean (%)	Test value	P-value (Sig.)	Rank
1.	The purposes and objectives of each functional task are clearly specified within the organization	7.18	71.76	7.13	0.000*	3
2.	Every employee knows his role and duties accurately in the organization	7.36	73.65	7.85	0.000*	1
3.	Employees within the organization are committed to the job description and organizational structure and systems	7.18	71.76	6.19	0.000*	3
4.	There are formal rules and procedures that identify the role and responsibility of every employee in the organization	7.19	71.89	6.92	0.000*	2
5.	There is a regular and effective communication process which helps roles and responsibilities clarity of each employee in the organization	6.76	67.57	3.96	0.000*	5
	All paragraphs of the field	7.13	71.32	7.29	0.000*	

* The mean is significantly different from 6

II. The clarity of roles and the allocation of responsibilities - external

Table (5.14) shows the following results:

- The mean of paragraph #4 "There are laws and legislation that identify the roles and responsibilities of the Authority and the Utility accurately" equals 6.54 (65.41%), Test-value = 2.41, and P-value = 0.009 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this paragraph is significantly greater than the hypothesized value 6 but with small amount. We conclude that the respondents agree to this paragraph. In other words, most of study respondents agree that the laws and legislation identify the roles and responsibilities of the Authority and the Utility. It may reflect that there is no enough interaction between the legislators and all stakeholders. Also, it reflects that there is a need to improve the laws and legislation that identify the roles and responsibilities of each organization to help in the clarity of roles and responsibilities.
- The mean of paragraph #3 "The existing organizational structure of the Authority and the Utility helps in the clarity of roles and in the identification of responsibilities between them" equals 6.30 (62.97%), Test-value = 1.47, and P-value = 0.072 which is greater than the level of significance $\alpha = 0.05$. Then the mean of this paragraph is insignificantly different from the hypothesized value 6. We conclude that the

respondents (Do not know, neutral) to this paragraph. In other words, most of study respondents moderately agree that the existing organizational structure helps in the clarity of roles and in the identification of responsibilities. It may reflect that the existing organizational structure referred to the state organizational hierarchy. Also, it may indicate that the existing organizational structure needs to be developed to help in clarify the roles and responsibilities of the Authority and the Utility.

- The mean of the field "The clarity of roles and the allocation of responsibilities- external" equals 6.45 (64.46%), Test-value = 2.48, and P-value=0.015 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this field is significantly greater than the hypothesized value 6 but with small amount. We conclude that the respondents agree to field of "The clarity of roles and the allocation of responsibilities - external ". The result indicates an overall acceptable level of the clarity of roles and the allocation of responsibilities between the two organizations. It may reflect that there are unobvious expectations and responsibilities among the managers in both organizations. However, the result reflects the need to improve the clarity of roles and the allocation of responsibilities between the two organizations. There is a need to develop the organizational structure of the two organizations and develop the laws and legislations that regulate the relationship between the Authority and the Utility.

Table (5.14): Means and Test values for "The clarity of roles and the allocation of responsibilities- external"

No.	Item	Mean	Proportional mean (%)	Test value	P-value (Sig.)	Rank
1.	There are formal rules and procedures that clarify role and responsibility of both the Authority and the Utility	6.46	64.59	2.46	0.008*	3
2.	There is a regular and effective communication process which helps roles and responsibilities clarity of both the Authority and the Utility	6.49	64.86	2.43	0.009*	2
3.	The existing organizational structure of the Authority and the Utility helps in the clarity of roles and in the identification of responsibilities between them	6.30	62.97	1.47	0.072	4
4.	There are laws and legislation that identify the roles and responsibilities of the Authority and the Utility accurately	6.54	65.41	2.41	0.009*	1
	All paragraphs of the field	**6.45**	**64.46**	**2.48**	**0.015***	

* The mean is significantly different from 6

III. The clarity of roles and the allocation of responsibilities

The mean of the field "The clarity of roles and the allocation of responsibilities" equals 6.83 (68.27%), Test-value = 5.59, and P-value=0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this field is significantly greater than the hypothesized value 6. As a result, the respondents agree to field of "The clarity of roles and the allocation of responsibilities". The proportional mean of the field equals 68.27%, it indicates an overall acceptable level of the clarity of roles and the allocation of responsibilities in and between the two organizations. It identifies the necessary to develop the clarity of roles and the allocation of responsibilities in the two organizations and between them. This agrees with the PWA (2010) which highlighted that the relative roles, responsibilities and relationships of the institutions within the water sector are in need of clarification. Also, this is in agreement with Klakegg (2009) his study identified that there is a need for further clarification of roles and responsibilities of the governing party and project management. Improve unclear or supply missing governance structures. Also, Chen et al. (2008) found that there is still an unsettled debate about who is responsible for defining various interfaces in a project. With no clear answers, current specifications are inadequate with respect to interface responsibilities. Present contract documents usually do not specify interfaces among contractors; therefore, questions of responsibilities for contractors and disagreements about the scopes of work arise frequently. Weshah et al. (2013) found that there are undefined responsibilities among relevant parties involved in the project. (Rong-Yau et al., 2008) found that there are insufficient working drawing details and insufficient specifications among construction parties.

So, we can conclude that better clarity of roles and the allocation of responsibilities have a directly positive influence on better management of interface, with statistically significant results.

Table (5.15): Means and Test values for "The clarity of roles and the allocation of responsibilities"

Field	Mean	Proportional mean (%)	Test value	P-value (Sig.)
The clarity of roles and the allocation of responsibilities	6.83	68.27	5.59	0.000*

*The mean is significantly different from 6

4. The Management of interface is influenced by the financial resources.

I. Financial resources - internal

Table (5.16) shows the following results:

- The mean of paragraph #2 "The financial reports are prepared to management periodically and regularly (for example, every month) at a good degree" equals 7.75 (77.53%), Test-value = 10.00, and P-value = 0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this paragraph is significantly greater than the hypothesized value 6. We conclude that the respondents agree to this paragraph. In other words, most of study respondents agree that the financial reports are prepared to management periodically and regularly at a good degree. It may indicate that the financial reports are essential in organizational transparency. However, it may reflect a need to improve the financial reporting system in the two organizations to make control over the financial issues.
- The mean of paragraph #5 "There is an allocation for the necessary funds for the implementation of future projects at a good degree" equals 7.04 (70.41%), Test-value = 4.10, and P-value = 0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this paragraph is significantly greater than the hypothesized value 6. We conclude that the respondents agree to this paragraph. In other words, most of study respondents agree that there is an allocation for the necessary funds for the implementation of future projects at a good degree. It may reflect that there is a good cooperation between the funders and the organizations. However, this result may reflect the need to improve the funds allocation process in the two organizations to undertake the future projects.
- The mean of the field "Financial resources- internal" equals 7.21 (72.15%), Test-value = 6.69, and P-value=0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this field is significantly greater than the hypothesized value 6. We conclude that the respondents agree to field of "Financial resources- internal ".The result indicates an overall good level of the financial resources in the two organizations. It may reflect that the financial departments in the two organizations are capable of managing the financial resources in a good way. However, the result may reflect the need to improve the funds allocation process and the financial reporting system in the two organizations to improve the financial recourses management.

Table (5.16): Means and Test values for "Financial resources- internal"

No.	Item	Mean	Proportional mean (%)	Test value	P-value (Sig.)	Rank
1.	There are clear procedures and policies for the use of financial resources in the organization	7.64	76.44	7.75	0.000*	2
2.	The financial reports are prepared to management periodically and regularly (for example, every month) at a good degree	7.75	77.53	10.00	0.000*	1
3.	The financial resources are properly distributed at projects	7.32	73.15	6.26	0.000*	6
4.	There is a transparency in the use of financial resources in the organization	7.41	74.11	7.39	0.000*	5
5.	There is an allocation for the necessary funds for the implementation of future projects at a good degree	7.04	70.41	4.10	0.000*	7
6.	The financial reports allow to compare account balances with estimates or estimated budgets	7.44	74.38	7.20	0.000*	4
7.	The financial statements are subject to a comprehensive and periodic reviews, including comparisons with the previous period and the amounts of estimated budgets	7.59	75.89	7.88	0.000*	3
	All paragraphs of the field	**7.46**	**74.56**	**7.98**	**0.000***	

* The mean is significantly different from 6

II. Financial resources - external

Table (5.17) shows the following results:

- The mean of paragraph #3 "There is a good coordination between the Authority and the Utility to support the long term strategic funding and the priorities of funding requirements" equals 7.10 (70.96%), Test-value = 4.96, and P-value = 0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this paragraph is significantly greater than the hypothesized value 6. We conclude that the respondents agree to this paragraph. In other words, most of study respondents agree that there is a good coordination between the Authority and the Utility to support the long term strategic funding and the priorities of funding requirements. It may reflect that the target goals for both organizations are similar. Also, this result may reflect the need to strengthen the coordination between the Authority and the Utility to support the strategic funding.
- The mean of paragraph #4 "There are laws and legislations that organize the use of financial resource between the two organizations" equals 6.55 (65.48%), Test-value =

2.24, and P-value = 0.014 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this paragraph is significantly greater than the hypothesized value 6 but with small amount. We conclude that the respondents agree to this paragraph. In other words, most of study respondents agree that there are laws and legislations that organize the use of financial resource between the two organizations. It may reflect that the existing laws do not cover all aspects of the financial recourses because the financial resources of both organizations are separate. Also, this result may reflect that the need to develop the laws and legislations that organize the use of financial resource between the two organizations.

- The mean of the field "Financial resources- external" equals 6.88 (68.77%), Test-value = 4.28, and P-value=0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this field is significantly greater than the hypothesized value 6. We conclude that the respondents agree to field of "Financial resources - external ". The result indicates an overall acceptable level of the financial resources between the two organizations. It may reflect that the final goals for both are similar. Also, the result may reflect the need to develop the laws and legislations and the coordination process between the two organizations to manage the financial resources in an effective way.

Table (5.17): Means and Test values for "Financial resources- external"

No.	Item	Mean	Proportional mean (%)	Test value	P-value (Sig.)	Rank
1.	There is a good financial transparency between the two organizations	6.95	69.45	4.19	0.000*	3
2.	There is a good coordination between the Authority and the Utility to achieve optimal use of available resources	7.07	70.68	4.84	0.000*	2
3.	There is a good coordination between the Authority and the Utility to support the long term strategic funding and the priorities of funding requirements	7.10	70.96	4.96	0.000*	1
4.	There are laws and legislations that organize the use of financial resource between the two organizations	6.55	65.48	2.24	0.014*	5
5.	The two organizations publish financial reports periodically	6.73	67.26	3.08	0.001*	4
	All paragraphs of the field	**6.88**	**68.77**	**4.28**	**0.000***	

* The mean is significantly different from 6

III. Financial resources

- The mean of the field "Financial resources" equals 7.21 (72.15%), Test-value = 6.69, and P-value=0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this field is significantly greater than the hypothesized value 6. We conclude that the respondents agree to field of "Financial resources ". The proportional mean of the field equals 7.21%, it indicates an overall good level of the Financial resources in and between the two organizations. It identifies the necessary to develop the financial resources in the two organizations and between them. This study disagrees with Al-Hammad (2000) study which highlighted that there is a need to solve financial issues to overcome the interface problems and prevent conflict. Also, this study agrees with Chen et al. (2008) study which highlighted that financial problems in a construction project include delayed payments, underbids, cash flow problems, cost disputes, etc. These problems cause low productivity, poor quality, suspensions of work, delays and disputes. Also, Ku et al. (2010) study found that there is financial problems include developer payment delays and inaccurate project budget forecasts. Moreover, Weshah et al. (2013) and (Rong-Yau et al., 2008) studies found that there is financial difficulties include delay in progress payment by owner, inaccuracy of the project cost estimate, owner's low budget for construction relative to requirements and price changes of materials and laborers during construction.

So, we can conclude that better financial resources management has a directly positive influence on better management of interface, with statistically significant results.

Table (5.18): Means and Test values for "Financial resources"

Field	Mean	Proportional Mean (%)	Test value	P-value (Sig.)
Financial resources	7.21	72.15	6.69	0.000*

*The mean is significantly different from 6

5. The Management of interface is influenced by soft and hard skills

I. Soft and hard skills- internal

Table (5.19) shows the following results:

- The mean of paragraph #1 "The manager / official can use written and verbal communication skills including listening easily" equals 7.69 (76.89%), Test-value = 9.26, and P-value = 0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this paragraph is significantly greater than the hypothesized value 6. We conclude that the respondents agree to this paragraph. In other words, most of study respondents agree that the manager can use written and verbal communication skills including listening easily. It indicates that these requirements are the basic requirements for the positions. This result may reflect that the managers have good communication skills that need more improvement to develop the communication process.
- The mean of paragraph #4 "The manager / official can put goals and long term vision to all tasks, and can help others to do the same thing" equals 6.86 (68.65%), Test-value = 3.91, and P-value = 0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this paragraph is significantly greater than the hypothesized value 6. We conclude that the respondents agree to this paragraph. In other words, most of study respondents agree that managers can put goals and long term vision to all tasks, and can help others to do the same thing. It may indicate that managers are aware of the importance of setting goals which can help them in finding the best ways to reach these goals. However, this result may reflect that managers need to develop their strategic vision and goals to all the work tasks.
- The mean of the field "Soft and hard skills- internal" equals 7.20 (72.01%), Test-value = 6.74, and P-value=0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this field is significantly greater than the hypothesized value 6. We conclude that the respondents agree to field of "Soft and hard skills- internal ". The result indicates an overall good level of the soft and hard skills in the two organizations. Mangers have these skills through their life work which improved the theoretical college experience. This result may reflect a need to develop the communication, delegation and decision making skills in the two organizations to guarantee the strong relationship between the employee and the quality of the work.

Table (5.19): Means and Test values for "Soft and hard skills- internal"

No.	Item	Mean	Proportional mean (%)	Test value	P-value (Sig.)	Rank
1.	The manager / official can use written and verbal communication skills including listening easily	7.69	76.89	9.26	0.000*	1
2.	The manager / official can make decisions which affect him or others	7.24	72.43	6.93	0.000*	3
3.	The manager / official delegates Authority to others to help them learn	6.93	69.32	4.03	0.000*	6
4.	The manager / official can put goals and long term vision to all tasks, and can help others to do the same thing	6.86	68.65	3.91	0.000*	7
5.	The manager / official possess the skill of dealing with the used computer programs easily	7.50	75.00	8.25	0.000*	2
6.	The manager / official possess the skill of improving water quality standard	7.05	70.54	4.88	0.000*	5
7.	The manager / official possess the skill of preserving the surrounding environment quality	7.12	71.22	5.26	0.000*	4
	All paragraphs of the field	7.20	72.01	6.74	0.000*	

* The mean is significantly different from 6

II. Soft and hard skills- external

Table (5.20) shows the following results:

- The mean of paragraph #1 "The managers / officials of the Authority and the Utility have written and oral communication skills that facilitate communication process between them" equals 7.46 (74.59%), Test-value = 8.87, and P-value = 0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this paragraph is significantly greater than the hypothesized value 6. We conclude that the respondents agree to this paragraph. In other words, most of study respondents agree that the managers of the two organizations have both written and oral communication skills that facilitate communication process between them. It may indicate that all managers must possess these requirements for the positions. This result may reflect that the need to improve the communication skills between the Authority and the Utility to strength the relationship between them.
- The mean of paragraph #5 "There are joint training programs between the Authority and the Utility which enhance the completion of the joint work effectively" equals 6.54 (65.41%), Test-value = 2.24, and P-value = 0.014 which is smaller than the level of

significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this paragraph is significantly greater than the hypothesized value 6 but with small amount. We conclude that the respondents agree to this paragraph. In other words, most of study respondents agree that there are joint training programs between the Authority and the Utility which enhance the completion of the joint work effectively. It may reflect that there are joint training programs due to the similar nature of work in order to make integration between the two organizations to improve the water sector. This result may reflect that there is a need to increase joint training programs between the Authority and the Utility to allow every one of them do his work effectively and to prevent the role conflict between them.

- The mean of the field "Soft and hard skills- external" equals 7.04 (70.35%), Test-value = 6.18, and P-value=0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this field is significantly greater than the hypothesized value 6. We conclude that the respondents agree to field of "Soft and hard skills- external ". The result indicates an overall good level of the soft and hard skills between the two organizations. It may indicate that managers are aware of the essentiality of these skills for improving the water sector and accomplishing the final goals of both organizations. This result may reflect that the need to develop the soft and hard skills between the two organizations to facilitate the work relationship between them and to do their work in an effective manner.

Table (5.20): Means and Test values for "soft and hard skills -external"

No.	Item	Mean	Proportional mean (%)	Test value	P-value (Sig.)	Rank
1.	The managers / officials of the Authority and the Utility have written and oral communication skills that facilitate communication process between them	7.46	74.59	8.87	0.000*	1
2.	The managers / officials of the Authority and the Utility have the skill of ability of joint problem solving effectively	7.19	71.89	6.76	0.000*	2
3.	The managers / officials of the Authority and the Utility can set goals and long term vision for all joint tasks, and they can help others to do the same thing	7.11	71.08	5.95	0.000*	3
4.	The managers / officials of the Authority and the Utility possess the skill of setting joint development programs to develop water system	6.88	68.78	4.46	0.000*	4
5.	There are joint training programs between the Authority and the Utility which enhance the completion of the joint work effectively	6.54	65.41	2.24	0.014*	5
	All paragraphs of the field	**7.04**	**70.35**	**6.18**	**0.000***	

* The mean is significantly different from 6

III. Soft and hard skills

The mean of the field "Soft and hard skills" equals 7.13 (71.32%), Test-value = 6.72, and P-value=0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this field is significantly greater than the hypothesized value 6. We conclude that the respondents agree to field of "Soft and hard skills ".The proportional mean of the field equals 71.32%, it indicates an overall good level of the soft and hard skills in and between the two organizations. It identifies the necessary to develop the soft and hard skills in the two organizations and between them. It indicates that the managers have good experiences who have gained during their work life in the two organizations. Also, they are all having post university degrees. This disagrees with Al-Hammad (2000) study which found that the skills resources of laborers have a severe effect on the relationship among the various construction parties; a shortage of this important resource will affect the quality of the completed work and thus create a conflict among the construction parties. Also, (Rong-Yau et al., 2008) found that skills and productivity of laborers are one of the common interface problems among construction parties in MRT.

Also, Weshah et al. (2013) found that limited skills for labor and engineering represent one of the interface management problems for construction projects in Alberta**.** Likewise, Ku et al. (2010) found limitation of the skills between participants of the project include limited personal experience and an ability to feedback past data, Inability to forecast problems with new technological methods and materials, inability to solve problems caused by a new technologies and lack of experience with updating real-time management systems. Moreover, Chen et al. (2008) highlighted that Low-skilled labor more likely fails physical connections or functional commitments between large numbers of prefabricated products. Those workers also slow down the planned work progress and cause schedule conflicts and project delays.

So, we can conclude that better soft and hard skills have a directly positive influence on better management of interface, with statistically significant results.

Table (5.21): Means and Test values for soft and hard skills

Field	Mean	Proportional mean (%)	Test value	P-value (Sig.)
Soft and hard skills	7.13	71.32	6.72	0.000*

*The mean is significantly different from 6

- **Discussion of the aspects of the internal and external management of interface**

- **The aspects of the management of interface**

As shown in table 5.22, the mean of the all aspects of the management of interface in general field equals 6.96 (69.61%), Test-value = 6.71, and P-value=0.000 which is smaller than the level of significance $\alpha = 0.05$. So, the mean of this field is significantly greater than the hypothesized value 6. We conclude that the respondents agree to this field.

- **The aspects of the internal management of interface**

The mean of the all aspects of internal management of interface field equals 7.20 (72.01 %), Test-value = 7.18, and P-value=0.000 which is smaller than the level of significance $\alpha = 0.05$. So, the mean of this field is significantly greater than the hypothesized value 6. We conclude that the respondents agree to this field.

- **The aspects of the external management of interface**

The mean of the all aspects of external management of interface equals 6.68 (66.85 %), Test-value = 3.93, and P-value= 0.065 which is greater than the level of significance $\alpha = 0.05$. The mean of this field is insignificantly different from hypothesized value 6. We conclude that the respondents (Do not know, neutral) to this field.

According to the result shown above, we can conclude that:

The result of the aspects of internal management of interface showed a better score than the aspects of the external management of interface with a difference rate of 5.16%. It indicates that the application of the management of interface in the two organizations is better than the application of the management of interface between PWA and CMWU. The internal aspects of the management of interface within the PWA and CMWU are better due to unique regulations and by-laws within each. Moreover, formal and informal relations among its employees add a preference to others. On the other hand, there is deficiency in the external aspects of the management of interface between PWA and CMWU, corresponding to the following:

PWA is not working with full capacity referring to the lack of stuff to control over CMWU according to the PWL resulted from the Palestinian internal concession. CMWU is a body which performs as a services council under the umbrella of ministry of local government whereas it should be setup through PWL.PWA regulate water sector and perform projects as well and thus overlap occurs between PWA and CMWU. Due to unauthorized regulations signed, there is no concise definition of responsibilities and duties between PWA and CMWU.

By and large, all the noted above next to the political environment had a passive effect on the aspects of the management of interface between PWA and CMWU:

Communication network is limited to formal way through correspondences upon need and not periodically.

Coordination is bounded to limited number of PWA employees and coordination channels are vague upon CMWU reference to PWA or MoLG.

The clarity of roles and the allocation of responsibilities in regulation chapters show inaction of relations between PWA and CMWU upon the absence of PLC legislations.

Financial resources control by PWA is significantly weak and their role is limited government budgeting and there is no control over external donations.

Skill Training and development is not enough and few courses outside CMWU occasionally take place has no great effect.

This result agrees with Chen (2007) who pointed out that internal interfaces are much easier to handle because a single team is involved and the ownership and responsibility are clear. External interfaces occur between contracts or scopes of work. Managing them becomes difficult, especially when a large number of contractors or parties are involved. It is most important to clarify every external interface with involved subcontractors and precisely define their responsibilities. Also, Chen et al. (2008) pointed out that communication within the same party is much better performed than that across the boundary of parties. The latter becomes one of the major causes for a wide variety of interface issues.

So, we can conclude that better application of the aspects of the management of interface has a directly positive influence on better management of interface, with statistically significant results.

Table (5.22): Means and Test values for the aspects of the management of interface

Aspect	Mean	Proportional mean (%)	Test value	P-value (Sig.)
Communication mechanism and style	**7.16**	**71.60**	**8.23**	**0.000***
Communication mechanism and style- internal	7.45	74.51	9.44	0.000*
Communication mechanism and style – external	6.87	68.68	5.67	0.000*
The level of coordination	**6.40**	**64.04**	**2.27**	**0.013***
The level of coordination – internal	6.76	67.64	4.44	0.000*
The level of coordination- external	6.20	61.99	1.02	0.312
The clarity of roles and the allocation of responsibilities	**6.83**	**68.27**	**5.59**	**0.000***
The clarity of roles and the allocation of responsibilities- internal	7.13	71.32	7.29	0.000*
The clarity of roles and the allocation of responsibilities – external	6.45	64.46	2.48	0.015*
Financial resources	**7.21**	**72.15**	**6.69**	**0.000***
Financial resources- internal	7.46	74.56	7.98	0.000*
Financial resources – external	6.88	68.77	4.28	0.000*
Soft and hard skills	**7.13**	**71.32**	**6.72**	**0.000***
Soft and hard skills- internal	7.20	72.01	6.74	0.000*
Soft and hard skills- external	7.04	70.35	6.18	0.000*
The aspects of the management of interface	**6.96**	**69.61**	**6.71**	**0.000***
The aspects of the management of interface – internal	**7.20**	**72.01**	**7.18**	**0.000***
The aspects of the management of interface – external	**6.68**	**66.85**	**3.93**	**0.065**

*The mean is significantly different from 6

- **There is no difference of the respondents' answers about the Management of interface in water sector in Gaza Strip at significant level α =0.05 due to demographic characters (Gender, Age, Years of experience, Job title, Qualifications and Name of organization).**
  - **There is no difference of the respondents' answers about the Management of interface in water sector in Gaza Strip at significant level α =0.05 due to Gender.**

Table (5.23) shows that the p-value (Sig.) is greater than the level of significance α = 0.05 for each field, then there is insignificant difference among the respondents toward each field due to Gender. We conclude that the personal characteristics' Gender has no effect on each field. It may indicate that both males and females are post graduated and subjected to the same rules in the two organizations.

Table (5.23): Independent Samples T-test test of the fields and their p-values for Gender

No.	Field	Means		Test Value	Sig.
		Male	Female		
1.	Communication mechanism and style	7.16	7.15	0.020	0.984
2.	The level of coordination	6.44	6.25	0.393	0.695
3.	The clarity of roles and the allocation of responsibilities	6.82	6.85	-0.085	0.933
4.	Financial resources	7.17	7.43	-0.548	0.585
5.	Soft and hard skills	7.07	7.42	-0.797	0.428
	All fields together	**6.94**	**7.05**	**-0.270**	**0.788**

- **There is no difference of the respondents' answers about the Management of interface in water sector in Gaza Strip at significant level α =0.05 due to Age**

Table (5.24) shows that the p-value (Sig.) is greater than the level of significance α = 0.05 for each field, then there is insignificant difference among the respondents toward each field due to Age. We conclude that the personal characteristics' Age has no effect on each field. It may indicate that all managers have enough experience to identify the interface management issues properly.

Table (5.24): ANOVA test of the fields and their p-values for Age

No.	Field	Means			Test Value	Sig.
		Less than 40	40 – Less than 50	50 years and more		
1.	Communication mechanism and style	7.22	7.04	7.17	0.150	0.861
2.	The level of coordination	6.39	6.65	6.12	0.499	0.609
3.	The clarity of roles and the allocation of responsibilities	6.88	6.73	6.81	0.087	0.917
4.	Financial resources	7.17	7.52	6.90	0.677	0.512
5.	Soft and hard skills	7.21	6.90	7.23	0.345	0.709
	All fields together	**6.99**	**6.98**	**6.85**	**0.069**	**0.933**

- **There is no difference of the respondents' answers about the Management of interface in water sector in Gaza Strip at significant level α =0.05 due to Years of Experience**

Table (5.25) shows that the p-value (Sig.) is greater than the level of significance α = 0.05 for each field, then there is insignificant difference among the respondents toward each field due to Years of Experience. We conclude that the personal characteristics' Years of Experience has no effect on each field. It may indicate that managers have gained the required knowledge for their positions and completely aware of their tasks, duties, nature of work and their responsibilities. It agrees with Siao and Lin (2011) , Mortaheb and Rahimi (2010) and (Rong-Yau et al., 2008) studies. .

Table (5.25): ANOVA test of the fields and their p-values for Years of Experience

No.	Field	Means			Test Value	Sig.
		Less than 6 year	6- less than 10 years	10 years and more		
1.	Communication mechanism and style	7.38	7.47	6.98	1.238	0.296
2.	The level of coordination	6.77	6.55	6.25	0.614	0.544
3.	The clarity of roles and the allocation of responsibilities	7.32	6.82	6.70	1.147	0.323
4.	Financial resources	7.54	7.13	7.16	0.314	0.731
5.	Soft and hard skills	7.66	7.15	6.98	1.037	0.360
	All fields together	**7.34**	**7.04**	**6.83**	**0.878**	**0.420**

- **There is no difference of the respondents' answers about the Management of interface in water sector in Gaza Strip at significant level α =0.05 due to Job title**

Table (5.26) shows that the p-value (Sig.) is smaller than the level of significance α = 0.05 for the fields "The level of coordination, the clarity of roles and the allocation of responsibilities and Financial resources", then there is significant difference among the respondents regarding to these fields due to Job title. We conclude that the respondents' Job title has significant effect on these fields. It may indicate that each position requires different levels of coordination; the roles are clearer as the position is higher because of the job requirements and has more information about the financial resources which are essential for accomplishing the goals.

Table (5.26) shows that the p-value (Sig.) is greater than the level of significance α = 0.05 for "the communication mechanism and style and soft and hard skills" fields, then

there is insignificant difference among the respondents regarding to these fields due to Job title. We conclude that the Job title has no effect on these fields. It may indicate that all managers are living in the same organizational environment and the nature of communication is not different from one level to another and all managers must possess certain level of skills in order to satisfy the job requirements.

Table (5.26) shows that the p-value (Sig.) is smaller than the level of significance α = 0.05 for the overall fields, then there is significant difference among the respondents regarding to the overall fields due to Job title. We conclude that the respondents' Job title has significant effect on these fields. This result agrees with Weshah et al. (2013) study.

Table (5.26): ANOVA test of the fields and their p-values for Job title

No.	Field	Means				Test Value	Sig.
		Deputy Director-General	Director of Department	Head of Department	Head of Section		
1.	Communication mechanism and style	7.65	6.98	7.17	7.33	0.665	0.576
2.	The level of coordination	7.65	5.94	6.55	6.70	2.754	0.049*
3.	The clarity of roles and the allocation of responsibilities	7.61	6.38	6.85	7.43	3.512	0.020*
4.	Financial resources	8.76	6.70	7.17	7.72	4.173	0.009*
5.	Soft and hard skills	7.38	6.86	6.93	7.88	1.975	0.126
	All fields together	7.82	6.59	6.95	7.43	2.868	0.043*

* The mean difference is significant a 0.05 level

- **There is no difference of the respondents' answers about the Management of interface in water sector in Gaza Strip at significant level α =0.05 due to Qualifications**

Table (5.27) shows that the p-value (Sig.) is greater than the level of significance α = 0.05 for each field, then there is insignificant difference among the respondents toward each field due to Qualifications. We conclude that the Qualifications have no effect on each field. It may indicate that all managers must have certain level of education which allows them to do their jobs properly. This result agrees with (Rong-Yau et al., 2008) study.

Table (5.27): Independent Samples T-test test of the fields and their p-values for "Qualifications"

No.	Field	Means		Test Value	Sig.
		Bachelor and less	Master and more		
1.	Communication mechanism and style	7.12	7.22	-0.334	0.739
2.	The level of coordination	6.35	6.49	-0.395	0.694
3.	The clarity of roles and the allocation of responsibilities	6.76	6.93	-0.539	0.592
4.	Financial resources	7.15	7.32	-0.461	0.646
5.	Soft and hard skills	7.04	7.28	-0.685	0.496
	All fields together	**6.90**	**7.06**	**-0.532**	**0.597**

- **There is no difference of the respondents' answers about the Management of interface in water sector in Gaza Strip at significant level α =0.05 due to Name of organization**

Table (5.28) shows that the p-value (Sig.) is smaller than the level of significance α = 0.05 for the field "The level of coordination, the clarity of roles and the allocation of responsibilities and soft and hard skills", then there is significant difference among the respondents regarding to these fields due to Name of organization. We conclude that the respondents' Name of organization has significant effect on these fields. It may indicate that each organization has different assigned works which require different skills from the other organization and this requires different type of coordination and different roles.

Table (5.28) shows that the p-value (Sig.) is greater than the level of significance α = 0.05 for "the Communication mechanism and style and Financial resources" fields, then there is insignificant difference among the respondents regarding to these fields due to name of organization. We conclude that the respondents' name of organization has no effect on these fields. It may indicate that both organizations are aware of the importance of communication in accomplishing the jobs and the usage of the financial system fundamentals.

Table (5.28) shows that the p-value (Sig.) is smaller than the level of significance α = 0.05 for the overall fields, then there is significant difference among the respondents regarding to overall fields due to name of organization. We conclude that the respondents' name of organization has significant effect on these fields. It agrees with Mortaheb and Rahimi (2010) study and Weshah et al. (2013) study.

Table (5.28): Independent Samples T-test test of the fields and their p-values for "Name of organization"

No.	Field	Means		Test Value	Sig.
		Palestinian water authority	Coastal Municipalities Water Utility		
1.	Communication mechanism and style	6.87	7.24	-1.093	0.278
2.	The level of coordination	5.47	6.66	-2.887	0.005*
3.	The clarity of roles and the allocation of responsibilities	5.84	7.10	-3.813	0.000*
4.	Financial resources	6.68	7.35	-1.517	0.134
5.	Soft and hard skills	6.38	7.34	-2.422	0.018*
	All fields together	**6.28**	**7.15**	**-2.604**	**0.011***

* The mean difference is significant a 0.05 level

Chapter 6

Conclusion and recommendations

6.1 Introduction

This chapter provides the main conclusions related to the field work and the appropriate recommendations to enhance the management of interface between Palestinian Water Authority and the Costal Municipalities Water Utility and the recommendations to further researches in management of interface field.

6.2 Research conclusion

The main objective of this research is to evaluate Management of interface between Palestinian Water Authority and Costal Municipalities Water Utility for the water sector in Gaza. This objective is done through assessing the aspects of the management of interface which are communication mechanism and style, the level of coordination, the clarity of roles and the allocation of responsibilities, financial resources and soft and hard skills.

The results showed differences in the means between the internal and external management of interface, it showed that the mean of the aspects of internal management of interface equals 7.20 and the weight mean equals (72.01 %) while the aspects of the external management of interface equals 6.68 and the weight mean equals (66.85%). The result means that the application of the internal interface management is better than the application of the external management of interface.

In addition the results showed that the application of the communication mechanism and style in the two organizations is better than the application of the communication mechanism and style between the two organizations; it showed that the weight mean of the internal Communication mechanism and style equals (74.51%) while the weight mean of the external Communication mechanism and style equals (68.68%).

Also, the results showed that the level of coordination in the two organizations is better than the level of coordination between the two organizations; it showed that the weight mean of the internal level of coordination equals (67.64%) while the weight mean of the external level of coordination equals (61.99%).

As well, the results showed that the clarity of roles and the allocation of responsibilities in the two organizations is better than the clarity of roles and the allocation of responsibilities between the two organizations; it showed that the weight mean of the internal clarity of roles and the allocation of responsibilities equals (71.32%) while the

weight mean of the external clarity of roles and the allocation of responsibilities equals (64.46%).

Furthermore the results showed that the management of the financial resources in the two organizations is better than the management of the financial resources between the two organizations; it showed that the weight mean of the internal financial resources equals (74.56%).while the weight mean of the external financial resources equals (68.77%).

Likewise, the results showed that the soft and hard skills in the two organizations is better than the application of the soft and hard skills between the two organizations; it showed that the weight mean of the internal soft and hard skills equals (72.01%).while the weight mean of the external soft and hard skills equals (70.35%).

Moreover, the results showed that there are no significant statistical differences at level ($\alpha = 0.05$) among the respondents in their opinions about the study fields attributed to gender, age, years of experience, qualifications. Whereas, it showed that there are significant statistical differences at level ($\alpha = 0.05$) among the respondents in their opinions about the study fields attributed to Job title and name of organization.

These results mean that the respondents of the sample agree that the management of interface in and between PWA and CMWU is influenced by the five aspects of the management of interface.

6.3 Recommendations:

To enhance the management of interface in and between PWA and CMWU, the researcher recommends the following:

1. **Policies and strategies to develop communication mechanism and style**

- Using different communication means to speeds up the decision making process and to make decisions more efficient and sufficient. here are some means:

a) Using the intranet and internet based communication to increase communication opportunities in and between PWA and CMWU.
b) Using written communication methods which easily and quickly identify the problems encountered and provides employees with the ability to analyze messages.
c) Running effective meetings in and between PWA and CMWU to increase the quality and quantity of the decisions.

- Using a combination of horizontal and vertical communication in the organization for strengthening the relationship between various levels of managers in the two organizations.
- Improving the used technology to speed up the services.
- Developing the organizational structure to become more flat to ease communication and the decision making process between the Authority and the Utility.
- Strengthening the informal relationship between the two organizations to ease the communication. Maintaining communication intensity at extraordinary level. Encouraging an open exchange of ideas, in which people are blunt and straightforward in going after the issues.

d) Policies and strategies to develop the level of coordination

- Achieving the maximum benefit out of technology in coordination. Using unified database to ease the access to the information to facilitate the coordination process.
- Promoting the use of modern technology in the coordination by giving free access opportunity for all managers to use Intranet in the two organizations, and use Internet special work programs between PWA and CMWU.
- Strengthening the interrelations between all the directors of each department by encouraging the use of face-to-face communication media in the two organizations and carry out regularly scheduled meeting between PWA and CMWU.
- Increasing the awareness and commitment of managers to participate in the coordination process.
- Integration of management systems on all levels, and between the two organizations.
- Reinforcing and improving the management of interface concept through holding training seminars for the managers to understand and figure out the nature of this concept.

e) Policies and strategies to develop the clarity of roles and the allocation of responsibilities

- Further clarification of roles and responsibilities of all departments.
- Improving the awareness of the managers to the importance of communication in identifying roles and responsibilities.

- Improving and maintaining the existing organizational structure in the two organizations.
- Improving the laws and legislations that identify the roles and responsibilities of each organization.
- Emphasizing the role of PWA as a policy maker and regulator and the role of CMWU as a service provider through strengthening the laws and legislations that identify the roles and responsibilities of each organization.

f) Policies and strategies to develop financial resources

- Improving the financial reporting system in the two organizations to make control over the financial issues.
- Improving the funds allocation process in the two organizations.
- Strengthening the coordination between the Authority and the Utility to support the strategic funding.
- Developing the laws and legislations that organize the use of financial resource between the two organizations.

g) Policies and strategies to develop soft and hard skills

- Developing the communication, delegation and decision making skills in the two organization to guarantee the strong relationship between the employee and the quality of the work.
- Starting internal training to improve the employees skills, also conducting jointed training programs and highlighting main objects between the Authority and the Utility to allow every one of them do his work effectively and to prevent the role conflict between them.
- Allocating human resource rationally and establishing the mechanism of personnel flow in both organizations.

6.4 Recommendations to further researches

Further researches may need to consider:

- The Management Of Interface Between The Different Governmental Stakeholders In Palestinian Water Sector.
- The Impact of Inter-organizational Interface Problems On A Services Quality in water sector.
- The Development of Interface Information Management System in water sector.

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Appendices

Appendix (A): Questionnaire in Arabic

بسم الله الرحمن الرحيم

الجامعة الإسلامية – غزة
الدراسات العليا– ماجستير إدارة الأعمال

أخي الكريم / أختي الكريمة

السلام عليكم و رحمة الله وبركاته.....

يتشرف الباحث بأن يضع بين أيديكم استبانة بعنوان " **إدارة العلاقة بين سلطة المياه الفلسطينية و مصلحة مياه بلديات الساحل لقطاع المياه في قطاع غزة** " لاستكمال متطلبات الحصول على درجة الماجستير في إدارة الأعمال من الجامعة الإسلامية – بغزة.

ولتحقيق الهدف من الدراسة صممت هذه الاستبانة من جزأين:

الجزء الأول : يشتمل على البيانات الأولية.

الجزء الثاني : يشتمل على البيانات التخصصية من خلال خمسة محاور رئيسة هي:

المحور الأول : آليات و أنماط الاتصالات المستخدمة.

المحور الثاني : مستوى التنسيق.

المحور الثالث : وضوح الأدوار وتحديد المسؤوليات.

المحور الرابع: المصادر المالية.

المحور الخامس: المهارات الحياتية و الفنية.

آمل تكرمكم بقراءة كل محور وعباراته قراءة متأنية، ومن ثم الإجابة بوضع درجة الموافقة التي ترونها مناسبة مع رؤيتكم للعبارة في المربع المخصص أمامها (1، 2، 3، 4، 5، 6، 7، 8، 9، 10) حيث يمثل الرقم (10) موافق بشدة، و الرقم (1) غير موافق مطلقا، مع العلم أن مساهمتكم في تعبئة الاستبانة سيكون لها أكبر الأثر في الحصول على النتائج المرجوة . سيتم التعامل مع البيانات بسرية تامة، وستستخدم فقط في أغراض البحث العلمي.

تقبلوا فائق التقدير والاحترام،

الباحث : عماد علي موسى

<u>الجزء الأول : البيانات الشخصية:</u>

الرجاء استيفاء البيانات التالية و تحديد البيان المطلوب بوضع علامة (x) في الخانة المناسبة:

1. **الجنس:**

☐ ذكر ☐ أنثى

2. **العمر:**

☐ أقل من 30 سنة ☐ من 30 – أقل من 40 سنة

☐ من 40 سنة – أقل من 50 سنة ☐ 50 سنة فأكثر

3. **سنوات الخبرة :**

☐ أقل من 3 سنوات ☐ من 3 – أقل من 6 سنوات

☐ من 6 – أقل من 10 سنوات ☐ 10 سنوات فأكثر

4. **طبيعة العمل:**

☐ مدير عام ☐ نائب مدير عام ☐ مدير دائرة

☐ رئيس قسم ☐ رئيس شعبة

5. **المؤهل العلمي:**

☐ الثانوية العامة ☐ دبلوم متوسط ☐ بكالوريوس

☐ ماجستير ☐ دكتوراه

6. **اسم المؤسسة:**

☐ سلطة المياه ☐ مصلحة مياه بلديات الساحل

يتكون هذا المقياس من عشر درجات (1، 2، 3، 4، 5، 6، 7، 8، 9، 10) حيث يمثل الرقم (10) موافق بشدة، و الرقم (1) غير موافق مطلقا، أي كلما اقتربت الاجابة من الرقم (10) دل ذلك على الموافقة العالية على ما ورد في العبارة و العكس صحيح، الرجاء وضع الرقم الذي تشعر / تشعرين أنه يتناسب مع رؤيتك للعبارة في المربع المخصص أمامها.

الجزء الثاني : محاور الدراسة:

المحور الأول: آليات و أنماط الاتصالات

الرقم	العبارة	درجة الموافقة 1 – 10
1	يوجد سهولة في التواصل و تبادل المعلومات و نقل الأفكار من المستويات الدنيا إلى المستويات الأعلى في المؤسسة والعكس.	
2	يسود في المؤسسة المزج بين الاتصال الافقي و الراسي.	
3	يسود في المؤسسة استخدام الاتصالات الرسمية بين المستويات الادارية المختلفة عبر التسلسل الهرمي.	
4	تعتمد المؤسسة المزج في الاتصال الرسمي و غير الرسمي لتبادل المعلومات.	
5	يسود استخدام الاتصال الشفهي المباشر بين المستويات الادارية المختلفة في المؤسسة (عقد لقاءات مباشرة).	
6	يتم التنويع في استخدام وسائل الاتصال بين المستويات الادارية المختلفة داخل المؤسسة.	
7	يساعد الهيكل تنظيمي (الهرمي أو الأفقي) في فاعلية عملية الاتصال بين السلطة و المصلحة.	
8	تساعد التكنولوجيا المستخدمة في فاعلية عملية الاتصال بين السلطة و المصلحة.	
9	يتم استخدام الاتصالات الرسمية بين موظفين السلطة و المصلحة لتبادل المعلومات.	
10	يتم استخدام الاتصالات غير الرسمية بين موظفين السلطة و المصلحة لتبادل المعلومات	
11	يسود استخدام الاتصال الشفهي المباشر بين السلطة و المصلحة (عقد لقاءات مباشرة).	
12	يتم التنويع في استخدام وسائل الاتصال بين السلطة و المصلحة.	
المحور الثاني: مستوى التنسيق		
.1	يوجد التزام واضح من قبل الادارة للمشاركة في عمليات التنسيق داخل المؤسسة.	
.2	يتم اعتماد اسلوب الاتصال المباشر بين المدراء / المسؤولين داخل المؤسسة	
.3	في المراحل الاولى لوضع سياسات جديدة يقوم المدراء بمناقشتها قبل اعتماد السياسات المناسبة داخل المؤسسة.	
.4	يوجد تحديد دقيق لواجبات و مسؤوليات العمل بين موظفي المؤسسة.	
.5	يتم اعتماد اسلوب الاتصال المباشر بين مدراء / مسؤولين السلطة و المصلحة.	
.6	في المراحل الاولى لوضع سياسات جديدة يقوم المدراء بمناقشتها قبل اعتماد السياسات المناسبة بين السلطة و المصلحة.	
.7	يوجد تحديد دقيق لواجبات و مسؤوليات العمل بين السلطة و المصلحة.	
.8	يلتقي مدراء السلطة و المصلحة بشكل دوري لتبادل المعلومات، وصنع القرارات المشتركة.	

المحور الثالث: وضوح الأدوار وتحديد المسؤوليات		
.1	يعرف كل موظف دوره و مسئولياته بدقة داخل المؤسسة.	
.2	يلتزم الموظفين داخل المؤسسة بالوصف الوظيفي و الهيكل التنظيمي و الانظمة.	
.3	يتم تحديد اغراض و اهداف كل مهمة وظيفية بوضوح داخل المؤسسة	
.4	توجد قواعد و اجراءات رسمية توضح دور و مسئولية كل موظف داخل المؤسسة.	
.5	توجد عملية اتصال منتظمة و فعالة تساعد على وضوح ادوار ومسؤوليات كل موظف داخل المؤسسة.	
.6	توجد قواعد و اجراءات رسمية توضح دور و مسئولية كلا من السلطة و المصلحة	
.7	توجد عملية اتصال منتظمة و فعالة تساعد على وضوح ادوار ومسؤوليات السلطة	
.8	يساعد الهيكل التنظيمي الموجود لدى السلطة و المصلحة في وضوح الأدوار و تحديد المسؤوليات بينهما.	
.9	توجد قوانين و تشريعات تحدد ادوار و مسئوليات السلطة و المصلحة بدقة.	
المحور الرابع: المصادر المالية		
.1	توجد اجراءات و سياسات واضحة لاستخدام الموارد المالية في المؤسسة.	
.2	يتم إعداد التقارير المالية للإدارة بشكل دوري و منتظم (على سبيل المثال، كل شهر) على درجة جيدة.	
.3	يتم توزيع المصادر المالية على المشاريع بشكل مناسب.	
.4	توجد شفافية في استخدام الموارد المالية في المؤسسة.	
.5	يتم تخصيص الأموال اللازمة لتنفيذ المشاريع المستقبلية على درجة جيدة.	
.6	تسمح التقارير المالية لمقارنة أرصدة الحسابات مع التقديرات أو الميزانيات التقديرية.	
.7	تخضع البيانات المالية لمراجعات شاملة و دورية بما في ذلك مقارنات مع الفترة السابقة ومبالغ الموازنات التقديرية.	
.8	توجد شفافية مالية جيدة بين المؤسستين.	
.9	يوجد تنسيق جيد بين السلطة و المصلحة لتحقيق الاستخدام الأمثل للموارد المتاحة.	
.10	يوجد تنسيق جيد بين السلطة و المصلحة لدعم التمويل الاستراتيجي على المدى الطويل و اولويات متطلبات التمويل.	
.11	توجد قوانين و تشريعات تنظم استخدام الموارد المالية بين المؤسستين.	
.12	تقوم المؤسستين بنشر التقارير المالية بشكل دوري.	
المحور الخامس: المهارات الحياتية و الفنية		
.1	يستطيع المدير / المسؤول استخدام مهارات الاتصال الكتابي و الشفهي بما في ذلك الاستماع بسهولة.	
.2	يستطيع المدير / المسؤول صنع القرارات التي تؤثر فيه أو في الاخرين.	
.3	يقوم المدير / المسؤول بتفويض المهام للاخرين لمساعدتهم على التعلم	
.4	يستطيع المدير / المسؤول وضع الأهداف ووضع رؤية طويلة الأجل لكل المهام، ويمكنه مساعدة الآخرين لفعل الشيء نفسه.	
.5	يمتلك المدير / المسؤول مهارة التعامل مع برامج الحاسوب المستخدمة بسهولة.	
.6	يمتلك المدير / المسؤول مهارة رفع مستوى جودة المياه.	

.7	يمتلك المدير / المسؤول مهارة الحفاظ على جودة البيئة المحيطة.	
.8	يتمتع مدراء / مسؤولي السلطة و المصلحة بمهارات الاتصال الكتابي و الشفهي التي تسهل عملية الاتصال بينهما.	
.9	تتوافر لدى مدراء / مسؤولي السلطة و المصلحة مهارات القدرة على حل المشكلات المشتركة بينهما بفاعلية.	
.10	يستطيع مدراء / مسؤولي السلطة و المصلحة وضع الأهداف ووضع رؤية طويلة الأجل لكل المهام المشتركة، ويمكنهم مساعدة الآخرين لفعل الشيء نفسه.	
.11	يملك مدراء / مسؤولي السلطة و المصلحة مهارة وضع برامج تطوير مشتركة للمهارات لإنجاز العمل بفاعلية بما يمكن من الحفاظ على البيئة المستدامة.	
.12	توجد برامج تدريب مشتركة بين السلطة و المصلحة تعزز المهارات لانجاز العمل المشترك.	

Appendix (B): Questionnaire in English

The Islamic University of Gaza

Higher Studies- Faculty of Commerce

Dear All…

Researcher honor that puts in your hands a questionnaire entitled "The management of interface between the Palestinian Water Authority and Costal Municipalities Water Utility of the water sector in the Gaza Strip" to complete the requirements for obtaining a master's degree in business administration from the Islamic University - Gaza.

To achieve the objective of this study questionnaire was designed in two parts:

Part I: includes initial data.

Part II: includes specialized data through five sectors which are:

- Communication mechanism and style.
- The level of Coordination.
- The clarity of roles and the allocation of responsibilities
- Financial resources,
- Soft and hard skills.

I hope you reads each phrase carefully, and then answer your approval status degree that you deem appropriate with your vision for the phrase in the custom box in front of her (1.2, 3, 4.5, 6, 7.8, 9, 10), since number (10) represents that you strongly agree, while the number (1) represents that you strongly disagree, Knowing that your contribution to the fill in of the questionnaire will have the biggest impact in getting the desired results. Data will be dealt with confidentially, and will be used only for the purposes of scientific research.

Yours appreciation and respect,

Researcher: Emad Mousa

Part one : Initial Data

Please meet the following data and determine the required statement mark (x) in the appropriate box.

1. Gender

☐ Male ☐ Female

2. Age

☐ Less than 30 ☐ 30 – Less than 40 years

☐ 40 – Less than 50 ☐ 50 years and more

3. Years of Experience

☐ Less than 3 years ☐ 3 – Less than 6 year

☐ 6- less than 10 years ☐ 10 years and more

4. Job title

☐ Director-General ☐ Deputy Director-General

☐ Director of Department ☐ Head of Department

☐ Head of Section

5. Qualifications

☐ High school ☐ Diploma

☐ Bachelor ☐ Master ☐P.H.D

6. Name of organization

☐ Palestinian Water Authority ☐ Coastal Municipalities Water Utility

This scale consists of ten degrees (1.2, 3, 4.5, 6, 7.8, 9, 10)), since number (10) represents that you strongly agree, while the number (1) represents that you strongly disagree , if your answer be closer to number (10), this indicates that the high approval on what was in the statement, and vice versa, please put the number you feel it fits with your vision for the phrase in the custom box in front of her.

Part two: Include the five dimensions of the study, which are:

1st Dimension: Communication mechanism and style		
No.	**The sentence**	**The agreement degree 1-10**
1.	There is ease of communication and exchange of information and transfer of ideas from the lower levels to the higher levels in the organization, and vice versa.	
2.	The combination of horizontal and vertical communication is prevailing in the organization.	
3.	The use of formal communication between the various levels of management across the hierarchy is prevailing in the organization.	
4.	The organization relies on the combination of the formal and informal communication to exchange information.	
5.	The use of direct oral communication between the various levels of management is prevailing in the organization (direct meetings)	
6.	There is a diversification in the use of means of communication between the various levels of management within the organization	
7.	The organizational structure (hierarchical or horizontal) helps in the communication process effectiveness between the Authority and the Utility.	
8.	The used technology helps the communication process effectiveness between the Authority and the Utility.	
9.	The formal communication is used between the Authority and Utility employees to exchange information.	
10	The informal communication is used between the Authority and the Utility employees to exchange information.	
11	The use of direct oral communication between the Authority and the Utility is prevailing to exchange information.	
12	There is a diversification in the use of communication means between the Authority and the Utility.	
2nd dimension: the level of coordination		
1.	There is a clear commitment by the administration to participate in the coordination processes within the organization.	
2.	All managers / officials of the organization are linked through a unified database.	
3.	In the early stages of the development of new policies, managers discuss them before adopting the appropriate policies within the organization.	
4.	There is an accurate specification for the work duties and responsibilities among the staff of the organization.	
5.	All managers / officials of the Authority and the Utility are linked through a unified database through a joint database.	
6.	In the early stages of the development of new policies, managers discuss them before adopting the appropriate policies between the Authority and	

	the Utility.	
7.	There is an accurate identification for the work duties and responsibilities between the Authority and the Utility.	
8.	The Authority and the Utility managers meet on a regular basis to exchange information, and make joint decisions.	
9.	There is harmony in the goals the Authority and the Utility.	
10.	There is a good coordination between the Authority and the Utility to achieve the goals	
11.	There is a clear commitment in both to participate in joint coordination processes between the Authority and the Utility and to make them work efficiently.	
3rd dimension: The clarity of roles and the allocation of responsibilities		
1.	The purposes and objectives of each functional task are clearly specified within the organization.	
2.	Every employee knows his role and duties accurately in the organization.	
3.	Employees within the organization are committed to the job description and organizational structure and systems.	
4.	There are formal rules and procedures that identify the role and responsibility of every employee in the organization.	
5.	There is a regular and effective communication process which helps roles and responsibilities clarity of each employee in the organization.	
6.	There are formal rules and procedures that clarify role and responsibility of both the Authority and the Utility.	
7.	There is a regular and effective communication process which helps roles and responsibilities clarity of both the Authority and the Utility.	
8.	The existing organizational structure of the Authority and the Utility helps in the clarity of roles and in the identification of responsibilities between them.	
9.	There are laws and legislation that identify the roles and responsibilities of the Authority and the Utility accurately.	
4th dimension: financial resources		
1.	There are clear procedures and policies for the use of financial resources in the organization.	
2.	The financial reports are prepared to management periodically and regularly (for example, every month) at a good degree.	
3.	The financial resources are properly distributed at projects.	
4.	There is a transparency in the use of financial resources in the organization.	
5.	There is an allocation for the necessary funds for the implementation of future projects at a good degree.	
6.	The financial reports allow to compare account balances with estimates or estimated budgets.	
7.	The financial statements are subject to a comprehensive and periodic reviews, including comparisons with the previous period and the amounts of estimated budgets	
8.	There is a good financial transparency between the two organizations..	
9.	There is a good coordination between the Authority and the Utility to achieve optimal use of available resources.	
10.	There is a good coordination between the Authority and the Utility to support the long term strategic funding and the priorities of funding requirements.	
11.	There are laws and legislations that organize the use of financial resource between the two organizations.	
12.	The two organizations publish financial reports periodically.	

	5th dimension: Soft and hard skills	
1.	The manager / official can use written and verbal communication skills including listening easily.	
2.	The manager / official can make decisions which affect him or others.	
3.	The manager / official delegates Authority to others to help them learn.	
4.	The manager / official can put goals and long term vision to all tasks, and can help others to do the same thing.	
5.	The manager / official possess the skill of dealing with the used computer programs easily.	
6.	The manager / official possess the skill of improving water quality standard.	
7.	The manager / official possess the skill of preserving the surrounding environment quality.	
8.	The managers / officials of the Authority and the Utility have written and oral communication skills that facilitate communication process between them	
9.	The managers / officials of the Authority and the Utility have the skill of ability of joint problem solving effectively.	
10.	The managers / officials of the Authority and the Utility can set goals and long term vision for all joint tasks, and they can help others to do the same thing	
11.	The managers / officials of the Authority and the Utility possess the skill of setting joint development programs to develop water system.	
12.	There are joint training programs between the Authority and the Utility which enhance the completion of the joint work effectively	

Appendix (C): List of referees

No.	Referee's name	University name
1.	Prof. Faris Abu Mouamer	Islamic University – Gaza.
2.	Prof. Salem Helles	Islamic University – Gaza
3.	Dr. Yousuf Bahar	Islamic University – Gaza
4.	Dr. Sami Abu Al-Roos	Islamic University – Gaza
5.	Dr. Wasim Al-Habil	Islamic University – Gaza
6.	Dr. Akram Samour	Islamic University – Gaza
7.	Dr. Yasser Al-Shorfa	Islamic University – Gaza
8.	Dr. Rami Abdo	Al-Aqsa University – Gaza
9.	Dr. Wafiq Al-Agha	Al-Azhar University – Gaza
10.	Dr. Wael Thabet	Al-Azhar University – Gaza