

One-stop Shop E-government Solution for South-Korean Government Multi-ministry Virtual Employment-Welfare Plus Center System

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Abstract—In this paper, a one-stop e-Government solution will be proposed for the existing Korean government multi-ministry Employment-Welfare plus system that utilizes latest IT technologies. Since 2001, the Korean government had established 11 initiatives and 31 roadmaps to build e-Government infrastructure. Although this infrastructure has been very successful and well-esteemed in the international society, several improvements are required towards a one-stop shop solution. Currently, the system used by the Korean government is not a one-stop solution with a single point for the citizen to access government services. A Virtual Employment – Welfare Plus Centre (VEWPC) is then introduced to unify the services offered to the citizen. Comparing this VEWS with UK’s e-Government solution and review of corresponding literature, several requirements for change towards a one-stop shop solution implementation have been identified. A refined architecture to implement a South Korean e-Government one-stop shop is identified and proposed in this paper. Future plans for the applicability and cost of its adoption are also identified.

Keywords; e-Government; virtual organizations; one-stop shop.

I. INTRODUCTION

Described simply, e-Government is the application of the tools and techniques of e-Commerce to the work of government. These tools and techniques are intended to serve both the government and its citizens. It can also be described as the complete process transformation of the Governance using the implementation of Information and Communication Technology. Its primary objective is to bring faster and transparent service delivery, information sharing, accountability and people participation in governments’ decision-making process [1].

After the economic crisis in 1998, over the past 20 years, the South Korea government is continuously engaged in reforming the government structure by integrating large departments performing similar public service functions. This has led to building up an e-government structure

providing improved administrative services with better efficiency.

Since 2002, with the help of ICT functions, an online platform in the form of the one-stop shop is established to make numerous public services easily accessible through the website “Government 24”. This online service allows citizens to request and receive many civil petitions without having to visit administrative agencies [2].

The current structure of the South Korean Government welfare service system and functions of its different building blocks are greatly influenced by New Public Management (NPM) and Joined-up Government (JUG) organization structure by integrating multiple ministerial departments to provide a single platform based public services. This presents both problems and challenges to form a collaborated system to combine the employment and welfare services under a virtual organizational platform [3].

Based on the data collected in previous case studies, literature review and comparative analysis along with the results from the interviews and surveys, it is possible to draw the architecture of the current system to distinguish between the key elements and considerations necessary to design the architecture of the one-stop shop center.

Finally, based on this high-level architecture description, it can be concluded that the one-stop shop virtual government organization is a conceptual model of the manpower management system that utilizes business process data in the information system.

In this paper, we have viewed the high-level architecture as a three-layered functional architecture in order to elaborate the different infrastructural functions: layer one the customer, layer two local welfare service centres and layer three as the virtual environment of the ICT infrastructure with integration of e-Governance policy.

However, this can possess both limitations and challenges to implement conceptualized architecture using multi ministerial policies. Therefore, a comprehensive evaluation and further research are required to this paper in the areas of producing a detailed collaboration model for the above system.

The remainder of this paper will cover an overview of the system, including its requirements, in Section 2. In Section 3, the designs of the system will be defined and presented. Section 4 will detail the implementation of the overall system, including the classifier, interfaces, and explainability. Section 5 will present reflections and evaluations of the system, and Section 6 offers conclusion and suggestions for future work and research directions.

II. E-GOVERNMENT EVOLUTION IN SOUTH KOREAN GOVERNMENT

This case study has been constructed in a collaborative project between South Korea Government Department and Bournemouth University. The main aim is to propose improvements in the existing South Korea Government business processes and infrastructures.

The evolution of e-government implementations within the South Korean Government ministries is briefly described in the following subsections.

A. Service-Centred Government Policy

After the economic crisis in 1998, over the past 30 years, South Korea government is continuously engaged in reforming the government structure by integrating large departments performing similar public service functions. This has led to building up an e-government structure providing improved administrative services with better efficiency. Since 2002, with the help of ICT functions, an online platform is established to make numerous public services easily accessible through the website “Government 24”. This online service allows citizens to request and receive many civil petitions without having to visit administrative agencies.

South Korea Government has implemented a 3.0 strategy in the form of ‘Government 3.0’ in 2013 [4], to integrate the administrative services provided by the various administrative agencies into one window, and the provision of these services is well appreciated by the public. The main elements of this strategy were based upon (i) to set-up and promote an administrative reform in the form of the e-government, (ii) open information on all administrative agencies and (iii) collaborate and share information between administrative agencies. This strategy eventually has led to the formation of the ‘Employment Welfare Plus Centre’, which handles the employment and welfare related public services that have been carried out in various institutions autonomously.

B. The Level of e-government

In 2001, the Korean government had established 11 initiatives and 31 roadmaps to build e-government infrastructure. These initiatives include 11 systems, with an online administrative service system, an electronic procurement system, a financial information system, a home text system, and an electronic approval document system. The roadmaps include improved governments’ working

methodology, innovating administrative services and innovating information resource management.

In [5] presents the Government 24 online portal providing public services, such as apply and print official documents using the internet from home or offices, without a need of visiting the government agencies. It uses the cloud-based Government Integrated Data Centres (GIDC) gateway comprising of 20,000 information systems from 44 ministries. The cloud system has proprietary government-private cloud services that could provide central government agencies with information resources quickly and efficiently to support government agencies’ smart service. With the advent of ICTs and integrated government services, South Korea is implementing a ‘smart government’ in which ordinary users can easily and freely access government services regardless of delivery channels.

Based on these achievements, Korean e-Government ranked No. 1 in the E-Government Development Index (EGD) and E-Participation Index in the United Nations Global E-Government Survey for 2010, 2012 and 2014 [6]. Therefore, Korean e-governmental effectiveness is widely recognized in the international society and a similar range of e-government systems are being introduced to developing countries [2].

C. Workforce Management Strategy and Public Body Reform

As part of the reformed South Korea government, Ministry of the Interior and Safety (hereafter MOIS) is responsible for the manpower management, through setting up an upper threshold for a total number of employment and operating the manpower demand within that threshold. The review of the workforce for legal amendments and manpower threshold for upcoming projects in the coming years is assessed by the MOIS and confirmed with the Ministry of Strategy and Finance (hereafter, MOSF) every year. Ministry of Personnel Management (hereafter, MPM) administers the recruitment, independence, and professionalism of the personnel workforce.

III. EMPLOYMENT-WELFARE PLUS CENTRE (EWPC) – ONE-STOP SHOP SOLUTION

To introduce the implementation of JUG and NPM concept, the South Korean government has formed Employment - Welfare Plus Centre (EWPC) that links employment services and welfare services to alleviate the budget burden caused by the surge in welfare costs in 2014.

A. EWPC Managers and staff

The Employment - Welfare Plus Centre is an administrative service delivery system that eliminates blind spots in employment and allows the social safety net to be linked to employment. EWPC has been established in more than 100 geographically distributed centres, between 2014 and 2017, depicting the one-stop shop model that provides a combination of employment, welfare and financial services to the public easily and comfortably.

B. EWPC Architecture

The implementation of EWPC is modeled in two ways, first by adding welfare-related services to the existing employment centres and second by creating the new centres with linked welfare and employment-related public service.

EPWCs are affiliated to the Ministry of Employment and Labor, they are controlled and monitored by employees from the ministries and agencies related to employment and welfare policies [7]. Thereby, the centre is subdivided into employment, welfare support, finance, and culture departments and other welfare-related functions [8]. The centres' management consultation is done by the steering committee and the complex employment welfare case (if any) is managed by the Working Group and the Case Management Group.

Figure 1 presents the typical architecture for Employment-Welfare Plus Centre.

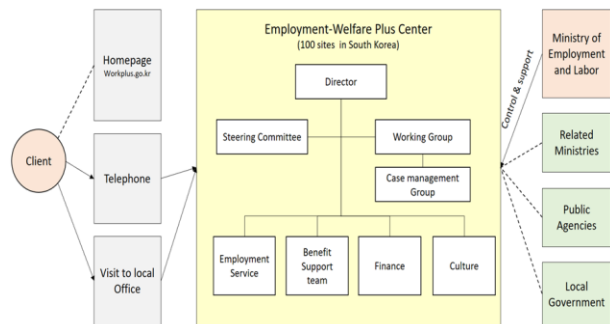


Figure 1. Architecture for Employment-Welfare Plus Centre

An individual seeking the government services should be able to find the relevant information using the online portal (Workplus.go.kr), then call further to gain information or visit the EWPC in person for an additional consultation [9].

Also, there is a separate online portal (Work.gov.kr) on job searching and job advertising for job seekers, which is not connected to EPWC. This is the problem with not having a true one-stop shop where employment-related services are integrated into one platform.

C. EWPC Functions and Clients

The main functions offered by the EWPC to their various clients including job seekers, benefit seekers, women with career break, veteran soldiers, retirees, and low-income earners are as follows:

- (i) *Employment services:* Provides comprehensive employment services such as job-hunting and re-employment support to help the livelihood of the unemployed, employment stabilization project supporting job creation and vulnerable classes.
- (ii) *Training services:* Provides employment support services for job seekers (interview technical coaching, cooperative interviews, etc.), job search, recruitment events, etc.

- (iii) *Women with career break:* Provides job counseling, vocational education and training, and internship for women with career breaks.
- (iv) *Services for veteran soldiers:* Supports career counseling, employment and start-up support for soldiers who have completed long-term service.
- (v) *Benefit support services:* Provides counseling social welfare services, receiving welfare applications, linking public and private for welfare support.
- (vi) *Finance Support Services:* Provides services such as low-interest funds, credit recovery support, and illegal financial meltdown counselling services for ordinary people, small businessmen and low-income people who are experiencing economic difficulties [8].

D. EWPC Business Process

Based on the type of the required public services, the main functions of the Employment Welfare Plus Centre can be categorized as follows:

- (i) *Employment Services:* Available for clients who are unemployed and do not require any welfare services
- (ii) *Employment and Welfare Services:* Available for clients who are unemployed and require welfare services as well, such as housing benefits, low-income support etc.
- (iii) *Welfare Services:* Available for clients who are able to work, however, requires other forms of welfare services. They also receive the employment services [8].

The list below describes the business process flow for availing different types of services in the EWPC, in its current state: client seeking employment or welfare public services can do so by, (i) visiting the centre directly, (ii) receiving an initial interview on employment services, welfare services only or both the services, (iii) deciding and implementing a suitable service. Record of these activities is stored in the local information database.

E. EWPC Performance

After the implementation of the EWPC, in 2016, there are remarkable improvements in public welfare services to the client such as:

- (i) The number of employed workers per centre increased from 653 to 731, an increase of 12%.
- (ii) Employment-welfare services linkage per centre increased from 118 to 212 [8].
- (iii) Different service paths are set for clients seeking an initial consultation, giving the benefit of availing employment services in more than one field within the visit to the centre.
- (iv) Reduction of time and cost by not visiting more than one service centres.
- (v) The collaboration of organizations to solve clients' problem by not only taking their own problem but also, by taking into account their surrounding circumstances.

The EWPC is expanded quantitatively to 100 centres within three years of introducing the system, however, the gap in the service quality is huge due to a large variation in workloads in each region and lack of legal platform as a government organization.

The above information was provided and evidenced by one the authors- Min Sig Park through confidential performance information collected from South Korea Government Ministry of the Interior and Safety (MOIS) where he is the director.

There is a need to increase manpower as the physical integration and expansion of the centre is steadily increasing. In addition, there is segregation of work due to the operation of a separate government system internally by dispatching agencies. The current integrated service on employment and welfare is to achieve the original purpose, that is expanding the employment rate and saving the cost of welfare. Therefore, it needs innovation of the operating system for the present centre by utilizing IT.

F. Problems Areas in Employment Welfare Service System-Comparison with UK's system

This section presents a comprehensive comparison between the Korea Employment Welfare Service System with the corresponding UK system. The choice for the comparison was by the definition of the project as the Korean Government representative who is an author in this paper, Min Sig Park, was tasked to start an appropriate study comparing the two countries to start with from his Government employer. More countries and examples should be considered in future research.

Both countries used the e-government architectural concept to establish and promote national government reforms by adopting a top-down approach. The innovations are prioritized in areas directly affecting people's lives. In both countries, recent administrative reforms trends are being pursued in the form of an open government using data and digital technology.

Compared to the UK, Korea has lack of interconnectedness and consistency between national plans for government innovations. There is not enough and specific systematic approach towards offering the consultation to government officials who are promoting government innovations and/or related guidelines that the public officials should pursue.

Both countries are evaluated as e-government powerhouse by the international community to provide one-stop service to the people using government portal viz, GOV.UK for UK and Government 24 for Korea. The UK has continued its efforts to build an e-government centred on the integration of the people's services through the council. However, South Korea has pursued e-government centred on building service systems and data centres. Therefore, the UK has established GOV.UK as a national government gateway to provide a single administrative service, however, South Korea is providing services through Government 24, which is a representative government gateway.

In terms of the workforce management, both countries require to consult with the financial authorities when they increase the government workforce. The two countries have established a long-term plan for government personnel and carrying out planned and systematic workforce policies. In the UK, government organizations and manpower management are managed by the Cabinet Office. However, in South Korea, the Ministry of the Interior and Safety oversees organization and manpower management, while the Ministry of Personnel Management is in charge of human resources development such as recruitment of manpower. Unlike the UK, which is reducing its workforce by establishing and implementing a workforce reduction plan, South Korea is restricting workforce growth by adopting a quorum system to maintain the upper limit of the workforce.

In terms of the organizational architecture of the e-government system and business processes, both countries use face-to-face interviews as the primary medium to converse with their clients due to the nature of the public services offered. However, Korea does not have an online system for a remote application like the UK where online applications can be made through GOV.UK which is the governments' single gateway.

The UK is well structured in partnership with local government, local communities, employers, and so on. In the case of Korea, the centre staff is dispatched to the relevant ministries, local government, and related organizations to collaborate. The UK is integrated with the job search website GOV.UK, but the Korean Worknet operates independently of the centre.

Typically, the clients in both countries organization system are either unemployed or like to seek other benefits. The clients for Jobcentre Plus in the UK are job seekers, students, graduates, and the disabled people, however, the clients of Employment Welfare Plus Centre in South Korea are job seekers, women with career interruptions, retirees, veterans, disabled people, and social disadvantage. In the UK, the benefits are directly implemented because the benefits agencies are integrated into the early stages. However, the Korean centre only enforces employment-related benefits directly, and the benefit only functions in consultation and acceptance.

In terms of business processes, both organizations are conducting face-to-face interviews for the initial assessment and conducting job search programs for job seekers with benefits. The UK provides consultation and employment welfare services through the integrated government gateway GOV.UK, telephone, and visit, whereas, South Korea has the drawback of not having an integrated online gateway but provides counseling and employment welfare services through telephone or institution visits. The client seeking unemployment benefit needs to go through initial interviews, however, in South Korea, an unemployed client does not need to go through the initial interviews. In the UK centre, professional counselors as a work coach are in the process of customizing their work. However, South Korea Centre is engaged in consultation with employees

dispatched from ministries related to employment counseling.

In terms of the performance, the UK centres are making a visible contribution to reducing unemployment benefits and increasing labour supply. There are direct and indirect effects on saving the welfare budget and increasing the national treasury. In South Korea, it is estimated that outcome will take time because the centre has been in operation for only three years.

The below is the summary of the main problem areas in the current South Korea Welfare System:

- (i) lack of connectivity between national strategies
- (ii) single gateway does not fully integrate to online service level
- (iii) workforce management using information management is not available
- (iv) no one-stop shop for employment welfare services
- (v) no linkage or integration with government 24, the government gateway
- (vi) a high proportion of manual work processes
no visibility on the performance

IV. SURVEY WITH KOREAN GOVERNMENT EMPLOYEES AND MANAGERS

This paper uses in-depth interviews and focus group interviews among various qualitative research methods to obtain user’s requirements. These interviews were conducted online and in person by Min Sig Park as part of his role in the Korean Government and as part of the research project with Bournemouth University in order to provide a comprehensive analysis of an e-government solution for South Korea Government. Since, VEWPC is an information system that processes the current business process, business management, and manpower management in a virtual space. Thus, to understand the system better, in-depth interviews are required including MOIS mid-level managers and staff who manages government organizations and personnel in off-line activities [10]. In addition, focus group interviews were conducted in order to grasp the various requirements of the staff working at the site. All the interviews were recorded with the consent of the interviewee. This survey uses an open questionnaire to identify the diverse experiences and opinions of the interviewees.

The following section describes the results without incorporating the authors’ related research. The final proposed system in this paper, incorporates all elements from the survey and the research.

A. Survey Findings

a) EWPC Supervisors and Employees

The results are extracted from the survey conducted by the Ministry of Employment and Labor departments, as part of the "Development Plan for the EWPC" projects. This describes three aspects of service linkage, manpower management and information system operation.

TABLE 1. EWPC SUPERVISORS AND EMPLOYEES SURVEY RESULTS

<i>Service Linkage Aspect</i>	Due to the reorganization of the employment centers into employment and welfare centers, the main clients of the center are the unemployment seekers. The lack of integration between the welfare and unemployment services brings diversity and complexity to the centre, which leads to poor services
<i>Personnel Management Aspect</i>	As a result of the employment and welfare linkage there is a surge in workforce requirement demanding new workers to cater the service demands. Centers vary in workload, workforce composition, service objects and jurisdictions leading to difficulty in coordinating work among internal employees.
<i>Information System Operation Aspect</i>	Due to the separated information system of employment and welfare services, it is difficult to compare, collaborate and share information of employees resulting in data redundancy and administrative inefficiency. This possesses one of the major concerns for the development of employment and welfare linked services.

b) Workforce management

The summary of the results listed below are extracted from the survey conducted with the employee responsible for workforce management across the centers.

TABLE 2 – EWPC MANAGERS AND STAFF SURVEY RESULTS

<i>Information systems operation status</i>	Most of the staff supported the idea of using information system for workforce management and management of the organization. This consists of workload information, staffing information and accuracy of data around that information. However, due to lack of integrated infrastructure and difficulties of collecting those data, most employees are not actively utilizing the information data.
<i>Workforce analysis functions</i>	Staff agreed that the annual workload prediction and work assignments are important in the calculation of manpower to identify the annual workload trend. Besides, analysis based on the accurate identification of

	the current workload and manpower problems are equally important.
<i>Factors and benefits while introducing the new system</i>	Many of the interviewees agreed for the implementation of the virtual government organization concept, but there can be unforeseen side effects due to the emergence of this fictitious virtual organization. The consideration of many factors is vital such as information security, details of comprehensive services and consideration for vulnerable groups accessing those data. However, the introduction of this virtual system can create new services beyond the existing business domain, communication between employees can be greatly improved along with proper organization management.

The above surveys led to the realization that an IT integration through a new virtual organization approach was emerging within the South-Korean government.

V. VIRTUAL EMPLOYMENT-WELFARE PLUS CENTER (VEWPC) SYSTEM

The employment welfare service system is not a simple interorganizational collaboration system but a virtual service that is built around a multi-ministry collaboration system to combine employment and welfare services to provide fast and personalized employment-welfare services. In addition, it presents a model to develop an organization and workforce management system for efficient management of the organization and employees related to the employment-welfare service.

A. VEWPC Architecture – Functional Requirements

The architecture supports the model to build a collaborative system using the virtual space to provide employment-welfare services that are performed jointly by multiple ministries. The intended users and audience of this architecture can be categorized into two parts. The first categories are the users and audiences related to the collaboration system comprising of government officials and supervisors who provide employment-welfare services. It also includes unemployed customers seeking the employment-welfare services. Second category of users are the users of the organization and the employee’s management system related to the employment-welfare service. This includes the managers managing the relevant ministry officials providing the employment-welfare services. In addition, government officials in related

ministries can also be seen as users because they need to update matters related to their duties.

The stakeholders of the virtual employment-welfare plus center are the various sponsors, customers, and users. The sponsors include the Ministries of Employment and Labour (MOEL) in South Korea and the Ministry of the Interior and Safety (MOIS) which is in charge of the management of government organizations and employees. The customers are the people seeking support in terms of employment and welfare public services from the government. Finally, the users are employees and staff who work for MOEL and MOIS [10].

The VEWPC is a collaborative system built by integrated online employment-welfare service to manage the workforce efficiently. In addition, it identifies the number and workload of the employees who are using the existing information system and utilize it in the management of the workforce using the newly developed information system.

The section below discusses the architecture of the Korean Virtual Employment-Welfare architecture and the business process flow associated with it.

The center consists of an online platform (web portal), employment-welfare service system, workforce management system and the related seven support systems. The customers seeking unemployment support services or welfare services, get support from this center through the portal. Then, after going through an initial assessment and database cross-check of seven administrative agencies the center evaluates customers’ current situation, needs and comes to a decision of providing the support to that customer. The Workforce Management System comprehensively analyses the operational speed and performance of the ministries and agencies that operate to support the virtual center. The system also helps managers to determine the relocation, reinforcement and reduction of workforce.

Figure 2 shows the database diagram for the Virtual Employment-Welfare Plus Centre. The main frame of the databases is made up of two parts. One of the databases (DB) stores information related to the welfare services and another one stores workforce management related information. The employment-welfare service server is composed of employment information DB, local job DB, woman’s re-employment DB, veteran employment DB, local welfare DB, microfinance DB, and self-sufficiency DB. Also, the workforce management server consists of personnel management DB, system metadata DB, payroll DB, organization and workforce DB, individual business record DB, and user profile DB.

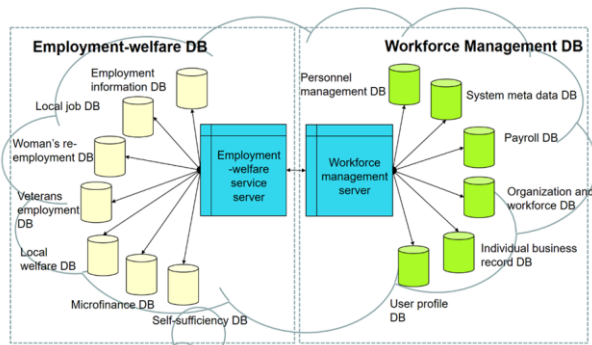


Figure 2. Database Model for the Virtual Employment-Welfare Pulse Centre

The process flow as the use cases represent in providing the public service can be described as follows:

1) the system receives enquiries seeking employment and welfare support from a citizen, 2) the inquiries are cross-checked by the employees of multi-ministries or agencies in government, 3) the employee decides and provide a suitable solution based on the decision, 4) the system record individual business performance, 5) the system analyses relationship between workforce and workload, 7) the administrative staff determine which action is appropriate based on the workload demand, 8) the administrative staff and managers take suitable actions to re-deploy, increase and reduce workforce accordingly.

In this arrangement, the citizen creates a personal account to use the public service. The actors are the citizens requesting employment and welfare public services from the government. The requests can be directly made via the online portal or by visiting the service center or by sending a letter. The employees enter the request details manually into the system. The employees do not work in one center but work individually in different ministries, responsible for different tasks. The meetings with customers and reporting activities are not automatically managed by the system.

One of the functional requirement of the system is to monitor the business process of employment-welfare service and employee's workload 24/7 to identify the processing time it takes to handle inquiries and be able to support flexible working hours for the employees.

B. VEWPC Non-Functional Requirements

The non-functional requirements, which can be implemented as improvement areas to realize a true one-stop shop virtual employment-welfare service system are shown below:

Usability and humanity requirements: The system should consider the work process, results, and working style of the employees. In addition, the system should be designed with usability heuristics in mind.

Performance requirements: The system should measure the individual workloads and the workload of the organization. It should also be able to calculate the manpower demands based on criteria set by the workforce policy standards.

Operational and environmental requirements: The system should have an integrated web portal and easy to use a mobile app for employees to enter the business progress remotely from an off-site location. The working times can be set for this remote working arrangement.

Maintainability and support requirements: The system should provide real-time information about new appointments and retirements of employees.

Security requirements. The system should include employees' personal and business performance information along with employees' task schedule information as workload changes. Therefore, managers and employees should have different access rights to this sensitive information.

Cultural requirements. The system should be customized based on the way of working such as, administrative policies and regulations, administrative culture etc.

Legal requirements. Government organizations should limit the basic rights of the people or impose obligations on them, so the establishment of the government in a virtual environment should be done carefully. This should be examined together with the implications of legal issues and public confidence in government organizations.

C. VEWPC Architecture Modeling

Based on the literature reviews and the specific case study requirements, we have transformed the existing Virtual Employment-Welfare System architecture into SysML Block Definition Diagram. Although SysML is not the traditionally used formalism for business processes, we have selected this in order to integrate the business processes world with the corresponding systems architectures. More diagrams from this project towards a completed model-based approach will be part of our future plans. This can help to prototype the model for one-stop shop based solution architecture. Due to the limitation of accessing the government technical information, Figure 3 is an approximate view of the existing architecture

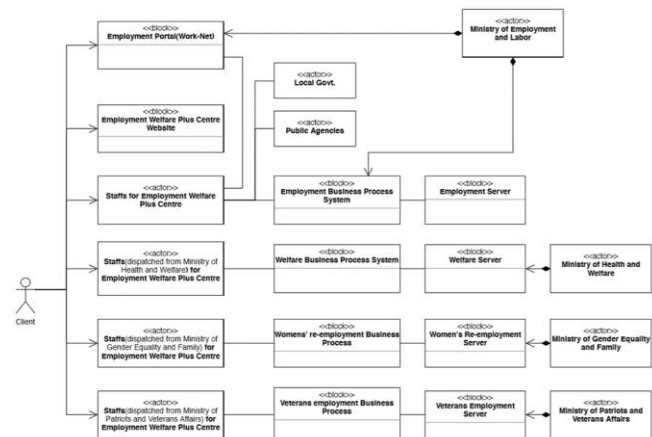


Figure 3. Block Definition Diagram for Korea Virtual Employment-Welfare Plus Center

As mentioned in the earlier section, in South Korea, the integrated information system has not yet implemented except for the *Work-Net* online platform for customers seeking employment services established by the Ministry of Employment and Labor. This *Work-Net* is not an exclusive business process information system of the EWPC, but an employment portal operated by the Ministry of Employment and Labor.

The inquiries submitted by the client are handled by the staff dispatched by the related ministries. The tasks are carried out by using the existing information infrastructure of their respective departments. This is the drawback of lack of integration of the information system between different ministerial departments and business processes, although, the work gets carried out at an integrated place. This demands to design a new model for a true one-stop shop virtual employment and welfare service system.

VI. PROPOSED ONE-STOP SHOP ARCHITECTURE

The architecture of the one-stop e-government, the virtual government organization in the public sector, is similar to the one-stop shop architecture described above.

The generic model of one-stop e-government, presented by [11], is based on a client-centered approach, concurrent access point, channel multiplicity, versatility, and security. Alo, Liu described that the model of one-stop e-government comprises of integration of information resources, system-based application construction and infrastructure construction [12].

Figure 5 shows the prototype architecture for one-stop shop Employment and Welfare Plus Center in South Korea based on the previous literature review of Liu and Dias & Rafeal, the comparative analysis results of the UK and Korea and the results of the survey.

In 2005, the South Korea has integrated servers of 44 central government ministries and local governments. Recently, G-Cloud has been introduced to optimize data management, analysis and services, and to protect data resources from the hacking. Thereby, the South Korean government needs a foundation for the information resource infrastructure and resource integration needed to build a one-stop shop.

Thereafter, the reorganization of the back office is required to build a one-stop shop, which is not yet done. Also, it is necessary to integrate work processes using information systems and collaborations of related ministries and agencies to provide employment welfare services. Therefore, it is designed that the government officials of each ministry or agency access the Employment-welfare service system through the platform that handles the inquiry related to employment welfare. A data exchange system

should be designed separately to exchange data between existing related information systems. With the help of business process integration, it is possible to process work from a distance which provides the less expected number of employees required at the center.

The customers who need employment welfare services should access the platform and submit an inquiry once, and then the Employment-welfare service system and related public officials should be able to process the inquiry. The information system then automatically handles the tasks that are handled manually, and the center staff only needs to perform the face-to-face meeting with clients in a complementary manner.

Finally, all the work processes and performance are managed by the workforce management system. If necessary, it can reallocate the work and personnel to increase or decrease the manpower.

Figure 4 shows the high level of architecture in more detail and allows for the construction of a customized regional center that reflects regional characteristics. This architecture includes a detailed server deployment plan which has improved the efficiency of data management by providing a regional server (database) under the main sector server. In addition, to implement the customized one-stop shop as a virtual governmental organization, a Virtual Online Window is integrated into the existing Work-Net and GOV.KR.

“LAYERED” PROPOSED ARCHITECTURE

The proposed architecture for the one stop shop Employment and Welfare system can be represented as three-layered high-level architecture. In this section, we discuss each of these sections with a view to integrate and consolidate the information data for easier workflow and knowledge management.

The first layer of this architecture depicts the citizen seeking the welfare support services should access the online platform and submit the inquiry. To implement the customized one-stop shop as a virtual governmental organization, the primary step is to integrate the Virtual Online platform with the official portal of the South Korean Government. This portal provides public services [5], an employment portal operated by the Ministry of Employment & Labor (*Work-Net*), telephone consultation services and employment & welfare hub.

The second layer presents the Employment Welfare Plus Centre architecture. For instance, if the client seeking employment, welfare or both services are unable to find the required information and avail the services using the online

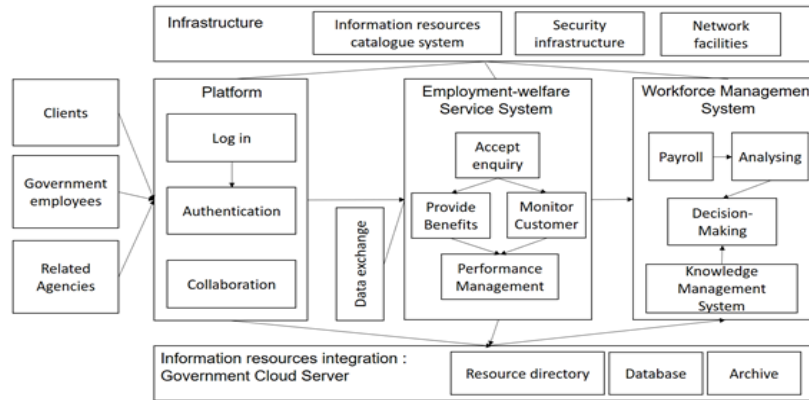


Figure 4. Conceptual Architecture of one-stop shop.

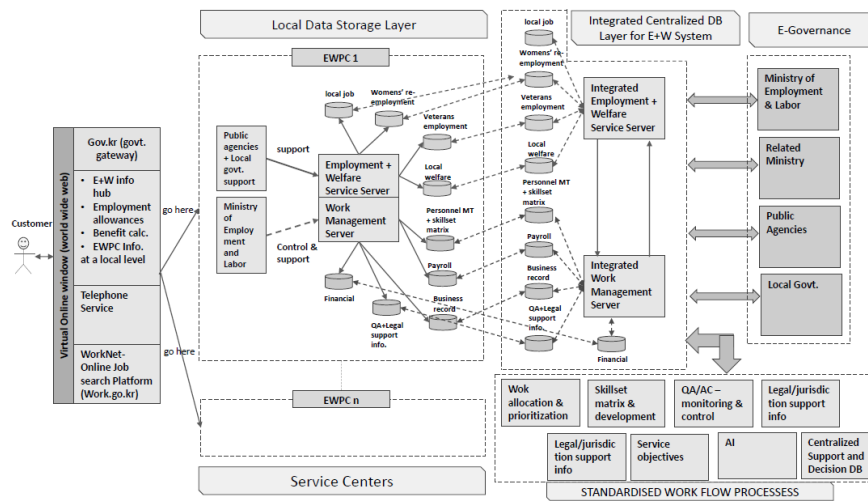


Figure 5. The Architecture of one-stop shop.

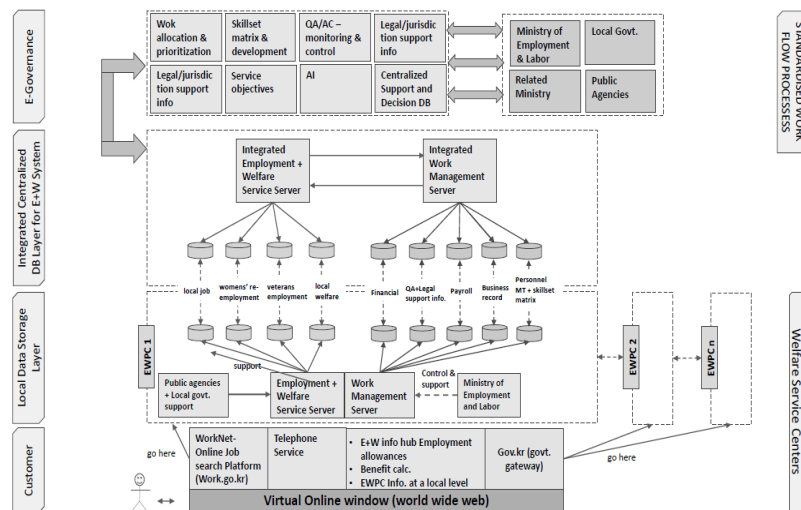


Figure 6. Intention-Based Design for one-stop shop Conceptual Architecture.

web portal information hub and telephone services are required to visit the walk-in welfare-employment center. An inquiry submitted by the client is checked and accepted by the Inquiry Process Department. Following to this, the client seeking employment services is required to attend an initial interview with the government employee consultants available at the centre. Once, the enquiry acceptance, processing and validation are completed, a suitable employment service is decided and implemented to the client's inquiry.

An unemployed person who seeks a welfare service receives an employment service can also avail the welfare benefits. However, there is an option where an unemployed person can choose to take the employment service only by opting-out the welfare services. In contrast to this, welfare service recipients can receive both welfare and employment services, if they have a valid working ability, otherwise can only choose to avail welfare services.

After a certain period of time, the client is required to visit the local walk-in centre for further consultation to evaluate the status of the provided services and eligibility criteria associated with the initial inquiry. Furthermore, a check is required to identify if there is any change of circumstances since the recording of the last update. If there is no change in personal circumstances and the eligibility criteria are met, then the provision of the services is also continued. In the instance where there is a change, then the client is advised for an in-centre consultation to re-evaluate and check if the eligibility criteria are met or not and accordingly to avail the services.

Information related to eligibility criteria, provided services, decisions and any special notes are stored in centers' local Employment & Welfare Service Server Database against the unique ID.

Information related to financial data such as employees' payroll, business record, personal skillset matrix is stored in the localized Work Management Server. Databases in various Employment Welfare Plus Centres are located in many geographically dispersed locations.

These information data are integrated into centralized server system, creating the 3rd layer of the proposed high-level architecture. Here, we would propose a federated or hybrid technology or similar for efficiency, scalability and security as well as service-oriented architecture implementations. This is to be further investigated in future studies.

Centralized database not only acts as an information storage system but also a platform for decision making and governance for policies and regulation. These policies and directives will be adopted from different ministries which are responsible for providing the services and its functional operation. Thus, creating a true one-stop architecture which can be easily and efficiently managed and controlled.

The following points describe the main components that are catered to by the database:

- An integrated hub for policies, directives and regulation governed by different ministries,

localized public agencies, local government and ministry of employment and labor

- Support and decision-making process for legal and jurisdiction compliance
- An integrated workforce management system facilitating: work allocation and prioritization, employee skillset evaluation and development program, service levels classifications and monitoring, QA/QC monitoring and control
- Archive of information

VII. CONCLUSION

In this paper, we have presented a virtual organization solution by introducing a one-stop shop solution to the Korean government case study. The required collaboration model presented by the Korean government case study is very complicated as it involves several ministries and models of collaboration and therefore a Virtual Organization (VO) approach is required that will take into account all contributing factors. In this paper, an initial conceptual model of the proposed architecture has been proposed.

In the proposed architecture, a hybrid approach that combines centralized and localized information storage and handling decision making has been followed. Despite the main requirement for a centralized VO approach, it has been proposed that a major part of the data processing and decision-making stays at the local level, therefore, leading to a hybrid architectural model. This optimizes the overall decision-making process by assigning to the local resources for data processing and storage, while, the complex decision making, involving multi-ministerial policies and related influences is handled by the centralized e-Governance layer. This has been tailored to the specific case study requirements in order to optimally solve South Korea Government e-government requirements.

The work was evaluated through feedback from Korea Government as was submitted to the Ministry of Interior and Design for evaluation as the outcome of the collaborative project with Bournemouth University. According to this feedback the virtual organization approach of the proposed architecture would add a major advantage to the existing structure. It would provide a simplified and faster model of decision making led by an integrated & centralized e-Governance policy platform (VO solution).

Initial draft cost analysis was also performed which demonstrated that this was a beneficial solution which required medium and feasible investment. This particular solution was preferred comparing to riskier alternatives which incorporated, for example, block-chain solutions and were also proposed and discussed during the project.

Future plans also include the design development of a complete model-based approach using SysML and other formalisms in order to incorporate the business processes and virtual organizations' requirements with system architecture descriptions. In this work, we have started from a high-level description of the problem and the proposed architecture. In order to proceed with the implementation of such a complex architecture, a top-down model-based

approach has been identified as a requirement that will incorporate business logic with IT. For the time being, the SysML language has been identified a standard and more accepted platform both requirements and solutions.

Although there are several steps required until the successful conclusion of this study, the initial feedback from the South Korean government is encouraging and promising for the adoption of Virtual Organization approaches in real-world applications.

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