

# Public Service System for SMEs in E-government

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**Abstract**—During the past twenty years, small-and-medium size enterprises (SMEs) have been playing more and more important roles in national economy. However, faced with complex and increasingly fierce competition, SMEs are encountering severe challenges because of their inherent weakness in resources and strength, and need well public service by government to foster their growing up. The public service system for SMEs has been an important task in the development of China's e-government.

This paper first analyzes the roles and characteristics of public services for SMEs, and then presents the "Bridge Pillar Principle" on the design of public service system to form an integrated and smooth service supply chain for SMEs. As a case in practice, the construction of public consulting system for SMEs in Ningbo, China, is described and discussed, including its operation mode, service category and technology solution. This system is a comprehensive service system composed of public services and value-added services. It is also an interactive system based on the combination of remote services and face-to-face services.

**Index Terms**—e-government, public service, consulting system, SMEs

## I. INTRODUCTION

During the past twenty years, small-and-medium size enterprises (SMEs) have been playing more and more important roles in national economy. They bring greater vitality to the market, provide more job opportunities, and promote technology innovation and economy stability. In China, SMEs account for more than 99% of all enterprises, with the average growth rate of about four times than that of large enterprises [1]. SMEs have become an important force supporting China's economic growth. However, faced with a complex and increasingly fierce competition in the market environment, SMEs are encountering severe challenges because of their inherent weakness in some aspects, such as information resources, human resources, technology innovation, financing

channels, management level, brand strength, and so on[1][2]. The average life span of SMEs is only 2 to 3 years in China [1][3]. Therefore, how to promote the sustainable development of SMEs has become an emerging problem to the government.

Many researchers addressed that providing SMEs with full-care public services and beneficial policies is an effective throughway to foster their growing up [1][4][5]. The demand for public services from SMEs may be divided into three categories [6]: (1) information services; (2) public administrative services; and (3) value-added services (social services). The first two are accomplished mainly through the relevant government departments, and value-added services are usually provided by various social service agencies.

Due to enormous number of SMEs and their differential in demand, public services for SMEs have some larruping characteristics and are usually a heavy burden for government[7][8]. It has been an attention that how to provide effective and satisfactory public services for SMEs in today's e-government. Therefore, a public service system is designed to provide all possible services for SMEs by integrating the services from different government departments and that from various social agencies [9][10]. In recent years, the public service system for SMEs has been an important task in the development of China's e-government.

As we discussed above, the public services for SMEs are provided by different government departments and various social service agencies. The connectivity, smoothness and integration of services in their contents and processes are common problems to debase the efficiency and satisfaction in existed public service system [3][8][11], and leads to the requirement of public service-oriented reengineering in e-government[11].

This paper explores the design principle of a public service system based on service supply chain, and discusses its application with the case of public consulting system for SMEs in Ningbo, China.

## II. PUBLIC SERVICE FOR SMEs

### A. Service Demand

From a comprehensive investigation to existed public

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service systems [6], we conclude the demand for public services by SMEs into three categories:

(1) Information services

SMEs need to get a wide range of information related to their business, such as market information, new policy, and technology cooperation. Such information can be obtained by making a call to the public service centre, or through a self-help approach such as asking from an automatic reply system, searching and browsing on the website. Such information, which is provided by government departments, industry associations, and social service agencies, needs to be delivered to SMEs in time and can be updated dynamically. Most of above services are free, and only some of the services provided by social service agencies need payment.

(2) Public administrative services

These services are provided by government as one of its responsibilities, and need professionally trained consultants to accomplish usually with the cooperation of multi-departments.

(3) Social services

These services are provided by non-governmental organizations by payment. We name this category as value-added services. It is necessary to introduce a competition mechanism to improve the quality and effectiveness of services. It's also the responsibility of government to select, evaluate, supervise, and manage these service organizations.

The demand for public services by SMEs has been extended increasingly from basic information inquiry and public administration to various value-added services, such as market analysis, business strategic planning, and some other extensive areas which exceed the scope of government's basic public services. It is the governments' special attention that how to make the public service system play a better role in value-added service area through effective integration of social resources.

**B. Bridge Pillar Principle**

The public services for SMEs are provided by different government departments and various non-governmental organizations. They may be inconsistent or poor connected in service contents and service processes. We illustrate this situation as Fig.1.

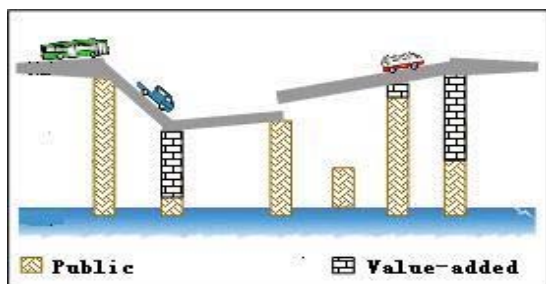


Fig.1 Broken Bridge in Public Service

In this figure, public services by government and value-added services by non-governmental organizations

are all pillars with different heights and in different positions, there are usually difficult to support a connective and smooth bridge surface.

To avoid the broken bridge, we present the "Bridge Pillar Principle" on the design of public services in a system as: reasonable distribution, balanced height and matched carrying capacity. That means basic public services should be combined well with appropriate value added services to meet the SME's demand under a smooth pathway as in Fig.2. This principle is carried out by an integrated service supply chain that will be discussed later.

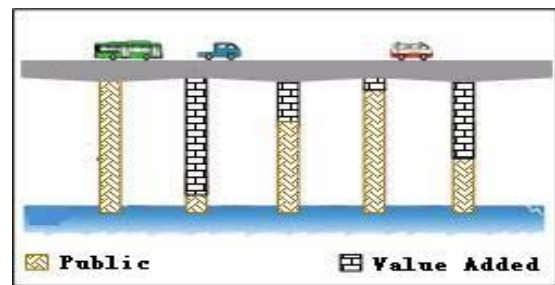


Fig.2 Bridge Pillar Principle on Public Service Design

**C. Service Supply Chain**

Distinguished by their profitability, the services for SEMs are divided into basic public services and value-added services.

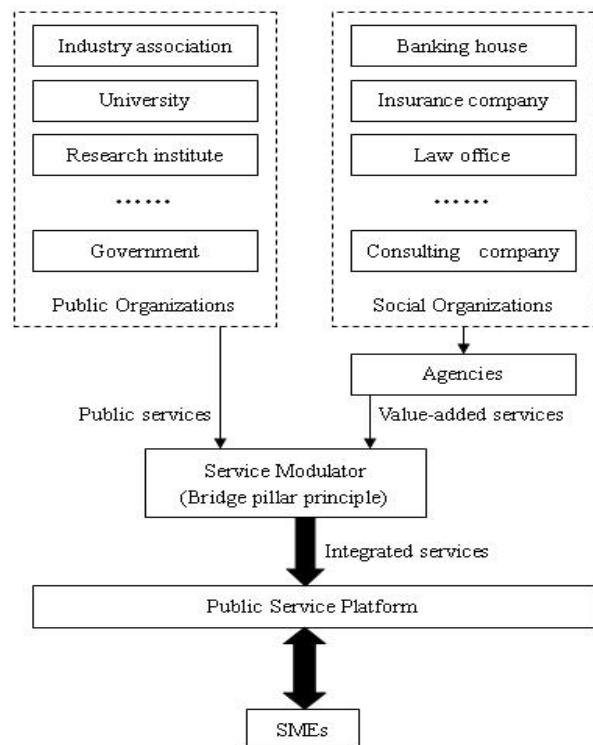


Fig.3 Service Supply Chain for SMEs

Basic public services are non-profitable and provided by government or some non-profitable organizations, such as industry associations, universities, research

institutes, etc. Value-added services are provided by some profitable organizations, such as bank, insurance company, consulting company, etc, through sometimes social service agencies.

In public service system, all of above services should be combined into integrated services by a service modulator under the Bridge Pillar Principle, and thereof form the Service Supply Chain as Fig.3. Service modulator is a series of components which define the service workflow, activities, actors and their standards to keep the connectivity, smoothness and integration of related services [12]-[14].

### III. PUBLIC CONSULTING SERVICE SYSTEM

Consulting services are day-to-day work for SMEs by government. As an example in practice, we'll discuss the application of Bridge Pillar Principle and Service Supply Chain on public consulting service system in Ningbo City, Zhejiang Province, China.

Traditional consulting model is faced with the following problems [3]: (1) high cost; (2) constrained by geographical location; and (3) difficult to meet the demands of dynamic feedback.

Modern communication technology and the Internet not only provide a new way to communicate and share knowledge, and also promote the innovation of the service model. Traditional consulting model is gradually replaced by remote consultation for its remarkable advantages such as no constrains in geographic position, and work-time limitation, which represents the future direction of consulting services. Now traditional consulting service is closely linked to IT, and changing from static to dynamic, from regional to international, from decision-making by a handful of consultants to knowledge-based artificial intelligence group decision [6][15].

The platform, with modern communication technology and the Internet, powerful integrated database support, and cooperation of the government departments, is an indispensable part of public service system. After meeting the SMEs' demand for various nonprofit consulting services from government, the platform also provides remote consultation and interactive services through fully integration of value-added services.

Ningbo, a seaside city in Zhejiang Province, has more than 100 thousand SMEs which support the main body of local economy. Ningbo government has established six public service systems for SMEs. They are financial support system, financing guarantee system, intelligence system, innovation service system, informationization service system, and industry self-service system. Except for the services provided by the six public service systems, other services are also separately supplied by different government departments, industry associations and variously social service organizations. It's increasing problem that most of the SMEs' demand for service is not so complex, but the way to obtain suitable services is more difficult and not easy. SMEs need immediate, fast, convenient and inexpensive services. For the sake, we design a public consulting service system as Fig.4.

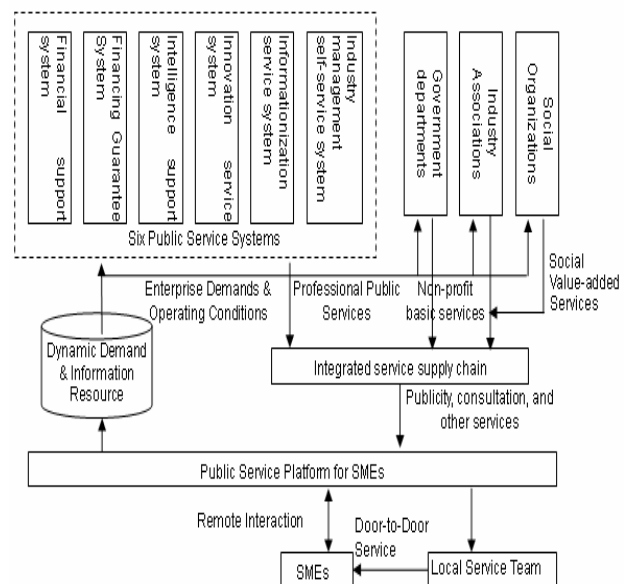


Fig.4 Public Consulting Service System for SMEs

According to the Bridge Pillar Principle, the professional public services from six public service systems are combined with other basic public services and value-added services into an integrated service supply chain. This system provides three service ways: self-help service, remote interactive service and face-to-face service.

Self-help service is accomplished by asking from an automatic reply system or browsing on the website. Remote interactive service is designed to meet the demand for interactive activities within a service supply chain. For example, one SME is interested in some non-policies on financial support by the government, and asks a consulting company to aid the application. This service will lead to a series of interactive activities among government, consulting company and SME. The whole process can be finished smoothly at high efficiency by the designed service supply chain. Face-to-face service is applied to complete those complicated activities by local door-to-door service teams that can't be fulfilled in e-government.

In this system, a public service platform is set to dispose accesses, coordinate activities and provide proper service supply chain to SMEs.

### IV. OPERATING MODE AND SERVICE CATEGORY

This system is made up of Call Centre (CC), Public Service Consulting Platform (PSCP), Data Center (DC), and Operation Management Centre (OMC).

Call Centre (CC) is responsible for processing the calls by telephone and the accesses from the internet. With the help of knowledge and cases from the Data Center (DC), some simple services are finished by the operators in Call Centre (CC). Advanced services are usually accomplished by different participators. The operating mode of this system is shown as Fig.5.

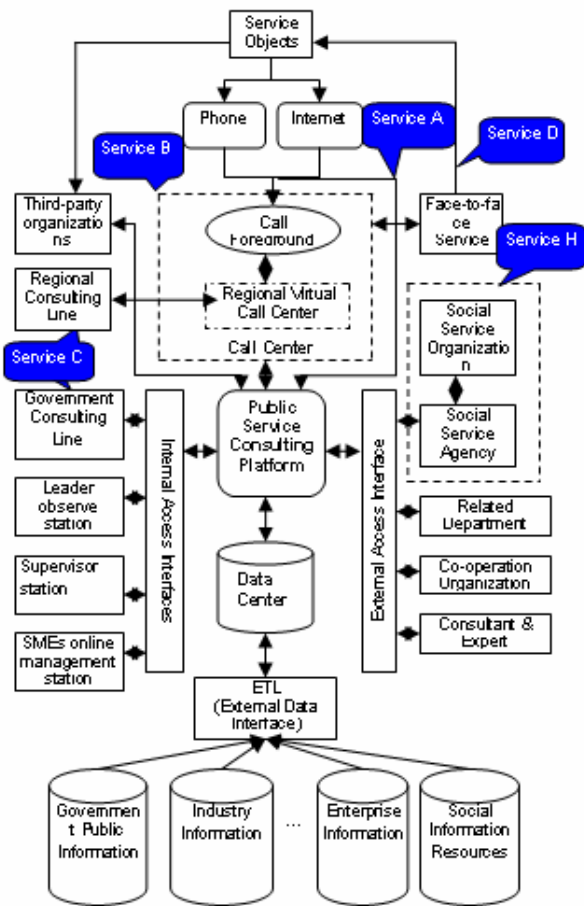


Fig.5 Operating Mode of the Public Consulting Service System

According to the difference in processing manners, public services for SMEs are divided into the following five categories:

**Service A:** Some simple inquiries about policies, routine processes, dynamic information and so on, are accomplished by telephone broadcast, text message, WAP, Web browsing and other self-help manners without human involvement. Internet users can also be linked to the websites of government departments. The flowchart of Service A is as Fig.6.

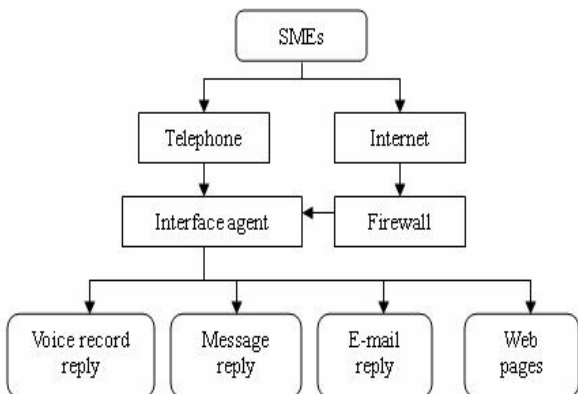


Fig.6 Flowchart of Service A

**Service B:** Some other services can be accomplished by artificial response, recording broadcast or other manners with only the help of operators in Call Center. The flowchart of Service B is as Fig.7.

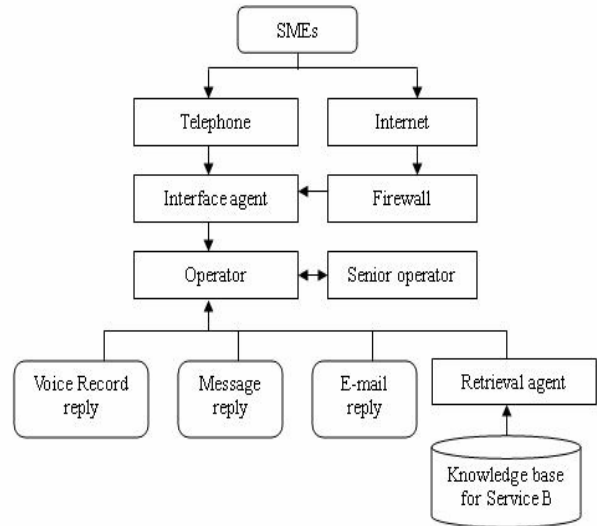


Fig.7 Flowchart of Service B

**Service C:** Some advanced services had to be accomplished through an interactive manner, in cooperation with Call Center and the government departments. The flowchart of Service C is as Fig.8

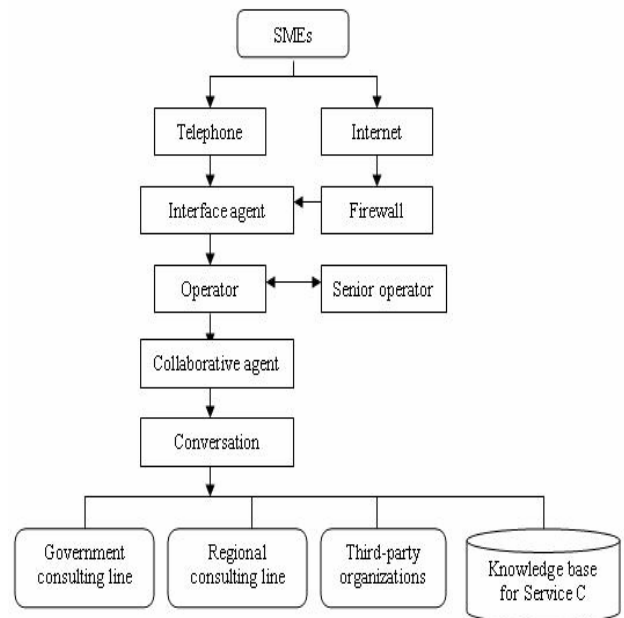


Fig.8 Flowchart of Service C

**Service D:** Some complicated services had to be accomplished through the cooperation of Call Center and door-to-door service teams. A group of door-to-door service teams are placed in different districts to deal with the local services. The Operation and Management Center (OMC) will assign tasks to a proper door-to-door service team if necessary. The flowchart of Service D is as Fig.9

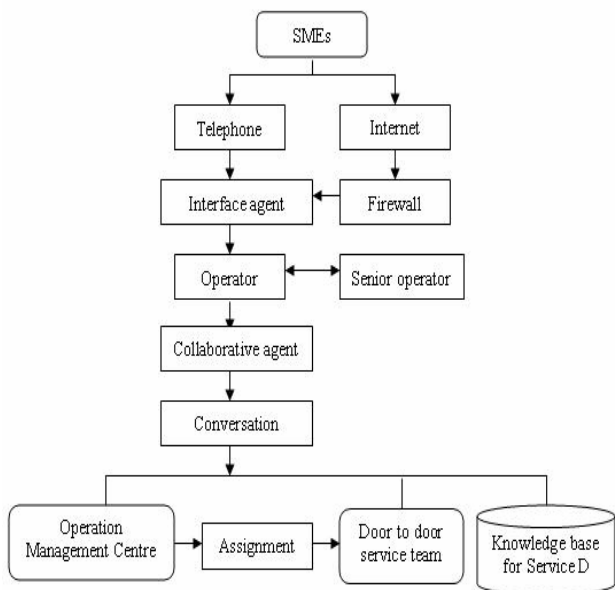


Fig.9 Flowchart of Service D

**Service E:** Some seminars and interactive public consulting services are offered by government through usually a remote video system. The flowchart of Service E is as Fig.10.

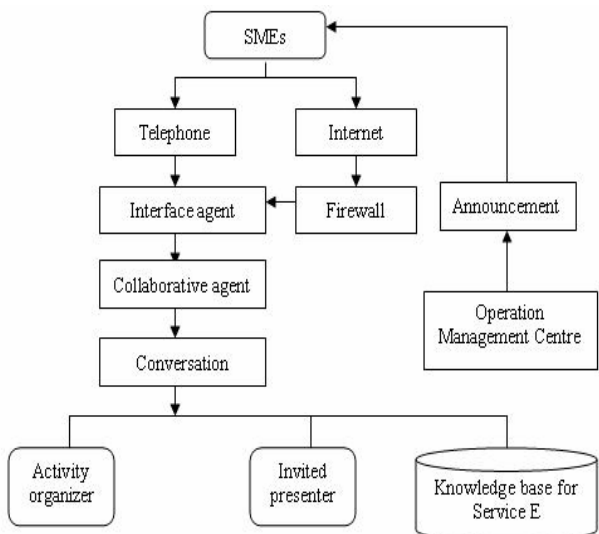


Fig.10 Flowchart of Service E

**Service H:** Service H is a category of value-added services provided by social service organizations through usually some social service agencies. SMEs need various value-added services, such as strategic planning, legal services, business process re-engineering and so on. Those services are customized by different enterprises, and don't belong to the basic public services offered by government, but it is the responsibility of government to facilitate the value-added services available for SMEs with reasonable cost and high quality. An effective way is to promote the growth of social service agencies, by which value-added services are selected and integrated for the demand of SMEs.

With the development of the public services, Service H

should be enriched gradually and continuously according to the actual needs and conditions. Service H is accomplished through the cooperation of Call Center (CC) and social service agencies. Those services can sometimes be provided in a remote way, by connecting the specified service systems of agencies or social service organizations with the Public Service Consulting Platform (PSCP). Internet users can also be linked to the service systems of the related social organizations. The flowchart of Service H is as Fig.11

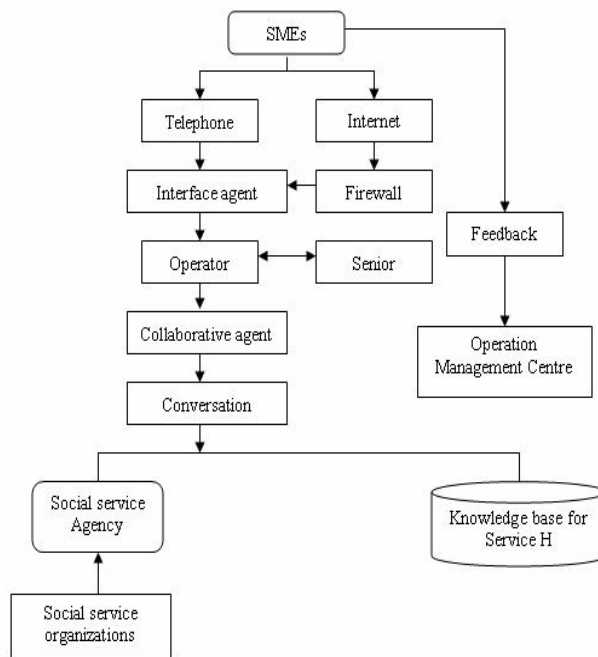


Fig.11 Flowchart of Service H

Service A, B, C, D and E are all the basic nonprofit services that mainly provided by government. Service H is value-added service, accomplished by social service organizations through the market mechanism.

V. TECHNOLOGY SOLUTION

A. Business architecture

The Public Service Consulting Platform (PSCP) is composed of two parts: Consultation Admissibility Foreground (CAF) and Consultation Support Background (CSB). The foreground receives demand information from SMEs, and put this information into a database in the background. The related services are listed and provided for SMEs after some processes by the background. The background is information storage and service management platform, which works according to the directions of the foreground, and provides services for enterprises and meanwhile transfers them to the foreground for feedback.

The business architecture of Public Service Consulting Platform (PSCP) is as Fig.12.

1. Consultation admissibility foreground:

It uses a variety of handling ways such as telephone, fax, SMS, E-mail, PDA, and Internet to provide the access port and communicate with SMEs. Services are sorted as common consultation, emergence consultation, switch consultation, and the feedback and complaint. The emergence consultation is processed by specified operator with rapid response. The switch consultation is handled to an external specified service system that connected with the Public Service Consulting Platform (PSCP).

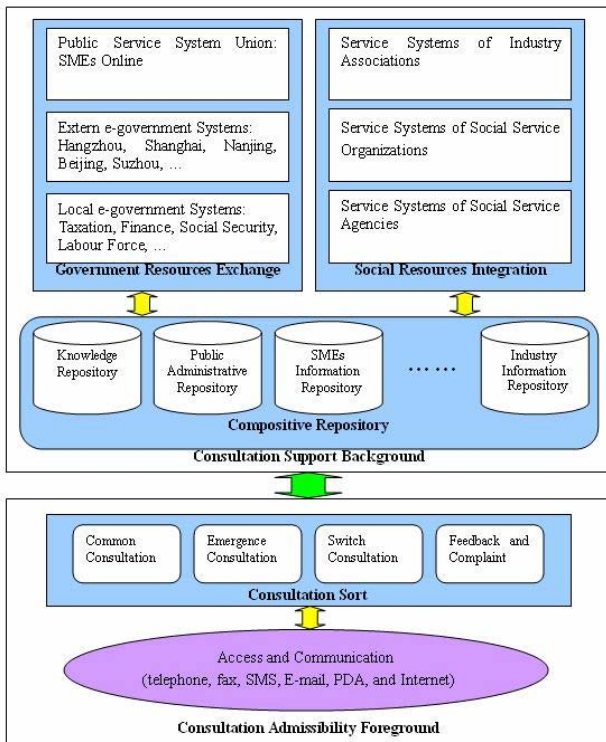


Fig.12 Business Architecture

2. Consultation Support Background

It consists of two service modules and one composive repository.

(1)Government resources exchange

This module is designed to provide basic public services based on government resources exchange. It connects with local e-government systems, external e-government systems, and SMEs Online. SMEs Online is a unified website in SDRCC's (State Development and Reform Commission of China) system, which achieves exchange and sharing of public service resources for SMEs among 38 provinces, municipalities and autonomous regions.

It makes SMEs get many resources and a wide range of government services through a "single point" at most convenience.

(2)Social resource integration

This module is designed to provide value-added services based on social resources integration. It connects with the service systems of social service agencies, social service organizations and industry associations. Sometimes, the value-added services are attached with

public services and form a service supply chain to meet the demand of SMEs.

(3) Composive repository

A group of repositories are established in this platform to provide support for both public services and value-added services as the followings:

**Knowledge repository:** a knowledge base which includes government policies, laws and regulations, terms of public services, and other related contents for SMEs. Knowledge is well organized to be quick retrieved, and is also applied to support the basic consultation by operators in the foreground, according to their experienced cases.

**Public administrative Repository:** a specified base which includes some routine guides to public administrative affairs and related information. Meanwhile, it conducts real-time data exchange with the relevant government department through e-government systems, and then continuously enriches itself using the information from experienced cases. It provides SMEs with comprehensive, multi-functional, and 7×24 services.

**SMEs information repository:** a database which includes the name, address, telephone, zip code, business license and all basic information of SMEs. Beside the basic information, some advanced information is also available for inquiry under the control of access rights, such as the credit rating, capital status and so on.

**Social service repository:** a database which includes the information of social service agencies, social service organizations, and the details of their services.

**Industry information repository:** a database which gathers the information of SME members, service functions, business situation, and so on for different industry associations.

B. Technology architecture

From the view of technology architecture, the whole public consulting service system mainly consists of three platforms: System Access Platform, Application Service Platform, and Infrastructure Support Platform as Fig.13.

1. System Access Platform

It provides access services for all kinds of users. The telephone users access Call Center by telephone. Mobile users can also access this system from Internet by WAP Gateway, GPRS or 3G communications network. Internet users access the system directly.

2. Application Service Platform

It provides a variety of application services and promotes data and resources sharing through integration components, which achieves dynamic integration and intelligent management for services by the web service system and multi-agent system. It consists of three layers as followings:

(1)Integrating engine layer

SOAP Router, Workflow Engine, Transaction Management Engine and their Adapters are placed in this layer. They call and organize the related components from component layer to form a service workflow.

(2)Component layer

All of function components are placed in this layer. There are three sorts of components: service components, management components, and other components.

(3)Information resource layer

Data, information and knowledge are placed in this layer. They are stored in three kinds of repositories: data warehouse, knowledge base and model base.

3. Infrastructure Support Platform

It consists of network infrastructure and relevant technical standards, protocols and norms.

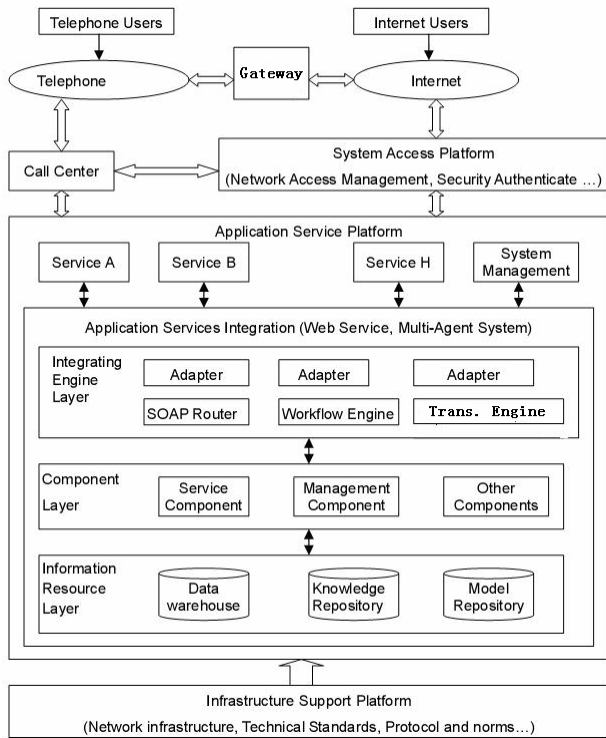


Fig.13 Technology Architecture

VI. ANALYSIS OF APPLICATION

This public consulting service system has been used in Ningbo for two years. Before the application of this system, services for SMEs were offered by different government departments or various social service organizations separately. SMEs had to contact with the related government departments and social service organizations one by one. As shown in Fig. 14, it was usually very hard and a costly process for SMEs to obtain an expected service which was fulfilled by the collaboration between government departments and social service organizations.

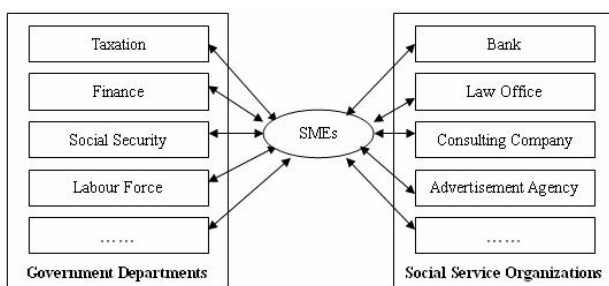


Fig.14 Former Service Manner for SMEs

With help of this system, all service information can be obtained from the Public Service Consulting Platform

(PSCP). Basic public services and value-added services are integrated into a service supply chain as in Fig.3, and then provided for SMEs according to their demand.

An annual report showed that 80.7% of consulting services were fulfilled by on-line way, and the face-to face interviews between government departments and SMEs were reduced 68.9% than before. The total amount of services increased as 11 times as before.

A meaningful change is the service structure compared with last year. For example, with the cases and their experience of Service B, we can add some new knowledge and automatic replies in Voice Reply System, Message Reply System, E-mail Reply System and Web Pages, so the similar inquiry of Service B may be processed as one of Service A at next time. In the same way, some of Service C can also be transformed as Service B if we add the knowledge from the experienced conversations between SMEs and government departments to the knowledge base. Similarly, part of Service D can be transformed as Service C or Service B. The Operation Management Centre (OMC) reported that from 2007 to 2008 service structure has been changed as followings: Service A, from 16.3% to 32.8%; Service B, from 37.4% to 49.5%; Service C, from 40.2% to 14.0%; Service D, from 6.1% to 3.7%. Those changes reflected the improvement of service efficiency and the loose of burden on government departments.

VII. CONCLUSION

SMEs have been playing more and more important roles in national economy. Due to their inherent weakness, it's very important to provide well public services for SMEs to foster their growing up. Combined with public services and value-added services, the "Bridge Pillar Principle" indicates a basis for the design of public service system for SMEs in e-government. This principle conducts the requirement of integrating basic public services with social value-added services into a service supply chain, which improves the service efficiency and loose the burden on government with the case of public consulting service system in Ningbo.

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