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Explaining the Executive Integration Method of Localized Organizational Application Systems for Using in Government Organizations (Applied in the Management of Marine Industries)

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Abstract

Integrating application systems based in organizations creates coordination and interaction between people and organizational units and hardware, software, and database infrastructures. This optimal solution integration results in achieving process maturity and creating suitable conditions for making strategic decisions at management levels to improve organizational performance. Therefore, this study aimed to develop a native executive method for integrating organizational application systems at the management level following the characteristics of Iranian government organizations and their execution in a marine organization platform as a case study. V method was used as a methodology in the execution algorithm for integrating organizational application systems. The effectiveness of the proposed method was proved through a case study and its execution in the real world in the framework of a government organization. The executive method explained for the integration of application systems in the field of defense management was implemented as a case study. This method became native to the marine industry and is suitable for use at the management levels of marine organizations. The advantages and achievements of using this executive method in a case study are 1) Improving the flow of data and information, 2) Increasing the ability to interpret data and information, 3) Reducing the costs of implementing, using, developing, and maintaining databases and organizational application systems, 4) Increasing flexibility and productivity of business processes, and 5) Integration and automation of processes is desirable.

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1.Introduction

The organization's management issues have a large volume and different degrees of complexity. In addition, the multiplicity of data bank collection structures has made it difficult and sometimes impossible to identify problems for scientific and logical solutions based on the degree of importance and work priority. Further, the multiplicity of information structures derived from different architectures of current processes and applied software systems also led to information division in an operational field. Therefore, achieving a centralized and integrated bank of existing information with separate structures becomes impossible. There is an imbalance between the high volume of data and the multiplicity of issues and conventional bureaucracies of the organization with available human resources. Thus, collecting and integrating data to solve problems traditionally or even using some methods of recognition and solving becomes ineffective in practice. In addition, there is no desire for managers and employees to use methods of solving current problems or to form problem-solving teams (Shakeri, 2019).

On the other hand, applying a process approach in any organization is one of the critical success factors. Combining this approach with process reengineering, along with eliminating redundant and non-value-added activities, is considered a necessity for improving organizational performance (Dousty 2012). The essential business process management action is process modeling to identify, review, validate, explore, and improve processes in the design phase. It is necessary to use various tools such as software and databases to increase speed and accuracy after knowing the essential processes required to perform critical activities to implement the organization's missions (Vasilecas et al. 2016). The process approach to its goals, including all processes in the organization, automatically achieves the integration of the organization's application systems to improve the organization's performance using a unique software platform and through the integration of subsystems and using the integrated information system (Mustafa Kamal, 2011, 3).



Today, the infrastructure of information technology and intra-company communication, databases, software, and application systems in organizations can be seen as a software ecosystem. These infrastructures include several applications with multiple and complementary architectures purchased from different providers or created and developed in isolation and separately based on the order of organizations (Messerschmitt and Szyperski, 2005). The frequent challenge of these ecosystems is that programs must interact and cooperate to keep their data coordinated or create a new function. Integrating enterprise applications (EAI) with the proper method is the optimal solution to solve this problem. Enterprise application integration (EAI) gathers two or more applications with their data or functions (Hohpe, 2003). When these programs already exist, this process uses pre-prepared or developed intermediaries on demand to integrate these elements to achieve uniform behavior and unified performance. The common challenge of both methods is the communication between entities. Some may be developed in different programming languages, standards, and architectures or based on heterogeneous data, making EAI essential (Wang et al., 2016).

This study aimed to explain the integration of the application systems of government organizations using a local implementation method. The proposed algorithm is implemented in an Iranian government organization as a case study, and its effects are investigated to check the effectiveness of the studied method. Process management approaches, information structure integration methods and V methodology were used to achieve the desired result. With the realization of the research objectives, the integration of information systems in management with a flexible and local structure was carried out based on the needs of each government organization, and the effectiveness of personal tastes was reduced.

There is a need for transparency in the steps and processes of doing the work to achieve this goal. A suitable platform and mechanized information systems are needed to achieve the goals and fulfill the organization's mission. There is a need to increase the speed of information transfer and up-to-date viewing of information by senior managers without intermediaries to update, effective information

communication, and information management between different levels of the center. Removing multiple databases with other structures is necessary to increase the decision-making speed. A single organizational literature should be created in all fields to summarize information quickly, with high reliability and low cost. There is a need to develop an integrated system of programs and application systems for organizations in the management field to prevent misinterpretations and personal impressions, including necessities (Roztocki & Weistroffer, 2009; Janssen & Cresswell, 2005).

2. Research literature

The theoretical framework of the research is based on the concepts of integration of the organization's application systems, business process management, process re-engineering, and (V) method as the methodology and executive approach of the integration method.

Soomro and Awan (2012) stated that the best solution to establish interaction between the application software of organizations is to use EAI. EAI enables software to interact with each other and share their data and processes with other software in a productive way without the need to change their data structure and infrastructure. Fenner (2011) found that (Fenner, 2011) states that EAI is a set of processes, standards, software, and hardware that works towards the integration of two or more application subsystems of the organization (application software). EAI provides conditions for these systems to act as a single system.

Systems that enable organizations to communicate inter-process are traditionally known as middleware. Middleware is primarily related to data-level integration. These systems do not provide functionality that provides a higher level of integration, such as object or process integration. Unlike middleware, EAI systems include technologies and processes to enable enterprise applications to exchange information at a semantic level in formats and frameworks that each system understands. These products integrate applications in a technical layer and provide a communication framework that provides the context for integrating information systems at the semantic and practical levels. This approach integrates data and information, objects, and processes (Puschmann, 2011).



Process management is related to managing all matters that affect the effectiveness and efficiency of processes. Process management reduces the risk of limited optimizations and moving away from general optimization by managing the entire processes that are going on between organizational units (Lashkar-Blouki, 2012). According to Esmailpour et al., process-based management or process management is the recognition of the management of business processes whose purpose is to meet customers' needs (Emailpour et al. 2010). Process management includes determination, analysis, measurement, and continuous improvement of processes through the participation of all people. Process management involves the processes' management and employees of all organizational levels. Process management includes documenting processes and customer orientation through identifying and prioritizing organizational processes, adapting processes to the organization's strategy, and controlling processes with the help of measurement indicators (Alwandi and Mansouri, 2007).

Process Reengineering, as part of the process management approach, seeks to make fundamental changes by designing new processes. In this approach, all processes are redesigned from the beginning, i.e., the existing processes are abandoned and redesigned. Champy defines reengineering as the fundamental rethinking and redesign of business processes to significantly improve critical bottlenecks of organizations, such as cost, quality, service, and speed. In this study, re-engineering does not mean repairing, but re-engineering an organization means abandoning the old systems and starting a new system that does not have the problems of the old systems. Re-engineering processes means taking significant and fundamental steps, and re-engineering processes is an all-or-nothing approach (Yarmohamedian et al. 2012).

Various methods, including the V, Scrum, RUP, spiral, cascade, XP, and SSADM methods, are used to implement the process management approach. V stands for a software manufacturing process method (which can also be adapted to hardware manufacturing) and may be considered an extended cascade model. In this model, the process path bends upwards in the shape of the letter V after the programming

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phase instead of the production path being a straight downward-sloping path like the waterfall model. Method V determines the relationship between the different phases of the life cycle of the production of software and application systems and the continuous stages of the test phase. The horizontal and vertical axes (from left to right) show the amount of time or completion of the project and the level of completion of the steps defined by abstract titles (the highest level of the main concepts), respectively (Turner, 2013).

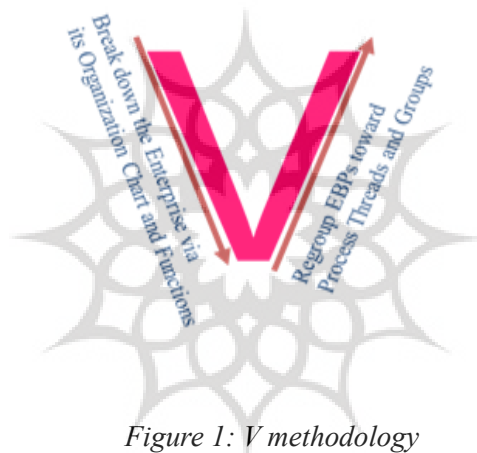


Figure 1: V methodology

The advantages of using the V method are so significant that its disadvantages can be ignored. Model V is an evolved method that supports flexibility and agility during development. This method, while minimizing the risk and improving and guaranteeing the quality of the project, significantly reduces the costs of the project's life cycle (Turner, 2013). V method is a disciplined framework approach that promotes detailed design, development, and documentation necessary to build sustainable software products (McHugh et al., 2012). Communication between all members is very high so that users are involved in all stages of the system's production, development, and maintenance. The status of changes, updates, and system maintenance is publicly available. The form shows the status of all requests and changes throughout the year. At the beginning of each project, it is possible to

design a particular model of the V method suitable for that project because it is an organizational and independent model (Tosin 5, 2015).

3. Research method

This study aimed to develop a native executive method for integrating organizational application systems at the management level under the characteristics of Iranian government organizations and their execution in a marine organization platform as a case study. The executive researcher-made method was based on Shakeri (1999), inspired by the V method and its combination with the process approach and business process management.

This executive method of integrating organizational application systems using the V methodology based on the process model approach and business process management (Shakeri, 2019) can be seen in Figure 2:

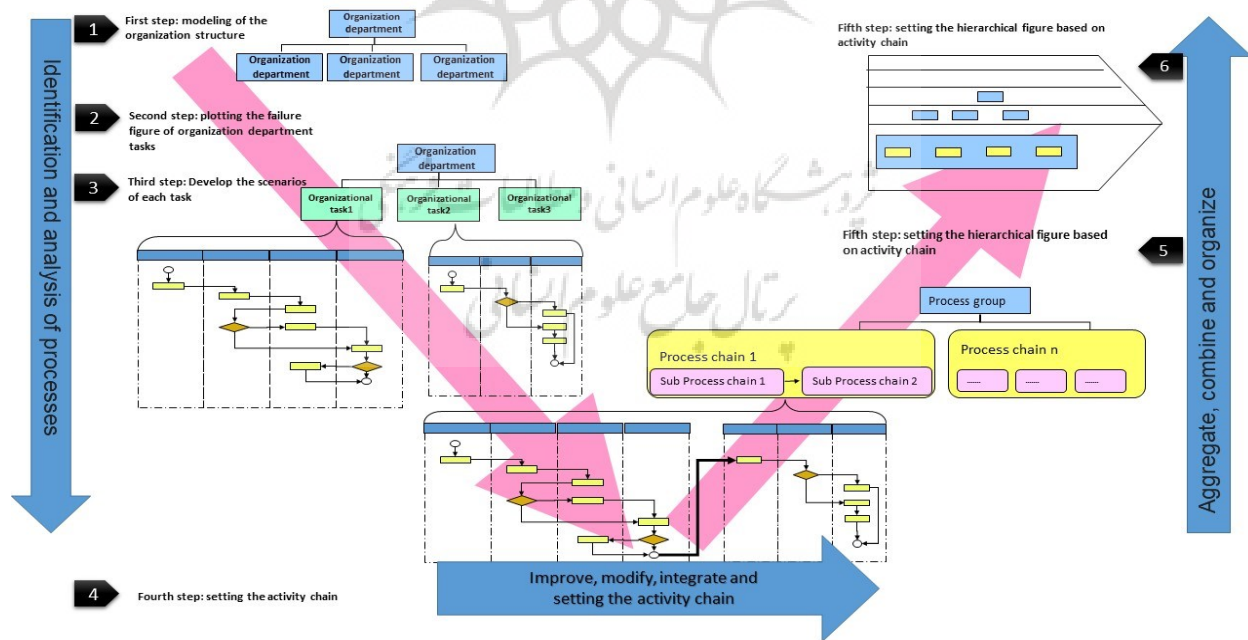


Figure 2: Implementation of process approach by V methodology

3.1 .First step: Organizational structure modeling.

The organization's current structure is identified in this step, and the existing documents are collected despite expiration. The organization's executive structure is shown here, and planning for the next steps is possible. The number of units, hierarchies, and chart type help to draw a basic diagram to accurately identify the system. Changes in documents are not updated in many government organizations. Therefore, the existence of differences between the existing records and the actual situation of the organization is inevitable.

3.2.Second step: plotting the failure figure of the organizational units' tasks.

After the implementation of the first step, it is time to determine and document the working processes of each of the obtained chart components. Therefore, according to the organizational chart of each organization, the desired positions are determined, and for each position, missions, and tasks are specified to achieve the organization's goals. The process figure of the components of the organizational chart is plotted by carrying out a field activity, including interviewing all available people according to the chart and collecting all the documents, including input forms and output reports that represent the collection activities.

3.3.The third step: Developing the scenario.

Developing the scenario of each of the tasks resulting from the previous step, which has been identified and documented, is performed in this step. Establishing a relationship between the input forms to the department and the output reports and comparing the interviews with the existing documents will reveal the dull points and re-conduct additional interviews to draw the task scenario. The output of this step will be a complete document of integrated tasks within the department in which all relationships between documents and activities are stated.

3.4.The fourth step: forming a chain of activities.



At this stage, the chain of activities is formed from the implementation method. In other words, the movement towards the peak has started at the endpoint of V. There is a relationship between the tasks and the movement of the opposite of failure. The components are connected to form a whole to realize the organization's primary mission. An integrated map of the entire processes of the organization is drawn by communicating and connecting the input and output of each activity.

3.5.The fifth step: Summary of similar activities.

This summary is performed in line with the bureaucratic logic of government organizations and under the supervision of the laws governing the organization in this department to obtain a process hierarchy diagram based on the chain of activities. In other words, an operational process chart is drawn, which can be a solid foundation for changes in the government organization's communication chart.

3.6.The sixth step: Determining the position of process groups in the process model of the organization.

This step relates to the implementation method explained, a specialized discussion at the macro level of planning the organization's processes. Existing processes are classified into main, management, and supporting processes. Processes among these processes are selected as critical processes, which are different in the organization and department according to the environmental conditions. Based on the direction of the organization, those processes that are of strategic importance and have an essential contribution to the organization's success are defined as critical processes. The most important criteria involved in identifying key processes are:

- Added value created
- Current and future interests of the customer
- The technical expertise of the organization

4 . Case study

Defense management is a case study for executing the mentioned method, whose implementation algorithm is schematically shown in Figure 3.

The defense's mission is to support employees in all areas, which is responsible for protecting individuals and their families and related services in the accommodation in institutional houses, as well as subsistence and welfare services.

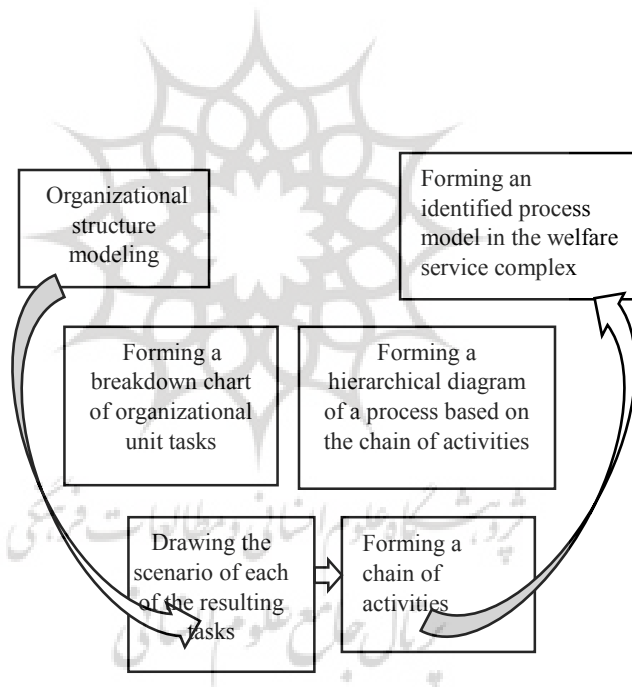


Figure 3: Research executing algorithm (Shakri, 2019)

The studied organization and department is a typical government organization, which is the most frequent among public and private collections. The welfare services and housing affairs of



employees in most holding organizations and large groups have a similar and close structure. This set has been selected as the target organization of the research. All policies and plans for the welfare and housing of the complex's employees are carried out in this organization. Welfare and housing services are usually connected to the tourism organization. These departments are mostly self-governing and provide free or subsidized services to the organization's personnel from their income.

The goals of creating the welfare mentioned above complex include the following:

1. Preventing parallel organizations and activities in subsidiary organizations in welfare and services (such as management of institutional houses, halls, guesthouses, entertainment, sports, tourism, etc.)
2. Fair use of all capacities and mobilization of all existing facilities at the desired level for effective and efficient service to employees, retirees, and their families per the policies, measures, and orders.
3. Improving the dignity and livelihood of employees through providing welfare services such as canteens, halls and guesthouses, tourist, sports, and pilgrimage centers, management of organizational houses, and provision of various essential and welfare loans.
4. Development and promotion of welfare services quantitatively and qualitatively.

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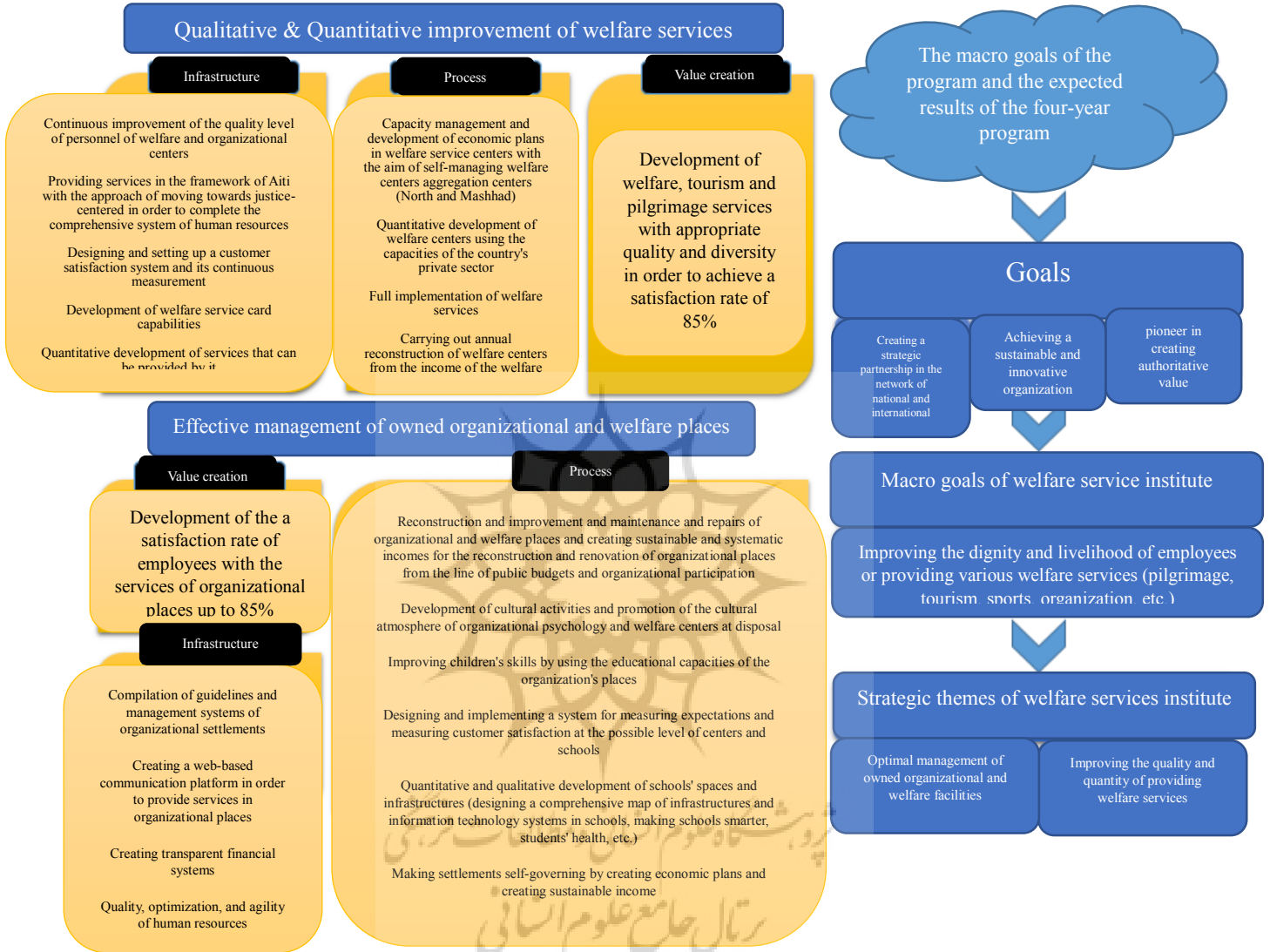


Figure 4: The main goals of the Welfare Services Institute

4.1. First step. Modeling the structure of the organization

The modeling of the structure in this study was in the following steps:

4.1.1. Organizational house field



The first level of the structure of the organizational house is composed of three departments, including the headquarters, the organizations that own the settlement, and the employees. The second level of the structure includes two sections of welfare services and settlement, as shown in Figure 5.

4.1.2. Place field

The first level of the facilities domain structure consists of three departments, including the management of welfare facilities, organization/group/industry, and employees, according to Figure 6.

4.1.3. Loan field

The first level of the structure of the loan sector consists of four departments, including the headquarters, the cooperative foundation, organizations, and employees. The second level of the structure includes the two parts of the central fund and the subsidiary fund, as shown in Figure 7.

4.1.4. Residential project field

The first level of the structure of residential projects consists of three departments, the central fund, the organization, and the employees. The second level of the structure includes a fund section in the form of Figure 8.

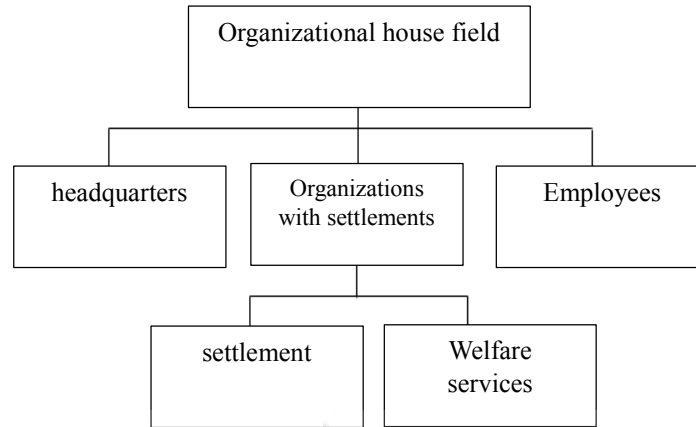


Figure 5. Organizational home field structure

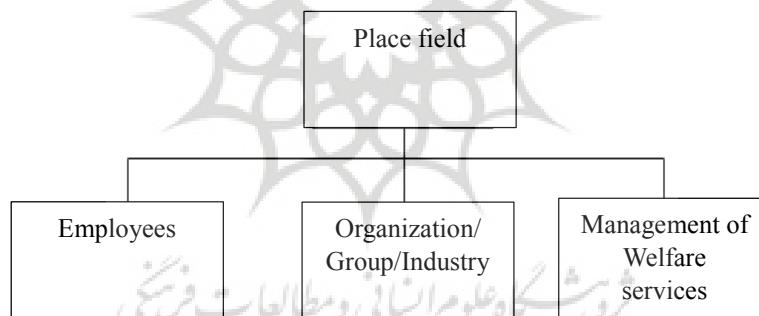


Figure 6. Structure of the place field

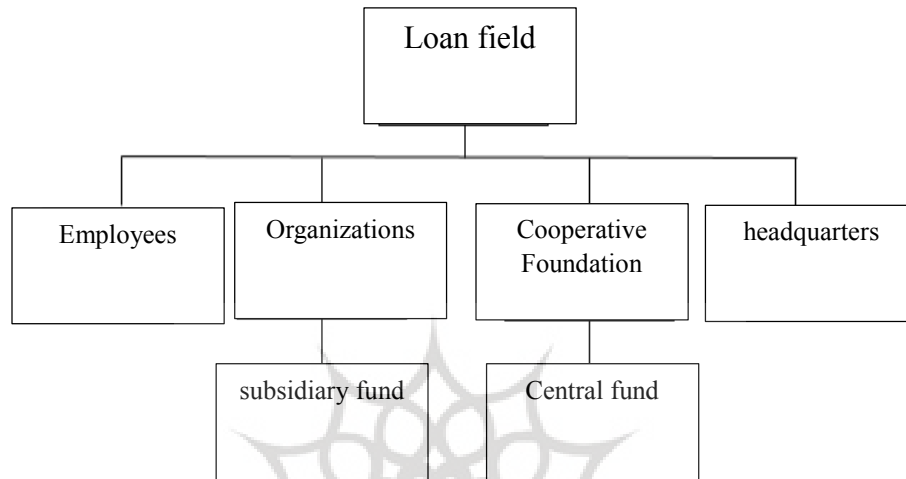


Figure 7. The structure of the loan field

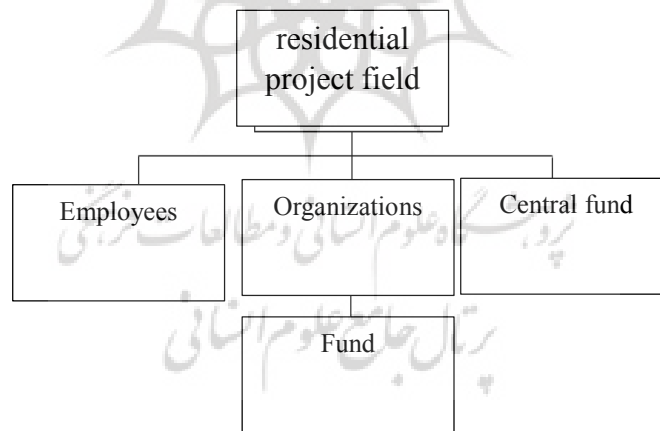


Figure 8. The structure of the residential project field

4.2. The second step. Diagram of failure of organizational units' tasks

The failure chart of organizational units' tasks is as follows:

4.2.1. Failure diagram of the tasks of organizational house units

These diagrams include four departments of welfare services, settlement, staff, and headquarters, as described in Figures 9 to 12. The tasks of the welfare services unit include the preparation of the birth certificate of the institutional home, quota allocation and allocation to organizations, and handing over the institutional home. The task of the settlement unit includes the car license. The staff unit's task provides for the organizational house's application. The task of the headquarters unit consists of the pricing of settlements.

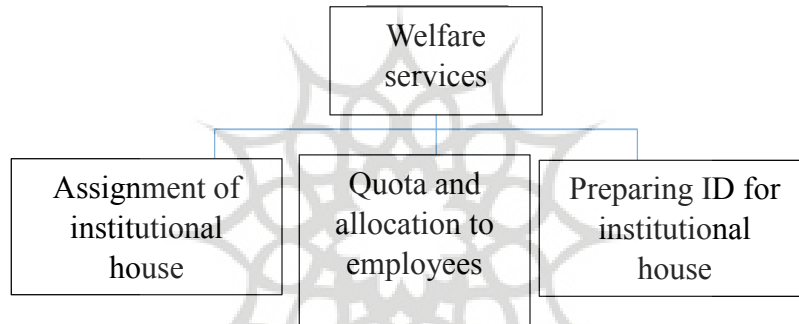


Figure 9. Tasks of welfare service unit

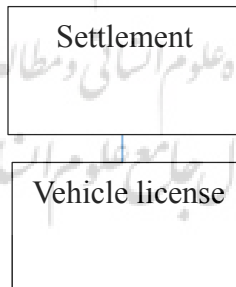


Figure 10. Tasks of the settlement unit

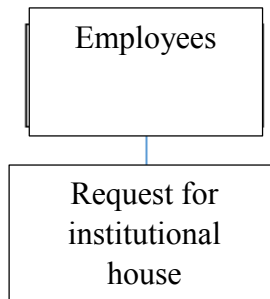


Figure 11. Tasks of the work unit

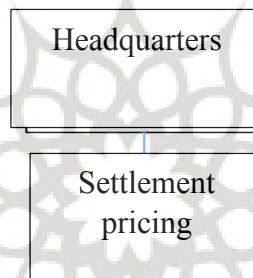


Figure 12. Tasks of the Headquarters Unit

The failure diagram of the tasks of units in the premises, loans, and residential projects can be formed and drawn, similar to the breakdown chart of the units' tasks in the organizational houses field.

4.3. The third step. Developing the scenario of each task

In this part of the integration algorithm, the chain of activities was developed based on the scenario of each task. This activity chain includes four processes and 33 sub-processes. The processes include institutional houses with six sub-processes, welfare places with seven sub-processes, loans with 12 sub-processes, and residential projects with eight sub-processes. Figure 13 presents the process of preparing the identity card of the institutional house as the task of the units of the institutional houses is described as an example. (The activities and scenarios for other tasks can be compiled similarly.)

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This process records and maintains the details of settlements and units (residential and commercial). In the current situation, * software is used, and its formats will be used in the desired situation. The information on settlements and units can be defined by the headquarters and organizations that own the settlement.

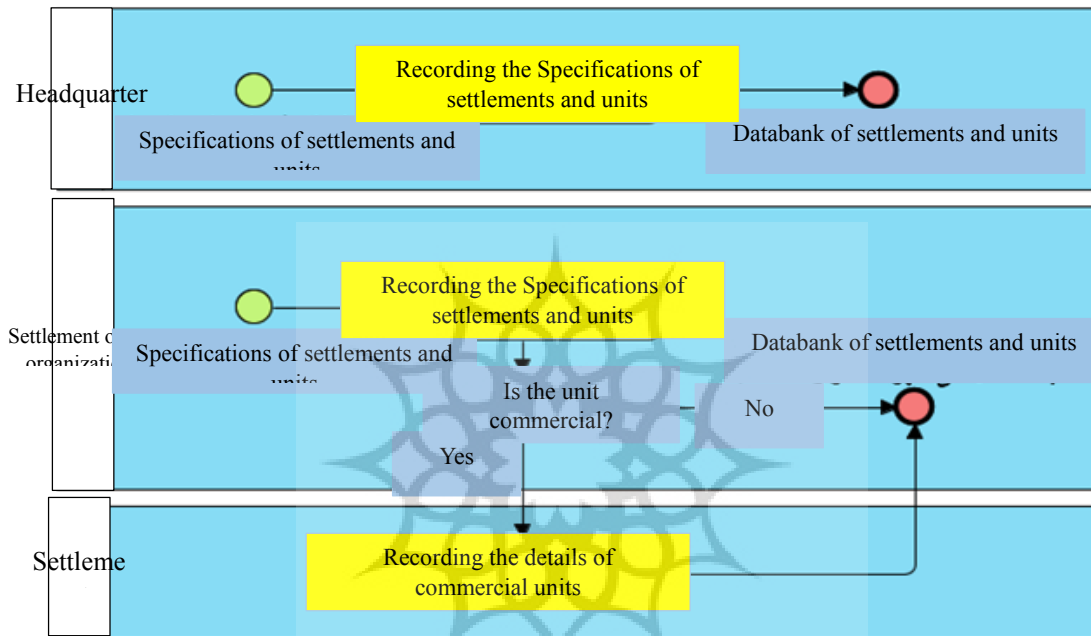


Figure 13. The process of preparing an organizational house ID

Table 1. Description of the process of preparing an organizational house ID

The process of preparing an organizational house ID				
Title of the sub-process:				
Field of activity: Institutional house			Upstream Process Title: Institutional Houses	
Business Process Model: The model depicted in the figure above				
Description of the business process:				
This process records and maintains the details of the settlements and units by the settlement owner.				
Input	Actor	Operation	Receiver	Output



Specifications of settlements and units	Organizations that own the settlement	Recording the Specifications of settlements and units	Organizations that own the settlement	Databank of settlements and units
Specifications of settlements and units	Headquarter	Recording the Specifications of settlements and units	Headquarter	Databank of settlements and units
Specifications of settlements and units	settlements	Recording the details of commercial units	Organizations that own the settlement	Databank of settlements and units
Process owner:				
<ul style="list-style-type: none"> - Headquarter - Organizations that own the settlement - Names of other agents and actors involved in the process: - Headquarters (General Directorate of Welfare Services (welfare expert-welfare manager)) - Organizations that own the settlement (welfare services deputy (welfare expert-welfare manager)) - Settlement (Commercial Expert) 				
Process output title:				
<ul style="list-style-type: none"> - Specifications of settlements and units 				
Process input title:				
<ul style="list-style-type: none"> - Specifications of settlements and units 				
The title of all the information forms used during the execution of the process:				
<ul style="list-style-type: none"> - Settlements specification form - Units specification form - Business units specification form 				
Titles and type of impact of laws and standards governing the process:				
<ul style="list-style-type: none"> - The process is modeled with a forward approach; therefore, at each step of the implementation of the process, at the discretion of the relevant operator, it is possible to go back to the previous stage and modify and review and decide how to continue the process. 				
Title of the sub-process:				
Field of activity: welfare places			The title of the upstream process: welfare facilities	

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Business process model:				
The model is drawn in the figure above				
Description of the business process:				
This process is for allocating welfare places and announcing to sub-groups.				
Input	Actor	Operation	Receiver	Output
Quota determination time	Headquarters/organizations/foundation	Determining the quota for owned places	Subordinate organizations	Quotas related to the organization
Quota related to the organization	Subordinate categories	Internal quotas	Subordinate categories	Internal quotas
Internal quotas	Subordinate categories	Informing the employees	employees	View the relevant quota
Process owner:				
Management of welfare facilities				
Names of other agents and actors involved in the process:				
- Management of welfare facilities (the deputy of welfare services (welfare expert - welfare manager))				
- Subordinate categories (welfare services deputy (welfare expert - welfare manager))				
- Employees				
Process output title:				
- Quota separately for each collection				
Process input title:				
- Quota determination time				
The title of all the information forms used during the execution of the process:				
- Quotation form				
Titles and type of impact of laws and standards governing the process:				
- This effect is determined based on the peak time calendar, courses, and the index (number of human resources) of each organization's quota.				
- CEO's quota is deducted from the total quota at allocation time. Determination of free quota is also done, which can be used by all collections.				
- The courses related to each quota are also specified.				
- Determining the withdrawal time for the quota of the center is done according to the distance of the route and the season.				
- the process is modeled with a forward approach. Therefore, at each step of the implementation of the process, at the discretion of the relevant operator, it is possible to go back to the previous stage and modify, review, and decide how to continue the process.				

4.4. The fourth step. Forming a chain of activities

Processes in the area of institutional housing include the process of preparing institutional housing ID, quota allocation and allocation to organizations, settlements pricing, institutional housing application, institutional house transfer, car license, institutional house relocation process, institutional house extension, institutional house evacuation, surplus houses, registration of residents' notices/violations, unit support management, commercial premises management, commercial premises contract renewal, and institutional house renovation. The connection of these processes is shown in Figure 14.

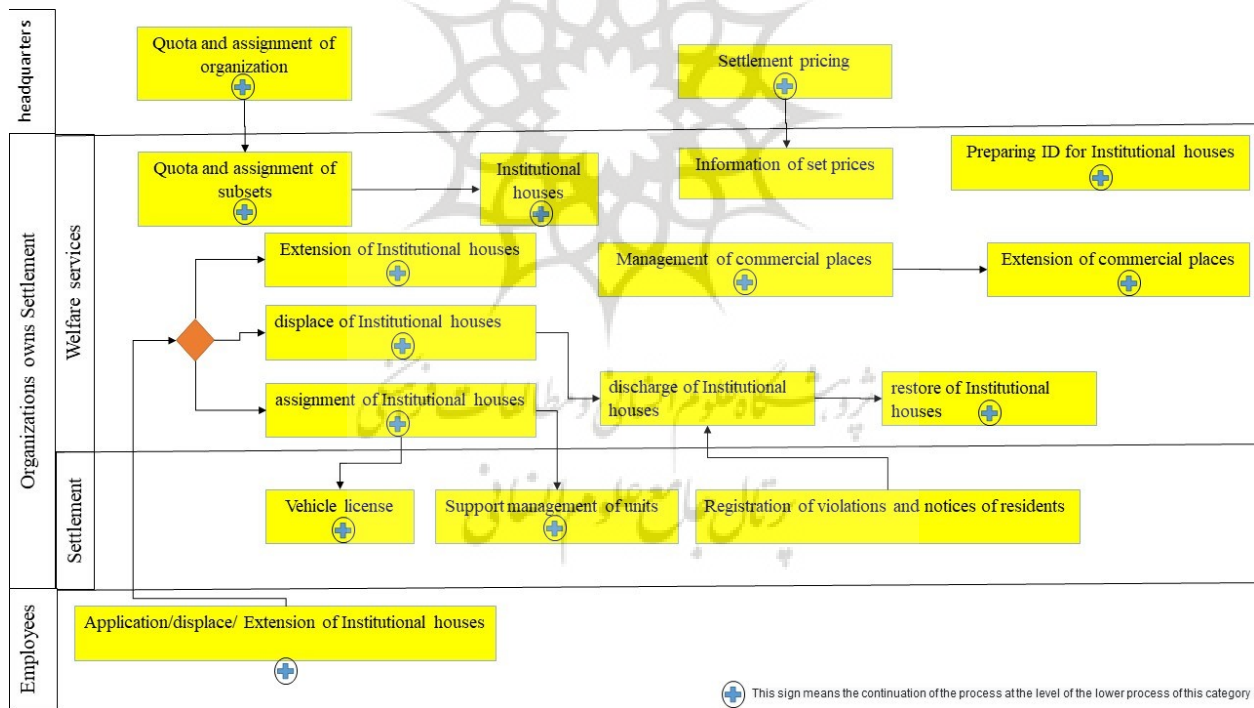


Figure 14. Processes of organizational houses

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In addition, the relationship between the processes of welfare facilities, loans, and residential projects is described in Figures 15, 16, and 17.

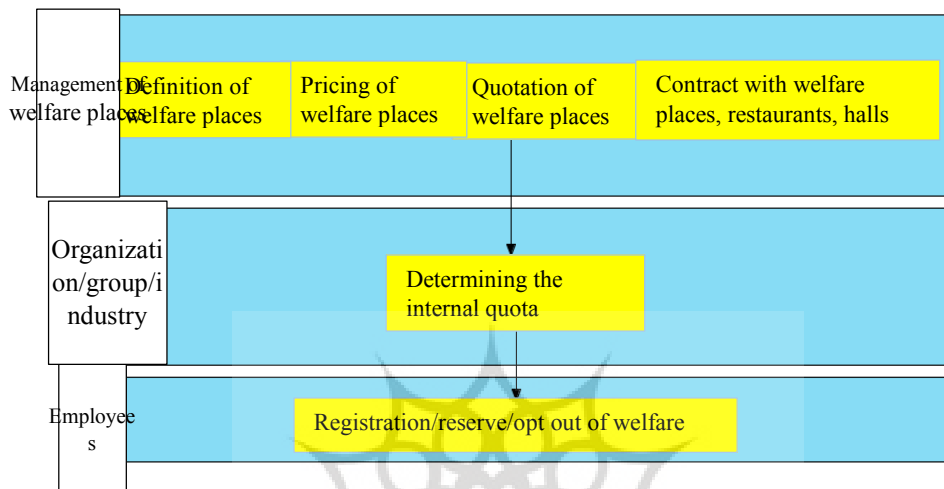


Figure 15. Places field processes

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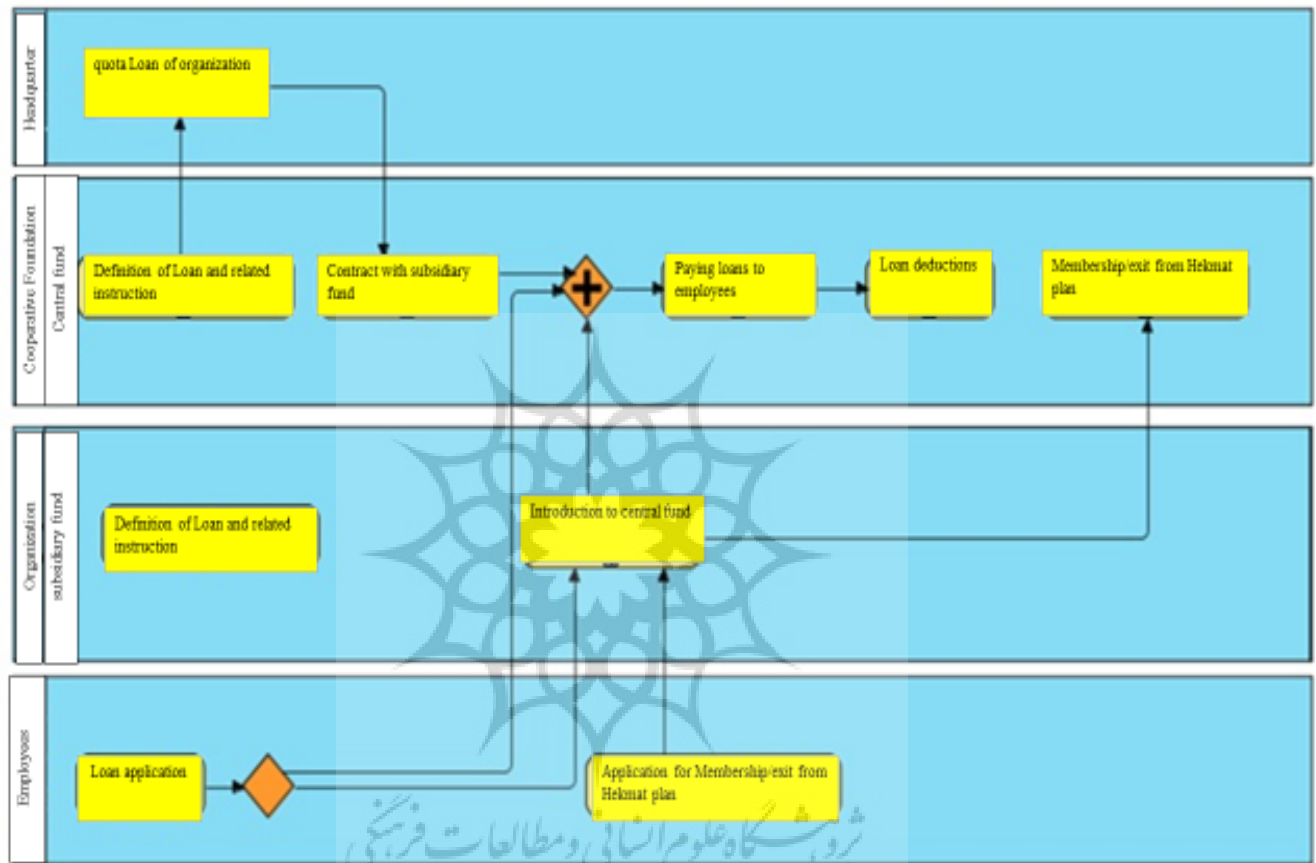


Figure 16. Loan field processes

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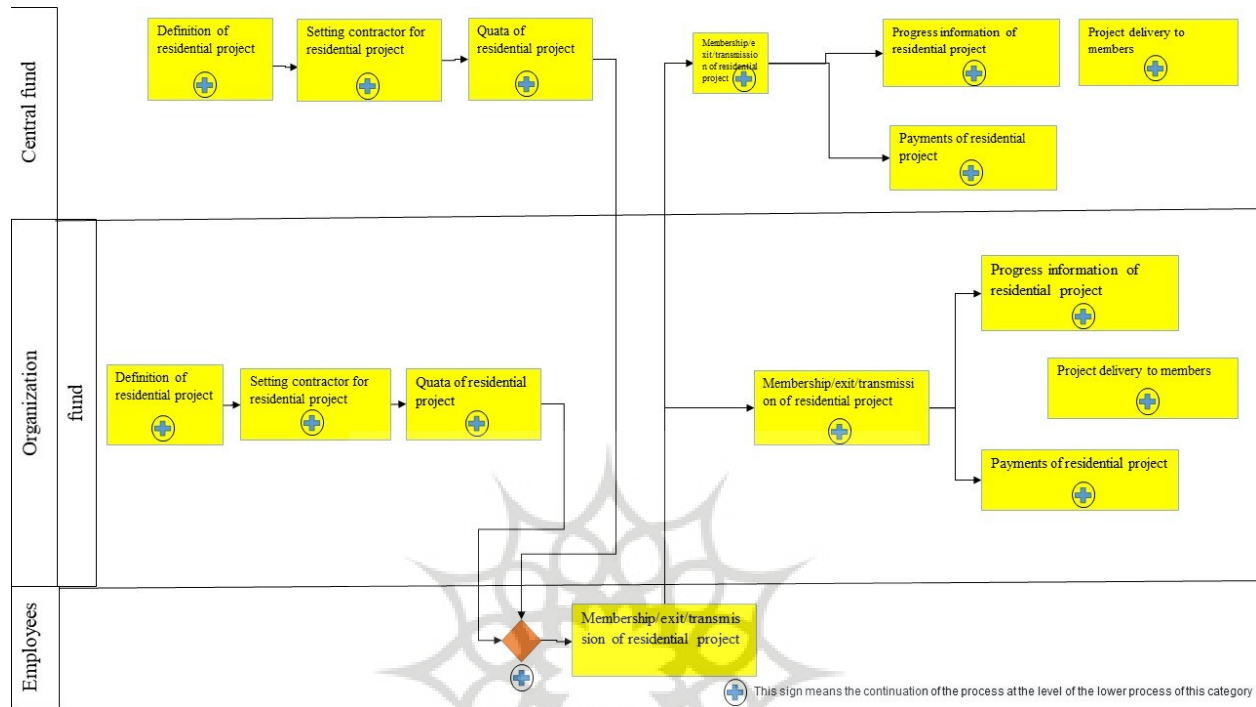


Figure 17. Processes in the field of residential projects

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4.5. The fifth step.

Hierarchical diagram of a process based on the chain of activities

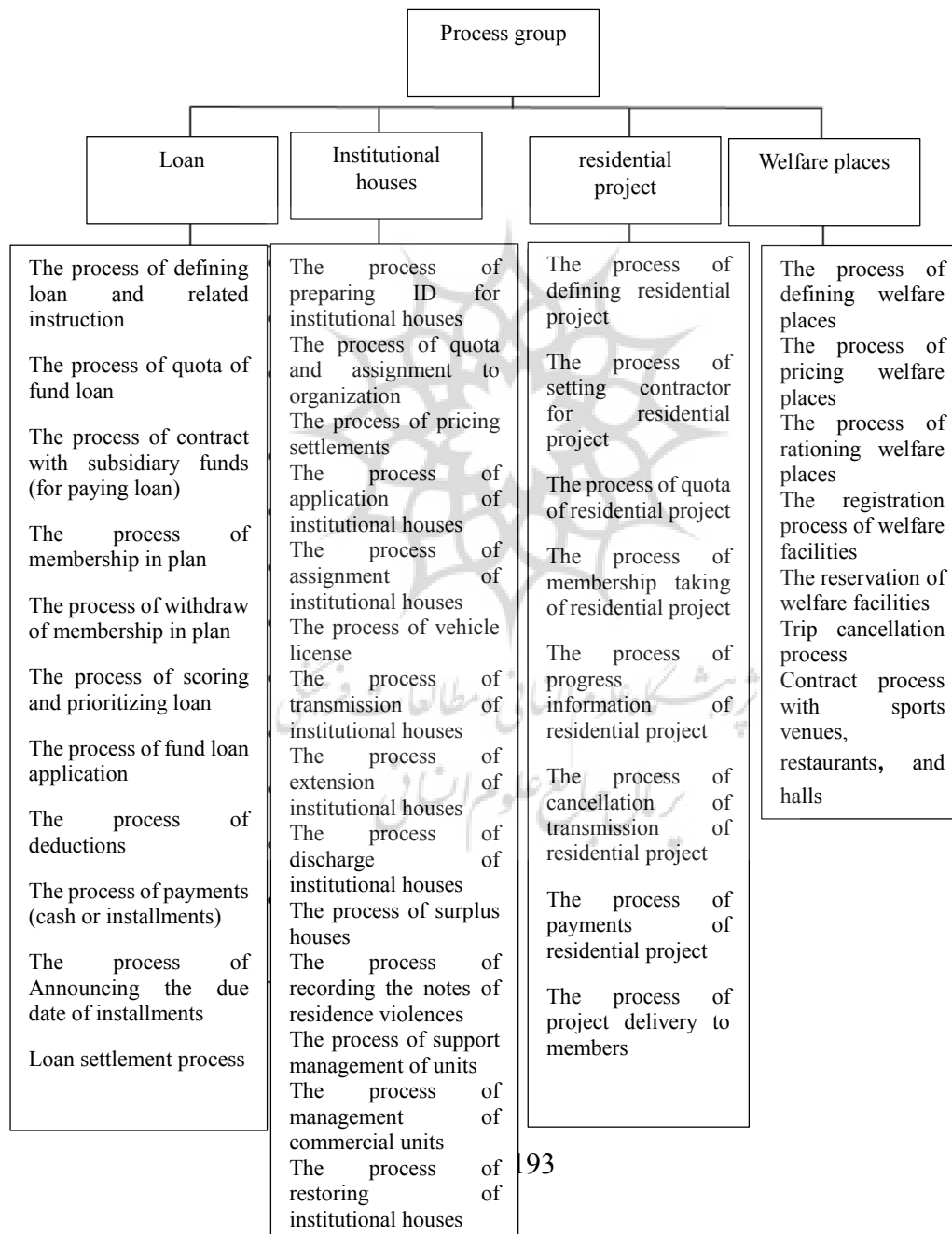


Figure 18. Hierarchical diagram of a process based on the chain of activities
The sixth step. Process model identified in the welfare service complex

Generally, the main processes identified in welfare services can be classified into four groups in the ideal business situation (Figure 19).

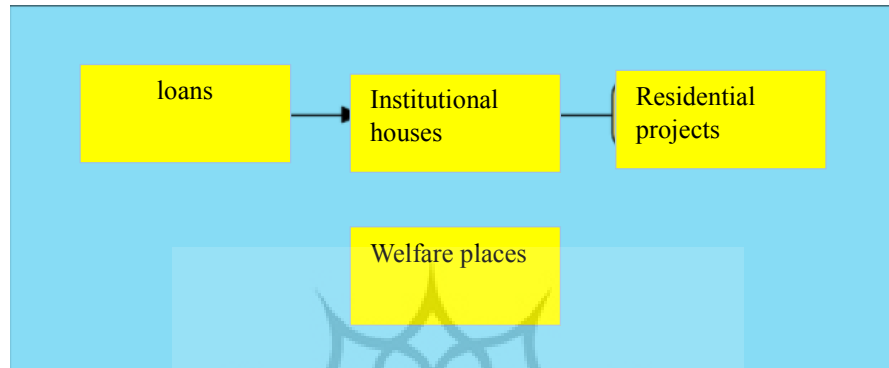


Figure 19. Process model identified in welfare services

5. Discussion and conclusion

Effective management to become a process-oriented organization is vital for the success of organizations in the 21st century. Today, the structure of companies moving towards an information-oriented economy increasingly requires integration with related and coordinated organizational applications. Separate and independent programs have joined history with the emergence and application of the so-called EAI integration approaches. This study was conducted in six steps to explain a localized executive method to integrate the application systems of government organizations. This method was implemented at the management level and in a localized government organization's commitment section using the V methodology, business process management approaches, and information structure integration methods.

The effectiveness of using EAI systems is a very complex process. It is impossible to examine the personal effects and consequences of each and to aggregate them due to the different nature of each, considering the systemic impact of EAI systems in all elements of the organization, including organizational, managerial, strategic,



operational, financial, and informational levels. The results of the executive method and the algorithm described in this research achieved the following advantages and improvements in the field of defense management:

Generally, EAI in organizations leads to the integration of the organizational structure and information infrastructure in a standard way. The algorithm described in the mentioned case study in the marine industry maintained the flow of data and information, and with integration, improved circulation, usability, interpretation, and processing of data and information in different organizational departments and between multiple users. This reduced the costs of implementation and use, development and maintenance of distributed information systems, which caused considerable savings due to the size and scope of the organization. In addition, the flexibility of business processes within the organization and between units was improved. Essential operational processes were identified and simplified to increase productivity. Redundant processes were eliminated, and the automation of the processes was carried out in the most favorable way possible with the integration resulting from the application of the explained implementation method.

Essential things such as the multiplicity of jobs and the complexity of the organizational structure, the architecture of the existing information structures, and the requirements of its use should be considered to realize the goals better and achieve the maximum benefits of implementing this approach and executive method. The EAI approach is scale-oriented and has a holistic and systemic nature. Therefore, this approach should be implemented in all levels and departments of the organization and even the supply chain related to the organization to achieve maximum benefits and proper functioning. An acquaintance of human resources and promotion of organizational culture in line with the integration and application of EAI is conducted to create a common understanding to facilitate implementation and minimize resistance to change of people within the organization.

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Future studies can implement the described algorithm and executive Russian in private companies and compare the results with the current research. Further, combining other approaches with the implementation method mentioned in this research can lead to innovation and maybe even improve.

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