Computer Aided Analysis for Managing Business Continuity in Ports

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ABSTRACT: Preparing business continuity plans (BCPs) under the Basic Law for Increasing National Resiliency enacted on December 4, 2013 is a new challenge for Japanese major ports to improve business continuity capacity and to promote international competitiveness. On the other hand, ISO22301 requires BCP builders to undertake comprehensive risk analysis and appraisal procedures including employment of a business impact analysis (BIA) and risk assessment (RA), for which Japanese port experts are seeking proper methodologies, techniques and tools. This study discusses on the possible development of computer aid analysis tool for assisting port experts in undertaking systemic BIA and RA procedures to prepare further effective and efficient BCPs at ports.

Keywords: Business Continuity Plan, Business Impact Analysis, Risk Assessment, Computer Aided Engineering

1. INTRODUCTION

Resiliency of logistics infrastructures in ports is one of key elements for the modern industry and business activities, therefore of great importance for the local, regional and global economy. Developing business continuity plans (BCPs) for major port operations are, in this context, currently encouraged by the government of Japan, in particular aftermath of the Great East Japan Earthquake. Preparing BCPs for ports is not straightforward, however, for people from the port community, which are normally a multi-stakeholder business colony with different business interests and no single governance. The integrated but a bit complicated risk analysis and appraisal procedures required by ISO22301 are also other challenges. This study discusses and proposes a methodology, by focusing on the port logistics, for systematically preparing BCPs in line with ISO requirements under supports of computer aided human and machine interactive working environment. Particular emphasis is placed on the practice to undertake BIA for improving quality of the business continuity strategy.

2. ANALYSIS FOR PREPARING BCP AT PORT

The process to prepare port-BCP is illustrated by Caselli et al (2016) as shown in Figure 1.

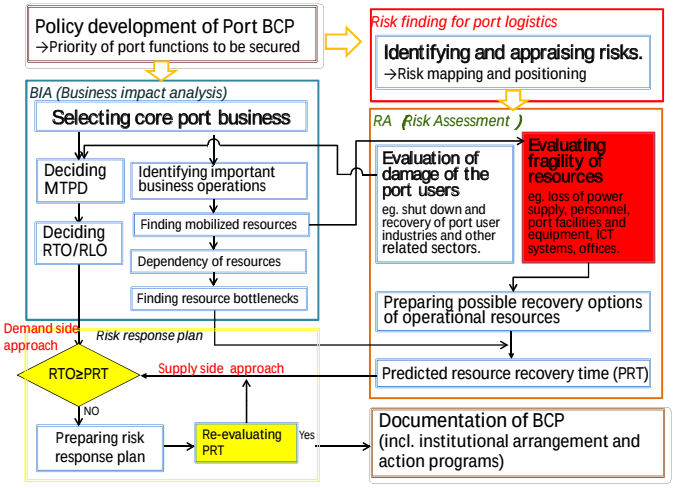

Fig. 1: Analyzing procedures for preparing port BCP

As a demand side approach of port services, BIA is employed to determine the maximum tolerable period of disruption (MTPD) and recovery time objective / recovery level objective (RTO/RLO), which are indices of clients' least requirements and maximum patience in terms of port service recovery after disasters. From a view point of port service supply side, RA is mobilized to evaluate predicted recovery time / predicted recovery level (PRT/PRL) of port services. In a practical view point of BCP preparation, PRT is evaluated an maximum time period for recovering availability of resources needed for port service in a reality basis. RA is a series of damages estimation procedures of resources needed for port operations. Resiliencies of these resources are represented by PRT/PRL, which are key indices for BCP preparation as stated above.

RTO and PRT are to be compared, and when PRT is shorter than the RTO provided PRL meets the required RLO, the clients are judged to be satisfied. The PRT is longer than the RTO, however, counter measures for curtailing the PRT are to be considered to fulfill the clients' requirements. As such, BIA and RA is conducted as a main stream preparatory study of developing port BCPs to maintain the port clients.

3. BCP PREPARATION PRACTICES AND ISSUES

From the practical view point of undertaking BIA and RA, mobilizing workflow analysis and worksheet techniques are found useful because of its advantages of being rich in transparency, which facilitates the information sharing among administrative and business entities concerned. (Kon, 2009; Komatsu et al., 2013; Ono et al., 2015)

Figure 2 is an example of work flow diagram prepared by the authors for BIA of container terminal operation in the port of Osaka, Japan. The authors noted the work flow analysis significantly encourage participations of port entities in the BCP preparation procedures and implementation of business continuity management (BCM).

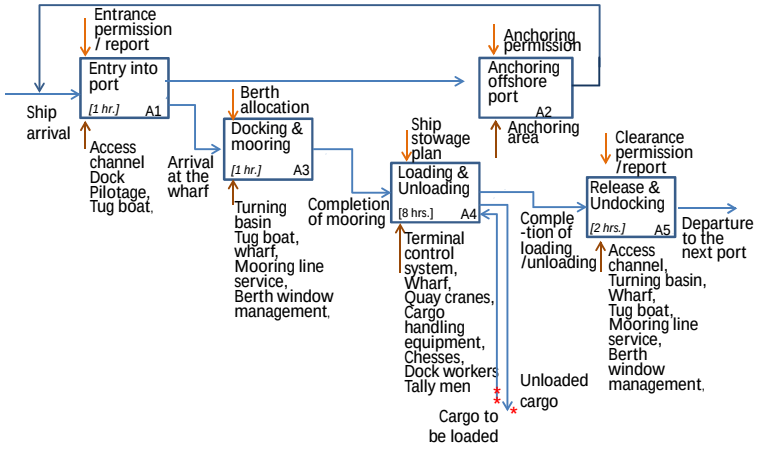

Fig. 2: A work flow diagram of container terminal operation

On the other hand, the step-by-step working procedures and multi-layered structure of the worksheets leads to the excessive working load of the staff in charge, therefore may result in the insufficient and uncompleted analysis works. In this view, the systematic BIA and RA implementation worksheet system was introduced by providing 14 worksheet templates, which enable BIA and RA analysts to undertake sufficient and complete analysis works by only transcribing data from the sheet to sheet, and adding necessary data and information as instructed.

A case study of a container terminal in a Japanese port undertaken by the authors, however, indicated that the terminal operation required a variety of resources such as water and energy supply, workforces, various facilities and equipment, information system services, and office spaces. Actual number of these resources identified through the work flow analysis reached at 243 items, which are classified into 61 resource categories. The authors noted that it is substantially impossible to process these bulky and duplicative data by humans. As such, developing computer aided system for preparing the above worksheets were considered vital to disseminate the system among port communities.

4. COMPUTER AIDED ANALYSIS SUPPORTING TOOLS

A computer aided system for developing BIA and RA work sheets is proposed by authors in order to enable port community to undertake BCP preparation in a more efficient and effective manner. The system mobilizes VBA (Visual Basic for applications) embedded in Microsoft Excel sheets, which automatizes data processing such as transcribing resources, removing the duplications and classifying them, and identifying interdependency among the resources with less working burden on the BCP analysts in charge. The schematic view of the system is as shown in Figure 3.

The system comprises three main stream worksheet files: ie. the files of "BIA", "RA" and "Resource bottleneck evaluation". Among

these mainstream files, BIA file are supported by three data processing files: ie. the files of “Resource collection sheet”, “Resource dependency identification sheet” and “RLO resource mobilization judgement sheet”. These three supporting devices play respectively important roles of: i) collecting resources from the work flow diagram of core port business, ii) identifying interdependency of the resources, and iii) selecting and deciding recovery levels of the resources on order to meet the required RLO of the port clients.

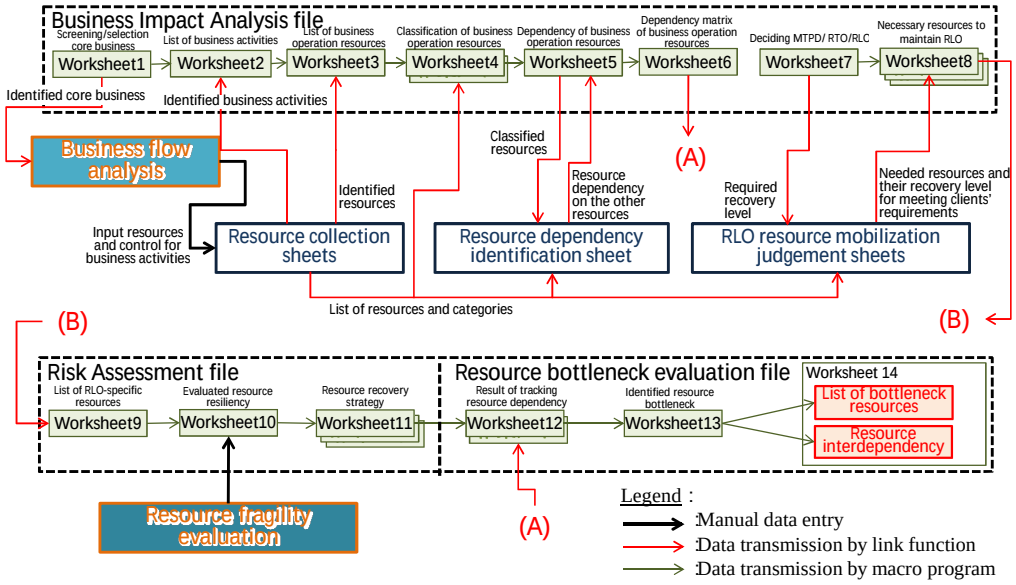

Fig. 3: BCP worksheet system assisted by Excel VBA macro

The system also equips learning capacity to store past worksheet data in the memory area for reducing data input efforts of BCP analysts. Figure 4 illustrates an example of the Excel window view for resource collection, which comprises i) checkbox menu for collecting resources based on the workflow diagram, and ii) functions to automatically remove resource duplications and summarize them into a corresponding cell.

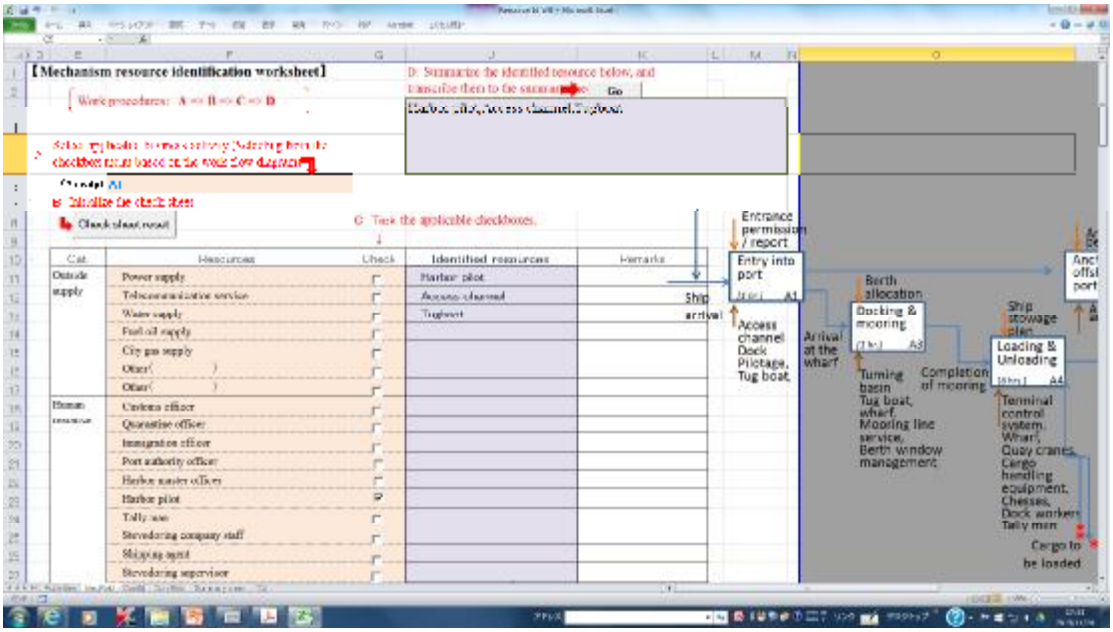

Fig. 4: An Excel worksheet window for collecting port operation resources

Figure 5 shows a worksheet window for classifying 1st tier operation resources. The identified resources through business flow analysis are classified into five resource categories of i) outside supply, ii) human resource, iii) facility and equipment, iv) ICT and v) building

and office. Once the system including relevance data and information is established, only a few minutes is enough to complete the works from collecting data on the business flow diagram to create the resource classification table as shown in Figure 5. As such, computer aided analysis system for preparing BCP is considered effective and speedy enough to be employed as a simulation tool to seek better strategy of removing resource bottlenecks and improving the port business continuity.

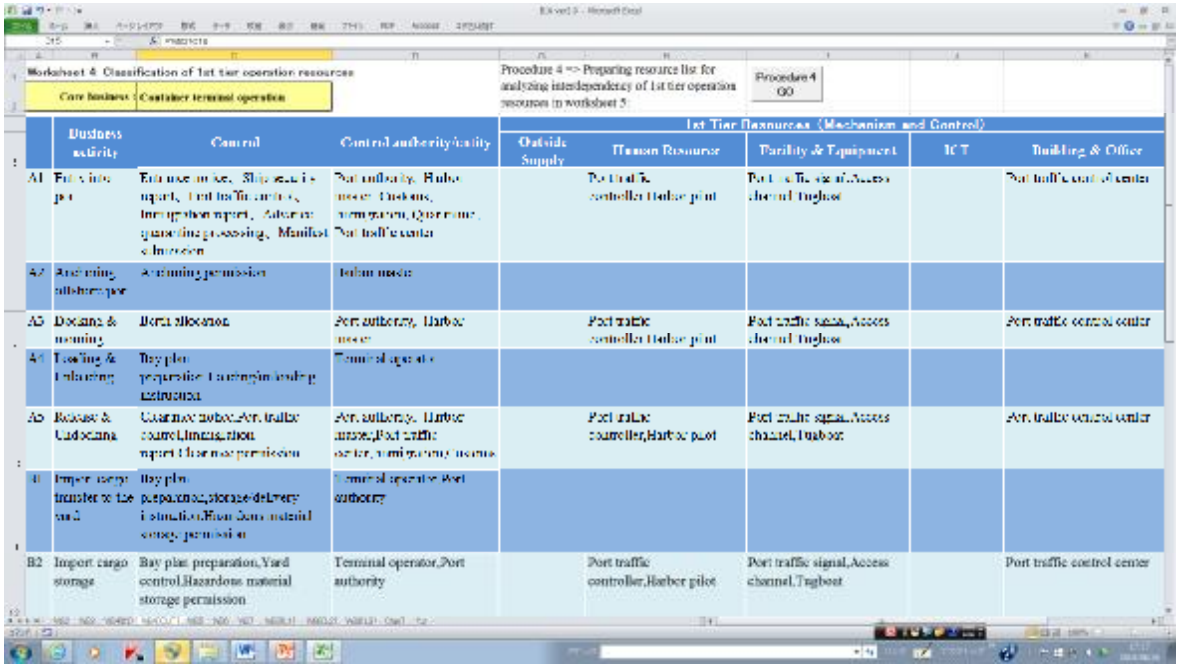

Fig. 5: A classification window for 1st tier operation resources

5. CONCLUSION

This paper first reviewed the current issues in terms of preparing port-BCPs in Japan. Because of ISO required implementation of sophisticated BIA and RA for effectively improving port continuity capacity, developing port-BCPs are new challenge for port community. In view of this, the authors discussed and proposed an analysis aid tool for assisting port experts in more systematically and efficiently addressing port business procedures, reviewing operational resources and identifying bottlenecks of the resource mobilization at disaster areas.

The computer aided analysis tool proposed in this paper involves VBA macro programs embedded in Microsoft Excel sheets, which, the authors expect, may ease preparatory analysis works undertaken by port communities. Since VBA macro programs are one of the simple and popularized computer language, it is also expected the tool can be easily customized by the users for further mobilizing in a variety of analysis scene for improving BCP.

6. REFERENCES

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