CARGO AND CONTAINER D WELL TIME REDUCTION: EFFECTIVE STRATEGY TO INCREASE THE EFFICIENCY OF IRAN'S PORTS

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Abstract
This research aims at identifying and Prioritization of implementing strategies in order to reduce cargo &container deposition in the Iranian ports which is performed in three steps. First,a review of literature on the factors affecting deposition of products and containerwere examined, and then by using the Delphi method, operationalstrategies to reduce depositionof cargoand containerproducts were codified.Finally formulated strategies implemented in the second phase prioritized in terms of applicability, cost-effectiveness, time required to execute and effectiveness in reducing deposit of the goods using analytic hierarchy process SAW. The final results indicate that decrease ofintricate bureaucracy and paperwork, increase cooperation and better coordination of the various agencies in order to issue permits ofcargo discharge,24 hours Customs operation, utilizing a combinationof road and railroadtransportation, utilizing electronic systems to reduce administrative paperwork and parallel working in the clearance of cargo are of highest priority.
Keywords: Container, Dwell Time, analytic Hierarchical process, SAW, implementation strategies, Iranian ports.

Introduction

The role of maritime transportation services as a main facilitator of global trade is crucial from the national economic point of view. Traffic increases in Ports andlarger vessels and more variety of products are shipped all around the world[1]. Simultaneously with the construction of larger vessels, terminals will equip with more transport equipment, and the time of ships entering the ports are getting substantially simultaneous [2, 3, 4]. From the globalization point of view, the portswhich cannot cope withthese changes in the demands for infrastructure and port serviceswill lose their competitiveness in the transportation of cargo [5].

Temporarystorage of containers in commercial ports is one of the main steps in marine transport process.[6]This process has two main parts: in the first partthe cargo is transported from the vessel to store place and vice versa.This process is called importing and exporting of containers[7, 8]. But the amount of importing and exporting of cargo in the ports is not always in balance and there are problems in terminals which leadto unbalancing, therefore a great amount

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of cargos will be piledin the ports[9]. This process is called cargo deposition. In other words cargo deposition is the outcome of the difference among the amount of body of cargos entering into the warehouse in a specified period of time,out of total cargos that were exited from theplace. This cargos maybe for export or transported for consumption. In addition, the amount of cargos which remain from previous times in the same place must be taken into account [10, 11]. One of the problems in ports that expect to increase with growth in commercial exchanges is the problem of cargo deposition and its significantcosts. Depositing of the goods occupiesthe area around the portsand then traffic congestion will increase the waiting time of the vessels. This will end in reducing the operational efficiency of loading and unloading ships and then cost of demurrage.ArguablytheproductdepositioninIranian portsis a serious difficultyanditis notonly limited to ShahidRajaee port but allIranian portsare facedwith this phenomenon.For example, in 2009 Anzali portwith 806000 tons of deposited cargo has a 40% increasecompared to the last year.While the total amount of cargo discharged in the port of Anzali was 4.3 million tones [2].Statistics shows that Amir Abad and Noshahrportshave 300000 tons and 500000 tons of goods respectively deposited in their place.As mentioned above, the aim of this study is to identify and classify practical strategies in order to reduce deposition of goods and container in the Iranian ports[8].

Research objectives

Accordingly, fundamental questions of this research that we will be answeredat the end of this study are as follows:

1) What are the crucial factors affecting the depositionof containers in the ports?
2) What strategies can reduce freight and container deposition in the Iranian ports?
3) What are the prioritiesof the strategies to reduce depositionof container & cargo in terms of applicability,cost, time required to perform& effectivenessin reducingdeposition ofgoods?

Materials andmethods

The present study,from the aim point of view, will be useful since the results can be used to reduce cargo and container deposition in the Iranian ports,is applied research and considering the type and nature of the problem, objectives and research questions,is a descriptive research method and survey methods used to collect data. In order to achieve the targets of this research, it has been conducted in three phases. In the first phase by reviewing of research theeffective factors on cargo and containers deposition in the Iranian ports has been surveyed. In second phase by using of Delphi methodology operational strategies in order to decrease the deposition of cargo & container will be done. Thenin third step implemented strategies of the second phase , will prioritized in terms of applicability , costs and the amount of time required to conduct and impact in reducing cargo deposition using analytic hierarchy process and SAW .

SAWmodel

SAWmodelor aSimple AdditiveWeightingisone of the simplestmethods ofMADM (multi attribute decision making).

To use thismethod,it isfirst necessaryto scale linearly decision matrixvalues. According tothe indicatorsused inthis studyareallpositive, for scalingdecision matrix values,equation (8) will beused[5]:

$$n_{ij} = \frac{a_{ij}}{MAX\ a_{ij}} \quad (1)$$

Thescalematrix multiplicationoftheweightsof indicatorsoptions,options respectively, based on the valuecalculated fromequation (9) will berankdescending:

$$A^{*} = \left\{ A_i \mid MAX \sum_{n=1}^{n} n_{ij}\ w_{ij} \right\} \quad (2)$$

In theequationsaij, the value of j index for option I,has beenScaleindexj valueforoptioni,jandjindexisimportantjcoefficient.So theoptionsareto havea greaterfinalweighthavegreater priority [4].

Analytical Hierarchy Process

Analytical Hierarchy Process(AHP)is oneof themost prominentmethods ofMCDM,hierarchicalanalysis processmethod(AHP), this methodcalculatesthecorrelation betweenweightparameters,andthe overall valueof eachoptioniscalculatedbased ontheweight. [11].AHPis based onthe human brainanalysisfor the complex a problem has been proposedby ThomasSaaty. Heexpressed thatin the beginning acomplexproblemmustbeanalyzed intosmaller problems.Then using thepairedcomparisonsa preference systemmust be establishedbetween the indicators andin the end logical consistency ofa measurementoccurs[12]. Compared with other methods of MCDM, AHPis usedwidespread to decide multiple criteria and often provides better results[13].As is mentioned before in this study, this method was used for scaling of criteria.

Communitysample

In this studycommunitysample includedallPMOexperts. Because of the lack ofprecise information onthenumber ofdatasamplesfrom theinitialquestionnaire wasdistributedamong20experts fromthe PMObytheinitialof variancecorrival/95Estimatedsample sizewas100percent. During the study wherever we used expertsit means one of this 100 people.

Results

First stage

Time amount of Container Dwell Time in the ports is equal to time amount a container discharged from a vessel and is transported by the trucks to the warehouse to be stored and cargo owner will clear Customs and the container will check out from the terminal gates. If the time period exceeds a certain standard time, then we can say a cargo or container has been deposited in port. This period of time depends on a number of factors and in the same time indicates efficiency and performance of the organizational structure and management of a port. That means if time amount of cargo deposition in a port is a little thisbe somewhat indicative of port's high efficiency in all areas that include in the discharge cycles of a container from vessel to the Customs clearance. At this stage, a literature review of factors affecting cargo and containers deposition in ports is discussed [3]:

1. **Portsand Customs human Performance:**HumanWorkforce meansall thepeopleworking in thevarious departmentsofCustoms and Ports. These factors includedifferent levels ofmanagers,

administrativestaff, and craneoperators, the clearance department operators andcargo inspections. In fact,decisionsand actionsof these individuals havea significant rolein reducing of cargo and containerin Iranian ports [2].

2-**Technical infrastructure:**technical infrastructureincludes theefficient and advancedcranealong the waterfrontandintheareaof containerports,usingmodernmethodstoinspect the goodsandcontainers,utilization of office automationandapplicationofnewand effectivesoftware inorder to reducehumanerror. So thedevelopment of thetechnical infrastructureof portsis considered oneof the most importantfactorsin reducingcargo deposition in the ports.

3–Customs performance: Customsclearanceasthe primarycustodian ofthecountry canhave a large impactontheexport andimport of goods inthe country.Customsadministrativeofficesat ports included four main sections:counting the cargo, evaluation, experts andmanagement. Each of thesesectionshas an effect on export and importprocess ofcargo andcargo deposition in theports [2].

4-The national transportationsystem:poor transportinacountrywill increasecostsofdifferent productsandwill lose competitive poweroftheindustryin theglobal market.Butwhatare importantforownersand exportersarenot only the sole transportation costs butthe total costsof the productionanddistribution.

Rail road and road transport are two main transport methods in Iran and almost we can say that total cargo transportation in the country is performing by this two kind.The purpose of thisfactoris to determine the effects of transport infrastructures in reducing cargo deposition in the Iranian ports[1].

5-IntegrationSystems of information: electronic Systems will causes that required economicinformation including: bill of lading, insurance policies, invoices and other informationin digital form, without the need for anypaperdocumentsare takenupand in the shortesttimethe economyactivity performed .Utilization ofelectronic systemsinIranian portswill leads in reduction of handlinghuge volumes ofpaper documentsin Iranian ports & Customs and also facilitates import & export and cansignificantlyreducedeposition of cargo and containers[5].

6–Cargoowners:undoubtedlya large partof theproblemleads to thedeposition ofcargo in Iranian ports is related to cargo owners.Although it seems likely that the cargo owners desire that exit their cargo from the port very quickly and transport it to the market, but in practice it does not always happen.There is some evidencethat suggeststhatsome cargo ownersaccording tomarket conditionstend not tohaverapid clearanceof theirgoods.Toimport their goodsin the first stepcargo owners must opencredits in thebanks. Afterpurchasingand transferring cargo tothe internalports,clearanceisrequiredto paythe fullpriceto getout the goods fromthe port. Lack of cash money andlarge fluctuationsin the marketwill leads in inability of owner to afford, sometimes resulting in thedepositionofgoods inthe ports[4].

7 –**Permit issuance process** by some relevant organs required for cargo clearance: entry of any cargo intothe country is subject to receipt ofdifferent organizations that is different according to type of cargo. Most important of this organizations that issue permissions are Health Administration and Standard organization that also will administrate import process.Along withthe licensingof different departments, bankscooperation in openingcredits forownersalsocanfacilitateimport cargosinto the country.Any complexityandtime-consumingprocessofpermission issuance by the administrative will also leadto cargo depositionin portsand increasethe timescaleof the cargo deposition.

8. PoliticalIssues: Anotherfactorthat cancontributeto thedepositionof cargoand containerin the Iranian portswill be politics and factors thatinfluenceit.Theseissuescan effect negatively easy transmission of money and also direct communicationofownersandsellers of goodsoverseas.
9. Complexity and bureaucracy of the entire system: the intricate bureaucratic licensing and documents process required for Customs clearance is always causing problems, which leads to the deposition of goods at the ports. Intricate and time consuming bureaucracy prolongs the clearance of goods at the ports and also doubles the cargo deposition.
10. Geographical and socialproblems: Part of thereason forthedepositof cargos inacountry issocially andgeographicallyrelevantissues.¬However, it appears that the contributionof this sectoris low, but has effects onamountof cargo deposition [3].

The second stage

Atthisstage,usingthe Delphi method, operational strategies were deployed inorderto reducecontainer &cargo deposition in the portsas describedinTable1.

Table1-operationalstrategiesinorderto reduce cargo & container depositionin the ports

code	Guidelines	code	Guidelines
1	Imposeheavy fineson cargo owners if they do notexit their cargos	12	Bettertraining ofstaff andworkersto control thecustomslaws.
2	Improvingtransportationtariffsto encourageowners oftrucks	13	Reduction in intricate paperworkandbureaucracy
3	The creation of relative stability in the market and prevent violent fluctuations that cause a sudden rise in demand in the country.	14	Improvethecountry's storagecosts
4	Periodictrainingto increaseemployeeefficiencyand operatorsworking inports and Customs	15	Increased cooperation and better coordination of the various agencies to issue permits for the discharge of cargo
5	Improvecooperationwith thecargo owners inopeningbankcredits	16	Creatingspecialtystorehousesacross the country
6	Removeadditional copiesof declaration	17	Applyappropriateincentivesto the cargo owners in case of fast clearanceof cargo
7	Increaseintherateof dischargeofcargo	18	Utilization ofmanpower andspecialized companiestotransfer cargos
8	Issuance of Customspermitwith theuse of computers	19	Increaseinthenumber oftrucks andlocomotives in the country
9	Utilization of asampleformandLicensingUnit	20	Customsboardingoperation
10	Proper communication withotherforeign trade organizations,	21	Usinga combinationof roadand railroadtransport
11	Appropriatefacilitiesfor importers and exporters	22	The use ofelectronic systemsto reducepaperworkand administrativeworkin parallelinthedischargeof cargo

The Third Stage

in this phase the strategies developedin the second phase will be prioritize in terms of applicability, cost, time required to run and efficiency in reduction of deposition of cargo by the Analytic Hierarchy ProcessandSAW.

First,using theanalytic hierarchy processweightof eachindexwas determinedas describedin Table2 below.

Table2-WeightIndicatorsBased OnAnalytic Hierarchy Process

	Applicability	Cost	Time	Effect
Indicators	P	C	T	E
Weight	0.25	0.19	0.16	0.4

then strategies knownby expertsusing a scale from1 to 9withrespect to the criteriascored and then DecisionMatrixSAWmethodas describedin Table3 belowwas formed.Then, usingSAW method, mentionedstrategieswill be prioritized. Table 4 showsthe order and priority of eachstrategy.

Table .3 Decision Matrix Method saw

code	MAX	MIN	MIN	MAX	code	MAX	MIN	MIN	MAX
	P	C	T	E		P	C	T	E
1	5	1	2.5	7	12	7.8	6	5	7.4
2	4	7	5	6.9	13	7.9	4	5.1	8
3	3	7.5	8	6.33	14	6	5	5.2	6.5
4	5	6	4.9	7	15	7.5	2	3	8.1
5	6	5	6	8	16	6.9	8	7	7.56
6	4	4.9	5.33	7.25	17	8.6	3.56	4.1	8.23
7	8	3.99	4.11	7.65	18	6	5.36	4.9	7.45
8	7.11	5.9	3.8	7	19	6.9	9	7.5	7.98
9	7	4	5.2	7.12	20	8.5	3.2	2.6	8.6
10	7.11	3	6.5	7.32	21	8.6	2	2	8.68
11	6.12	4.5	6.44	6.99	22	8.7	2.3	1.9	8.72

Table 3 - Final results saw method.

Code	Strategies	MAX	MAX	MAX	MAX	Final weight	rank
		E	T	C	P		
1	Creating a relative stability in the market and prevent violent fluctuations that cause a sudden rise in demand in the country.	0.28033	0.09836	0	0.35088	0.21559	22
2	Impose heavy fines on cargo owners if they do not clear their cargo from the ports	0.23849	0.5082	0.75	0.17544	0.36307	19
3	Improving transportation tariffs to encourage truck owners	0	1	0.8125	0	0.31438	21
4	Improve the storage costs	0.28033	0.4918	0.625	0.35088	0.39729	17
5	Improve cooperation between banks and cargo owners for opening credits	0.69874	0.67213	0.5	0.52632	0.61362	8
6	Remove additional copies of declaration	0.38494	0.5623	0.4875	0.17544	0.38043	18
7	Increase the rate of discharge of cargo	0.5523	0.3623	0.37375	0.87719	0.5692	10
8	Customs license issuance using a computer	0.28033	0.31148	0.6125	0.72105	0.45861	15
9	Utilization of a sample form in Licensing	0.33054	0.54098	0.375	0.70175	0.46546	14
10	Proper communications with other foreign	0.41841	0.7541	0.25	0.72105	0.51578	12

	trade organizations						
11	Creating appropriate facilities for importers and exporters	0.27615	0.74426	0.4375	0.54735	0.44951	16
12	Better training of Custom's staff to control the laws	0.4477	0.5082	0.625	0.	0.	9
13	Creating specialty stores across the country	0.69874	0.52425	0.375	0.85965	0.64959	7
14	Periodic training to increase efficiency of employees and operators working in ports and Customs	0.07113	0.54098	0.5	0.52632	0.34159	20
15	Apply appropriate incentives to the cargo owners in case of on time clearance of cargo	0.74159	0.18033	0.125	0.78947	0.54621	11
16	Using a combination of road and railroad transport	0.51464	0.83607	0.875	0.68421	0.67693	4
17	Utilization of electronic systems and reduce administrative paperwork and parallel working in the cargo clearance process	0.79498	0.32066	0.32	0.92982	0.66895	5
18	Utilization of specialized companies and manpower to transfer cargo	0.46892	0.4918	0.545	0.52632	0.50127	13
19	Reduction in intricate paperwork and bureaucracy	0.69038	0.91803	1	0.68421	0.78409	1
20	Increased cooperation and better coordination of the various agencies to issue permits for the cargo clearance	0.94979	0.11475	0.275	0.96491	0.69176	2
21	Increasing the number of trucks and locomotives in the country	0.98326	0.01639	0.125	0.98246	0.66529	6
22	Customs boarding operation	1	0	0.1625	1	0.68088	3
Weight		0.4	0.16	0.19	0.25		

Discussionand conclusions

Thisresearchaims at identifyingandPrioritizeexecutive strategiesinorderto reducecontainer & cargo deposition in the Iranian ports and implemented in three steps.First, aliterature reviewof the factorsaffecting container & cargo deposition has been surveyed and inthe second stageusing the Delphimethod, executive strategies, to reduce container & cargo deposition were developed.In the thirdstep, first phase, theindexes of applicability,cost-effectiveness, time required performing and effectiveness in reducing cargo & container deposition using analytic hierarchy process scaled, results indicated that the effectiveness index has the maximum weight and time index has minimum weight.Then in second phase, developed strategies were prioritized in terms of applicability,cost, time & effectiveness in reducing cargo deposition by using SAW method. the final results indicate that strategies of reduce intricate paperwork and bureaucracy, increase cooperation and better coordination of the various agencies to issue permits for the cargo clearance, customs boarding operation, use of combined transport road and railroad, use of electronic systems and reduce administrative paperwork and parallel working in the cargo clearance, get highest priority. and strategies of Creating a relativestabilityin the market andpreventviolent fluctuationsthat causea suddenrisein demand inthe country, Improvingtransportationtariffsto encouragetruck owners, Periodictrainingto increaseefficiencyof employees and operatorsworking inports and Customs, Imposeheavy fineson cargo owners if they do notclear their cargo fromthe ports, Removeadditional copiesof declaration get lowest priority.

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