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Survey Cultural - Academic Ability Levels Staff in Assessing the Development of Command and Control Systems in Government Agencies

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ABSTRACT

What has been referred to in the not-so-distant past as Communication in governmental organizations now is known as information and communication technology due to increasing development of novel technologies in governmental fields. Role and importance of this section in industry like nervous system of the human body is really vital and noteworthy.
Hence in high management levels we will decisively and powerfully perform when we communicate information (data analyzed by computer information systems) in the best communicative form under the name of speed, accuracy and security between sectors and thus we can comprehensively bring all available resources with high flexibility under our own control.
In this study considering slow trend of command and control system C4I in governmental organizations there has been attempted to identify, derive/ extract and statistically confirm human centeredness and its alternative development indices by comparatively study this system in developed/industrial countries so that they could be used in planning organization strategic visions to develop C4I in addition to planning administrative measures to remove challenges.
KEYWORDS: Command and Control System C4I, extracting development index, human

1-1- INTRODUCTION

Control and commanding, know as C2, is a rather new statement in military negotiations and communications which has got common after World War II. In the past commander was responsible for controlling and commanding, then C2 was replaced with C3I to which communication and information was added in addition to control and command [1].
Control and command is named C4I in the latest definition in which computing and computer have also entered. Main principles of control and command which has remained since World War II include observation, orientation, and reaction.
A small governmental force/unit will perform much more effectively than conventional forces by employing C4I. When C4I systems are sufficiently united/ integrated information will be transferred/ exchanged well among them and helps governmental forces to overcome enemy by utilizing prevalence in speed, integration/ solidarity, unification and coordination [2].

1-2- Significance of the Study

The importance of this issue is so high that it could be said this information system can change a governmental unit from a still/stagnant and degenerative state to dynamic and interactive unit with its external environment. So we must accept that when a manager is in the worst information status that finds himself in an un-unified, conflicting and old information archipelago and by making strategic decisions should immediately determine war destiny specially forces lives [3].
So using C4I technique makes an intensive and uniform control in the missions so that head managers and decision makers from war room by employing advanced information sensors in C4I to collect and process updated information can holistically control all their forces' operation and digitally determine war's fate in the true time by making decisions on the basis of system decision support [4]. Based on Japan's strategic visions this country in 2025's horizon will change into an attractive country for all people worldwide. Japan economic activities federation proposed a plan under the name of Action-21 to create a novel Japan in 1970. At first 2010's vision and then 2020's vision and now 2025's vision have been proposed by Japan economic activities federation [5]. Hence regarding changing traditional wars to new digital ones, reduction in wars durations and tremendous speed of governmental operations in beyond-regional fields there should be planned long-term

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strategic plans in governmental research organs specially C4I to fulfill such targets and prevent lagging in C4I updated knowledge [6].

1-3- Research Objective

Since in this study we want to qualitatively analyze C4I development criteria and achieve development main indices, major/ primary and minor/secondary objectives of the study could be classified as follows:

1-4- Primary objectives:

- Extraction, identifying and studying the role of human indices in C4I development in developed countries.
- Filtering indices with statistical analysis approach in comparison with cultural-local conditions of our governmental organizations.
- Recording certain and documented human indices of C4I development

1-5- Secondary objectives

In order to meet primary objectives the following secondary objectives could be consequently covered.

- Feasibility study on the percentage of success in operational plans considering evaluation of relevant indices with the plan.
- Planning administrative measures relevant with indices to remove development challenges.
- Increasing managers' awareness level in organization's future long-term strategic planning
- Possibility of well-organized observation on units' governmental-operational plans operati

1-6- Research questions

Slow trend of C4I development in our governmental organizations motivated us to identify challenges so that we extract human force indices in development and do research in aspects of governmental-administrative culture of organizational system, interoperability among systems, ISS (Info System Security) and DSS: Decision Support System.

- What are the most important preventive reasons and slowing agents of human forces indices in increasing and developing C4I trend of Army forces?
- How can we evaluate under-planning projects, plans and systems in organization level by achieved indices?
- Can hierarchy of organization command(ing) determine or increase the percentage of its strategies success in planning operational maps in battlefields? How?

2- RESEARCH LITERATURE

2-1- Command Control Communication Computer Intelligence C4I)

Indeed this comprehensive uniform information system is a Decision Support System and term C4I refers to Command, Control, Computer, Communication and Information. Command and control imply decision making and governmental management of C4I system section and information technology or computers, communication and information imply technology section of this system [3]. One of the important capabilities of C4I is accessibility to relevant information and enemy or insider force status. It should be acknowledged that although C4I is an information supremacy agent in decision making it could not individually guarantee supremacy in decision making. Commander should merge its relevant knowledge and experiences with achieved data from C4I systems and then make judgment. For example some of personnel behavioral agents are not changeable to quantitative indices; Fatigue, level of system users' experience, battlefield mental pressures, uncertainty of some data, and enemy or insider forces' creative and unpredictable activities are factors causing difficulties in command's making decision and judgment.

Production, communication, analysis and exploitation of information always have determining role in governmental strategy and operations. But new developments in information and communication technologies have increasingly highlighted the role of information. The change made by C4I in governmental forces is in line with changes made by information technology in all aspects' of human life [7].

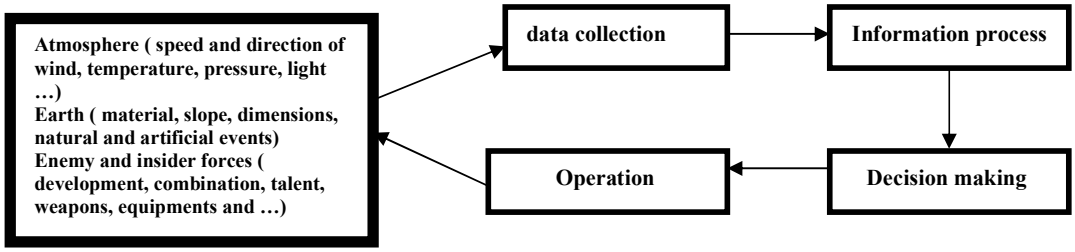

Chart 1. Information cycle in C4I

2-2- C4I system History in Iran and in the world

Since operational forum/ space in C4I of virtual and cyber space is considered as operational information priority for countries according to western sources the first cyber was between U.S.A and The Soviet Union dated back to mid 1970's but several wars over cold war (1917-2009) could be specifically and semi-traditionally regarded in this classification [6]. About cyber wars history in the world it should be noted that micro-documentations of such wars (way of operation, results, consequences…) are considered as top confidential documents and will be never revealed. From the famous titles in this field the following items could be pointed:

U.S.A and northern Korea 1980, Yugoslavia and U.S.A May 1999, Serbia and U.S.A September 1999, U.S.A and China March and April 2001, U.S.A 11 Sep 2001, U.S.A and Iraq May 2003 [5]. Iran Military forces in Summer 2003 approached Saudi Arabia to control petrol production in the Middle East. U.S.A gathered its Allies to parry Iran approach but suddenly found that had been virtually crippled by hidden and undetectable aggressive information systems. They cripple force network, cause trains clashes, disrupts financial exchanges and threatens communication systems. Second Persian Gulf War changed into first Iran information-virtual war. There is no evidence of cyber war between Iran and any other country in the world but we may be unaware due to principles of these wars and the level of their confidentiality [8].

2-3- Practical Sample of FBCB2 in U.S.A

Force XXI Battle Command, Brigade-and-Below, FBCB2, which displays situation awareness and command control for lower ranks of command provides necessary facilities for command and control information flow in battlefield and deals/interacts with external command, control and sense systems. Final output in such state is the vertical and horizontal integrity of digital battlefield and tactical units levels in Brigade and lower levels. Basically a FBCB2 system is suggested to support war command mission (in lower levels) in order to remove the following requirements [4]. Immediate Situational awareness for commander, general headquarters and soldiers, presenting common image of battlefield via visualization/ illustration of battlefield, graphic displays of enemy and insider forces situations, targeting and identifying insider forces, integrated logistic support [3]. Due to the existence of tactical internet in land force which is based on world web model, it is possible to communicate from each land point to each user inside tactical internet network equipped with FBCB2

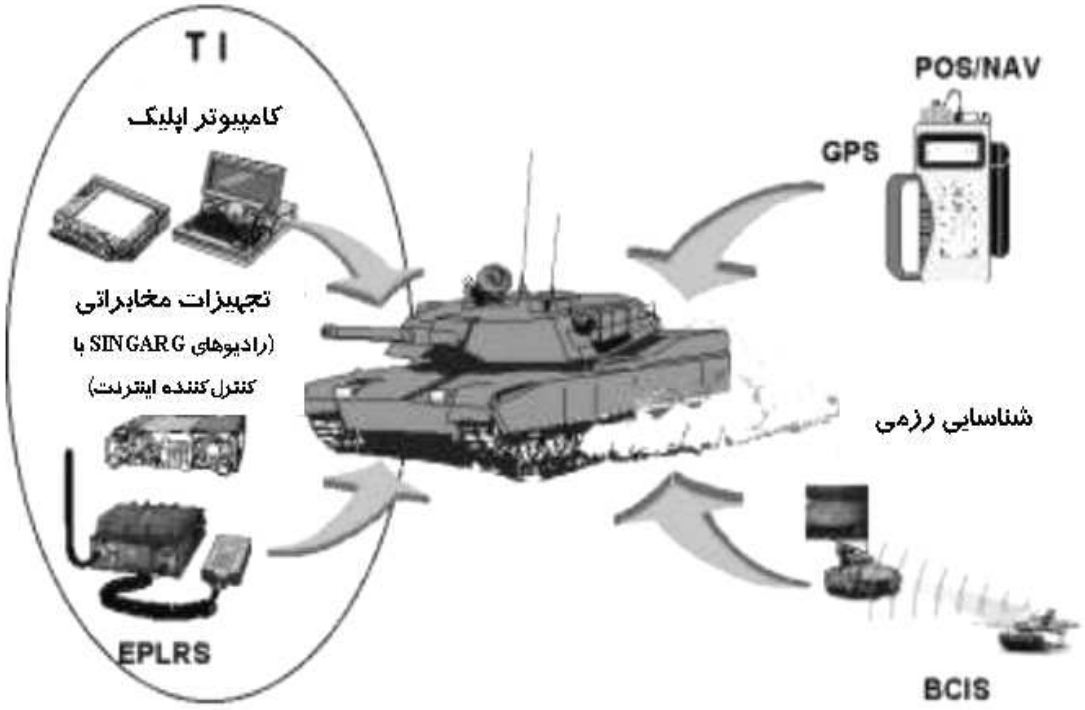

Fig. 1. : FBCB2 system

Table 1. Research Method

description	Components
Objectively :practical/ operational and Method : descriptive/analytical (exploratory)	Type of research
Governmental scopes: Tehran municipality, Transportation organization, Banks	Statistical Population
With regard to research statistical model assumptions , around 11 % of total relevant Statistical Population in sections	Sample size
Stratified randomization (relevant managers, specialists and personnel) in the abovementioned order 20, 20, 19, 20, 20, 9 and 12 (totally 120)	Sampling
Questionnaire with 6 main indices for 120 participants	Measurement tools
Cronbach's alpha proved validity, stability and consistency of questionnaire. Reliability of questionnaire was approved by 7 experts from statistical fields.	Validity and Reliability

3- RESEARCH METHOD

- **Research findings**

Studying types of command and control systems in famous countries and comparing with local and cultural situation of governmental organizations and confirming by expert governmental theorist in forerunner countries in this field, the following pivotal and recommended indices of human force in C4I development in governmental organizations were presented [2].

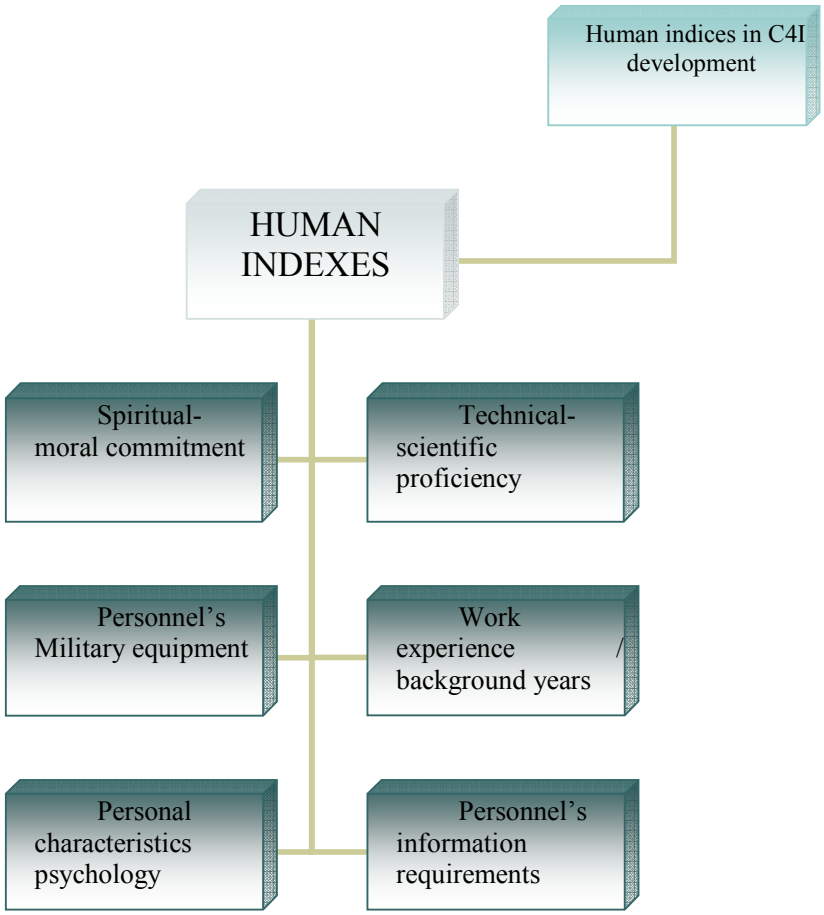

Fig. 2. Human indexes

By breaking structural-based human force we achieved recommended/ proposed framework with 6 main. By structurally breaking human force axis we achieved recommended/ proposed framework with 6 main axis-dependent indices as represented in the figure below:

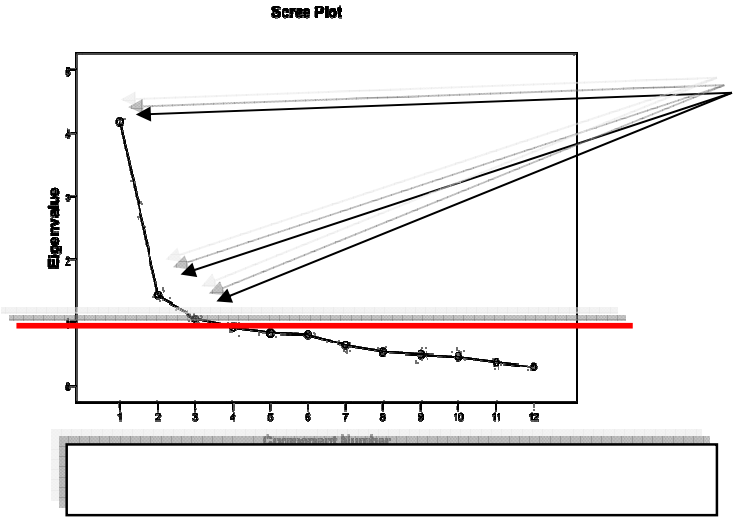

Fig 3: number of main-final extracted indices (>1)

Fig. 1. Extraction the number of main-final indices of human axis from proposed framework by Scree Plot

The following tests were done:

- Kaiser index (KMO) and Bartlett's Test
- Cronbach Alpha
- Correlation Matrix
- Scree Plot to extract factors
- Rotated Component Matrix
- Remaining indices interpretation[2].

Kaiser index and Bartlett's Test, which are used to confirm sampling sufficiency and small minor correlation among variables, were respectively between .762 and .805 for all indices indicating sampling sufficiency and in Bartlett's Test in all indices sig<.05 implied meaningful correlation matrix. Cronbach Alpha for each axis was individually calculated, for human force axis was equal to .802 so the questionnaire met desirable stability. Since rotating the factors in order to make factorial structure more simple and comprehensible and maximizing relationship among variables and factors is done by logical division of factors load on achieved components, it could be seen that after several rotations each of proposed axes and indices gain proper absolute load so variables with absolute amount of factorial load more than .6 could be organized in three groups of main indices in the following form (it's clear that factors HE1 , HT1,HS2 are deleted). Hence 9 other factors in three main and final analyzed indices are represented in the following table, and finally in each component some secondary indices with proper absolute load in the new or previously stable index format are classified. Therefore for the achieved result from rotated component matrix in the form of main and final table index is represented.

Table2. rotated matrix

Rotated Component Matrix			
	Component		
	1	2	3
HE1	0.435	0.411	0282
HE2	0.662	0.188	0.144
HT1	0.309	0.584	0.137
HY1	0.240	0.179	0.686
HY2	-0.227	0.066	0.844
HD1	0.397	0.047	0.633
HD2	0.818	0.107	0.049
HS1	0.682	0.296	0.023
HS2	0.458	0.494	0.096
HS3	0.088	0.698	0.209
HQ1	0.378	0.674	0.050
HQ2	0.047	0.742	-0.029

In the stage 6, by interpreting remaining indices and qualitative analysis based on statistical samples of 120 from selected statistical population, from 6 proposed-main indices, three new indices were achieved in the format below.

Table3. Confirmed Human Indices

componentمؤلفه	code کد	Axis
Component 1	HE2	Level of personnel's cultural-scientific capability
	HD2	
	HS1	
Component 2	HS3	Study on personnel's real requirements
	HQ1	
	HQ2	
Component 3	HY1	Personnel's experience level and years
	HY2	
	HD1	

Table below is the final results analysis for human force axis

Table4. final results analysis for human force

Sig	KMO	Number of rotation matrix for rotated component	Cronbach alpha	Number of main final indices	Number of main proposed indices	Axis
000	0.793	5	0.802	3	6	Human indices

Regarding human indices proposed framework of C4I development and according to table by deleting three disapproved indices and three indices either approved directly or made by combination of several proposed indices in the format of a new mixed index, the final framework is represented as below:

Table 5. Final Human Framework

Proposed	6
Main Final	3
Deleted	3

4- RESULT

In order to cover primary objectives of this study and practical advantages in using final framework of human indices for C4I development assessment in governmental organizations the following items could be pointed:

- Evaluation of under-planning projects, plans and human systems in organization level could be accomplished with achieved indices.

Reengineering on human administrative processes in organization could be accomplished by studying each index and removing organization challenges

- Estimation of percentage of success in operational maps in operation fields is possible by evaluating presented scales.
- Identifying slowing reasons and factors in C4I human development in governmental organizations
- Planning for appropriate administrative measures in order to remove human challenges in C4I development.
- Indeed these are primary objectives of the research that we were trying to fulfill them.

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