

Migration from CMMS to GIS Improves OCE Factor for Gas Utility

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Key words : M&R – OCE – CMMS - GIS

SUMMARY :

The subject of maintenance and repair (M&R) in organizations is of the increasing importance . Simultaneously M&R and associated man power productivity seems so important . The M&R Excellence Institute , introduces OCE index to assay and improve the productivity of manpower . One suitable tool for measuring , analyzing and improving OCE in gas utilities is CMMS , but it contains no spatial concept . GIS by eliminating this defect yields an effective improvement in M&R man power productivity .

This article evaluates the role of GIS in improving OCE in Khorasan Gas Utility .

Keywords :

معمولی و تعمیر (M&R) در سازمانها از اهمیت فزاینده ای برخوردار است . همزمان با M&R و بهره‌مندی نیروی انسانی از اهمیت فزاینده ای برخوردار است . مؤسسه مأموریت عالی M&R ، معرفی شاخص OCE را جهت سنجش و بهبود بهره‌مندی نیروی انسانی . یکی از ابزارهای مناسب برای سنجش ، تحلیل و بهبود OCE در صنایع گاز CMMS است ، اما فاقد مفهوم مکانی است . GIS با حذف این عیب ، بهبود مؤثری در بهره‌مندی نیروی انسانی M&R ایجاد می‌کند .

این مقاله نقش GIS را در بهبود OCE در شرکت گاز خراسان ارزیابی می‌کند .
معمولی و تعمیر (M&R) در سازمانها از اهمیت فزاینده ای برخوردار است . همزمان با M&R و بهره‌مندی نیروی انسانی از اهمیت فزاینده ای برخوردار است . مؤسسه مأموریت عالی M&R ، معرفی شاخص OCE را جهت سنجش و بهبود بهره‌مندی نیروی انسانی . یکی از ابزارهای مناسب برای سنجش ، تحلیل و بهبود OCE در صنایع گاز CMMS است ، اما فاقد مفهوم مکانی است . GIS با حذف این عیب ، بهبود مؤثری در بهره‌مندی نیروی انسانی M&R ایجاد می‌کند .

¹ - Overall Craft Effectiveness

² - Computerized Maintenance Management System

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INTRODUCTION

For most of the companies manpower is the most important capital , so it's productivity could be an effective factor in surviving and competing of these companies . Using new methods of M&R , improved manpower productivity has an important role in improving quality , reliability and decreasing operational costs in gas utilities . OCE index focuses on measuring and improving productivity by using M&R manpower added value .

Because of non-spatial concept of previous computerized systems , were used for M&R and associated reports , it does not satisfy needs of high speed accessibility to needed information in gas utilities . GIS provides easy access to information because it contains spatial analysis of features and related information , in addition to all of the previous information systems capabilities .

In the following section,at first we will survey the effects of CMMS and GIS in improving each of OCE parameters and in continue the immigration from CMMS to GIS and its role in improving OCE will be examined .

OCE DEFINITION

This index contains three major parameters , Craft Utilization , Craft Performance , Craft Service Quality . OCE is the multiplication of these three parameters .

OCE details	OCE
Effectiveness	Craft Utilization (%CU)
Efficiency	Craft Performance (% CP)
Quality	Craft Service Quality (%CSQ)

$$\text{OCE} = \% \text{CU} * \% \text{CP} * \% \text{CSQ}$$

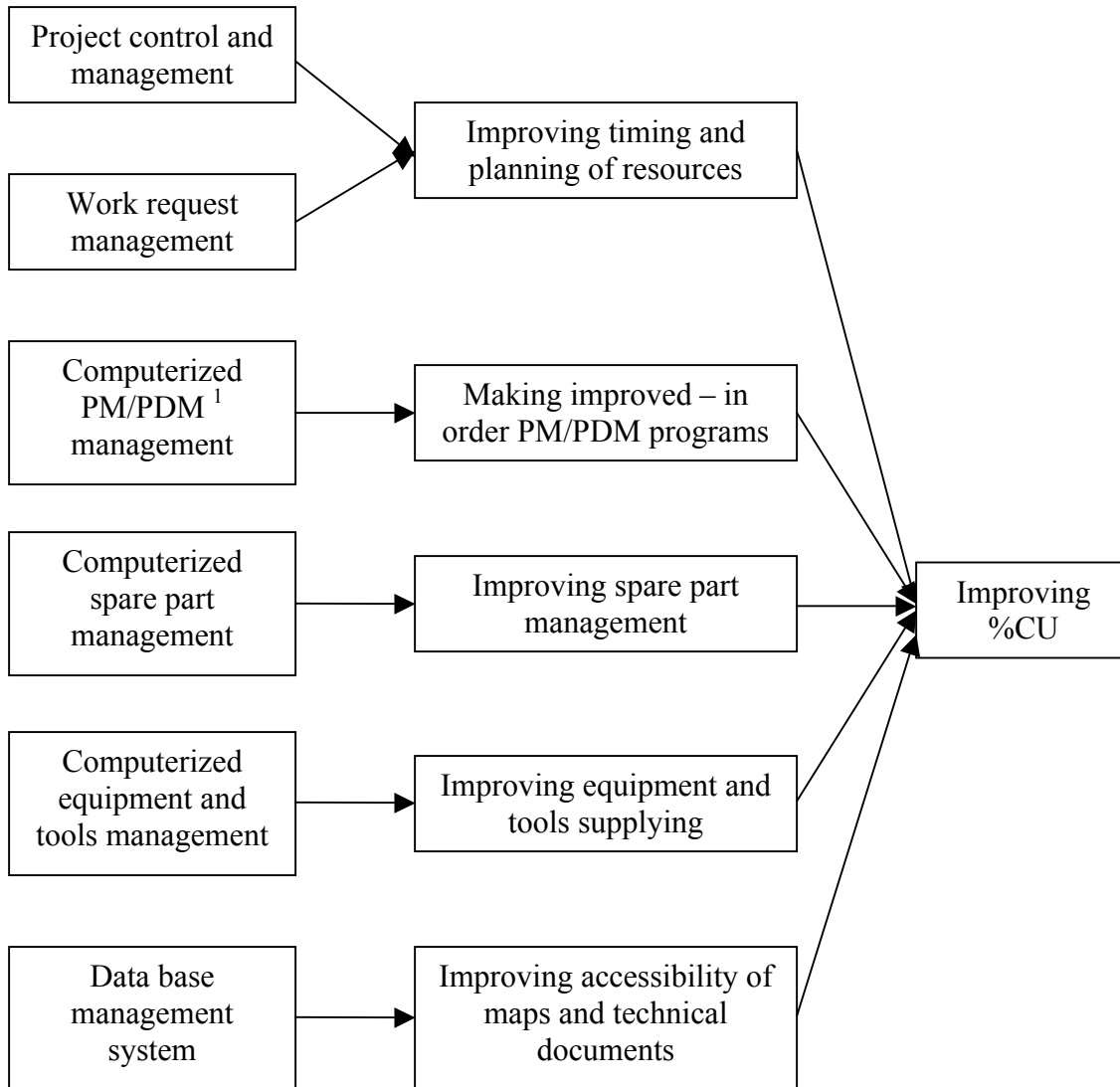
OCE PARAMETERS :

1. CRAFT UTILIZATION (%CU) :

M&R Craft Utilization or work pure time , studies planning and timing of manpower resources and results in added value . Improving of this parameter should be the first priority of improving programs .

Studies reveals that an improvement of 20 to 30 percent in OCE could be resulted by improving planning and timing of the works (Shadmehr , 2005) .

The following diagram illustrates the capabilities of CMMS and GIS in improving Craft Utilization .



These are results of mechanization and integrated management , made in to any of the aspects by GIS and CMMS .

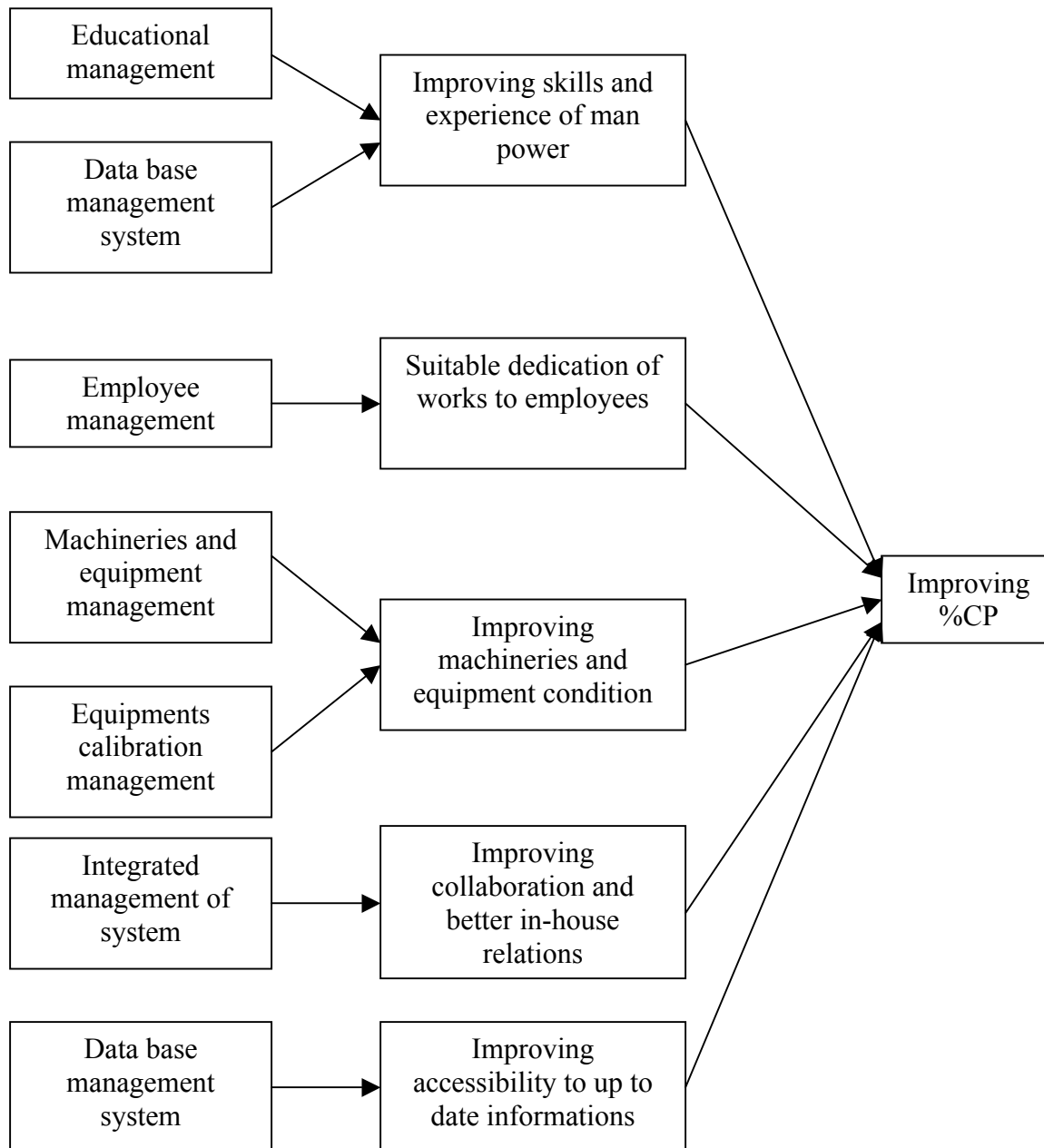
¹ - Preventive / Predictive

2. CRAFT PERFORMANCE (%CP) :

This parameter describes the real performance of M&R manpower in comparison with defined programs and work standards .

It depends on people individual skill rates . Experiences , work records and motivational affairs have a direct effect on increasing the skill rate of manpower (Shadmehr , 2005) .

The following digram illustrates the role of CMMS and GIS in improving craft performance in gas utilities .

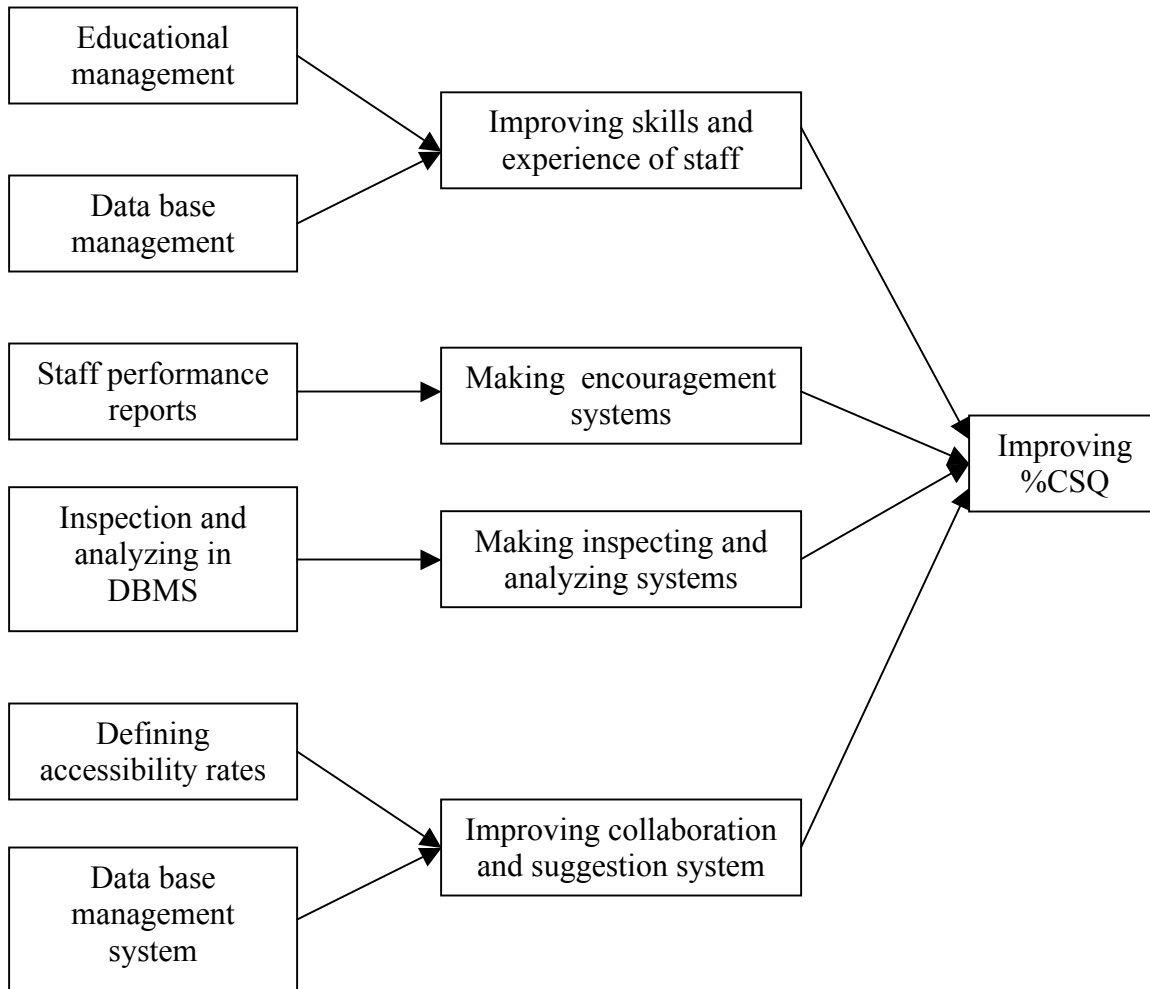


CMMS and GIS do the mentioned improvements by mechanization and integrated management of the procedures .

3.CRAFT SERVICE QUALITY (% CSQ) :

This parameter depends on real work quality in according to qualitative and quantitative indexes defined for M&R activities in gas utilities (Shadmehr , 2005) .

The following diagram illustrates the capabilities of CMMS and GIS in improving %CSQ in gas utilities :



CMMS and GIS have an effective role in improving %CSQ by mechanization and integrated management of alluded procedures .

MIGRATION FROM CMMS TO GIS :

GIS includes all capabilities of the previous information systems , like CMMS . Furthermore it provides spatial analyses of features and facilitates access to the related information . As it will be described , it results a great improvement in OCE .

GIS capabilities in gas utilities is classified as :

1. information management
2. making queries and spatial analysis
3. cartographic symbolization of information

1. INFORMATION MANAGEMENT

Using GIS , informations can be classified , loaded and updated in a short time .By improving work planning and timing , making a computerized inspection system and reducing mistakes and defects irritation because of less accessibility to information , GIS has an important role in improving work pure time , expediting the operations and promoting qualitative indexes in M&R operations .

2. MAKING QUERIES AND SPATIAL ANALYSIS :

2.1. Inspection By Overlaying :

In GPMS ¹ , inspection and analysing can be done by overlaying . for example layers represent valve defects and their producers can be used to distinguish which company results the most defects . this way , it reduces the defect rates and improves the CSQ .

2.2. Features Relative Positioning :

In GPMS , through over laying the feature layers of other utilities , damages to their buried installations can be reduced , therefore waste of time and operational costs is decreased to minimum .

2.3. Optimum Rout Selection To Desired Spot :

The optimum rout to desired spot depends on traffic , unilateral or bilateral streets and minimum distance . GPMS by over laying the related layers and analysing them , results in optimum rout and decreases time to access to the place and improves % CU and expedites the operations .

¹ - Geographical maintenance management system

2.4. Features Classification By Their Position Regard To A Specific Radius :

In occurrence of an emergency M&R activity, situation of relative features and operating groups in a predefined radius is accessible . This way, the nearest group could be dedicated for EM¹ or PM² activities ,and as a result it expedites M&R operations and improves work pure time .

2.5.Repairing A Feature By Using Other Relative Features :

In previous non-spatial computerized systems , positioning of relative features is not possible , how ever in GPMS it can be done . It is the GPMS capability to use minimum number of valves to depressurize a damaged feature , a piece of pipe for example , and so reduces the number of customers which are out of service , also it reduces the number of needed work groups , as a result it promotes the work pure time and qualitative indexes defined for M&R operations and expedites the operations in gas utilities .

2.6. Estimating The Amount Of Operational Needs :

In GPMS , it is possible to estimate the number of customers out of service in occurrence of an accident in pipe lines , so optimum planning of required equipments , machineries and man power , causes improvement in planning and timing , craft performance and qualitative indexes .

3. CARTOGRAPHIC SYMBOLIZATION OF INFORMATIONS :

3.1. Spatial Positioning Of Features :

Addressing in GPMS is noticeably more clear than in CMMS . This is specially useful in wide spread installations network , because it shortens maintenance time and expedites M&R operations . a typical GPMS designed for ports installations network is caused %33 decrease in M&R operation time (Sartipi , 2005) .

3.2. Features Classification :

GPMS does not have restrictions of features classification in previous information systems . it uses a map to allocate the exact position of features , so it causes faster and more accurate access to desired feature that has an effective role in improving craft performance and qualitative indexes defined for M&R operations .

¹ - Emergency Maintenance

² - Preventive Maintenance

SDI¹ IMPROVEMENT IN CRISIS MANAGEMENT :

Shortening the response time to manage a crisis is the first priority of managers . related organization collaboration in collecting and sharing the last updated information of crisis improves its management .

Providing the bases for this collaboration , SDI provides fast accessibility to needed information and improves planning in M&R emergency operations . This makes an effective improvement in craft utilization and performance and qualitative indexes defined for M&R .

IMPROVING STAFF PERFORMANCE IN CRISIS MANAGEMENT BY MOBILE GIS :

MOBILE GIS omits the problem of accessibility to needed information in site of accident and decreases the accessibility time to needed information . it also expedites the M&R and emergency operation . This causes more improvement in M&R craft performance and utilization .

CONCLUSION :

M&R and emergency aid groups of gas utilities usually face in emergency situations . Defects in planning , performance and M&R man power and resource dedication cause in irreparable accidents . Possible solutions are over timing and M&R contracts . By improving work capacity and performance and quality rate of M&R manpower , OCE decreases the needed over timing and offsets needs to making M&R contracts . It also improves PM/PDM programs and decreases redoing .

GIS capability in spatial analyzing of the features further than previous information systems like CMMS , causes a dramatic improvement in OCE . For this reason collaboration and cooperation of all organizations and users is necessary , so promoting relations between all organizations and making necessary up to dated data bases in all provinces and industries in country are suggested . To gain all GIS advantages in OCE improvement , not only interested users but managers are needed that know GIS as an effective technology in promoting organizations .

¹ - Spatial Data Infrastructure

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