

Improvement of Program Staffing Management Activity by Application of Excel Macro Automation Tool

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Abstract

The fast-growing IT/ consulting industry and evolving technology demands automating the recurring processes and thereby improvising the system efficiency. In organizations, recurring activities executed manually consume human efforts. Staffing management is one of those activities which play significant role in success of the project. Right availability of resource in right capacity for right duration is essential for staffing management. In some organizations, it is done by manually by using Microsoft Excel. To automate these processes major automation tools like Excel Macro, MS Automate are readily available. In this paper, the selection of automation tool using MCDM and application of tool to improvise and automate the process is explained in sufficient detail. The three constraints of effective program management are time, cost, and quality. The staffing management process is exhaustive, time consuming, lengthy, and increases the chance of occurrence of multiple errors. To make the process effective and efficient, it is necessary to reduce manual effort and hence automating staffing management process can be beneficial. The automation tool uses the Excel Macros (VBA) to identify the staffing of each resource. Therefore, the automation tools used in this paper helps in reducing human errors and determines the status of the staffing for each resource- overstaffed, understaffed, unaligned and optimally staffed. The outcome of the application of automation tool in program/ space management tool leads to effectiveness and improved efficiency of the space/ program.

Keywords

Excel Macro, Program Efficiency, MCDM, Effectiveness and Staffing management.

1. Introduction

Project management can be defined as to achieve predefined objective or scope apply available resource, Skills, tools and knowledge effectively. Effective project management can be achieved by effectively implementing and integrating of resources. A project may be managed in three separate scenarios: as a stand-alone project (outside of portfolio or program), within program, or within a portfolio, subsidiary programs, and coordination of program operations to achieve benefits not possible through individual management.

Program is defined as set of projects with some similar scope or type. Program management is defined as the use of different tools and techniques along with skills to achieve effectiveness and goals by smoothing the activities. Program management planning in IT industry is highly inclined towards the resource management, stakeholders' management and frequent program or space activities.

To achieve effectiveness and optimization of program, it is essential to get required data in right time with minimum errors. Many industries follow manual processes to run program management activities, and it leads to quality errors

like missing data, tool error, technical issues etc. Resource management(staffing) is one of the space/ program management activities in which allocation and verification of resource is carried out by considering three key parameters – overstuffed, understuffed and unaligned to any project.

Many global consulting/ IT, management services industries involve multiple sub spaces in different account/ portfolio in which project management resource is used to handle all space activities including space operation activities, resource management and stakeholder management. Most of the activities are consuming extra human efforts. Therefore, to improve effectiveness in space/program it is essential to optimize the processes to achieve and thereby enhance efficiency

This research paper presents the methodology in which excel macro automation tool can help achieve effective program management objective and the way automation can help to reduce unnecessary efforts and improve quality of process. Chaudhry et al. (2021) has explained Visual basic application i.e., VBA is a macro programming language used in Microsoft Excel to automate repetitive activities or operations. The benefits of using VBA are the reduction in time and effort and additionally improves quality of activity with maximum accuracy. Furthermore is economical and easily available as well as accessible. To operate the macros, single command is demanded post excel programming and subsequently the method of initiating user-defined functions and automating all spreadsheet repetitive tasks is explained precisely by using VBA.

1.1 Problem Statement

In the leading global IT/ consulting firm that delivers solutions that integrates consulting, technology, and operations which involves multiple spaces/programs which works on different types of projects and growing exponentially in headcounts as well in projects, resource (staffing) management plays a crucial role in projects to make right resource available at right time in right allocation of staffing.

Below Figure 1 shows current process of resource(staffing) management carries out by program management personnel.

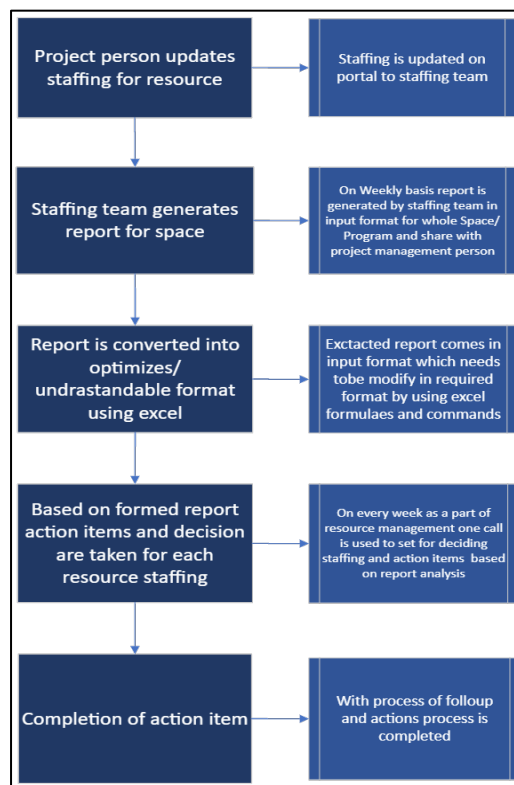


Figure 1. Staffing/ Resource management old process flow diagram

With the process shown in above fig.1 following issue occurs.

1. Converting extracted report into required format is manual process and consists of below sub activities:
 - a. Copy each resource data manually into predefined required format sheet.
 - b. In new tab apply formula of ‘=IFSUM(.’) to get single line staffing status of resource.
 - c. Repeat same for each resource.
2. Quality Issue: considering resource staffing detail into new sheet is manual process and hence the possibility of manual error increases like skipping any resource data, mismatch of staffing data etc.

To analyze the maximum impacting factor in quality Pareto analysis were carried out by considering issue and frequency of occurrence. Below Table 1-10 show factors i.e., issue and frequency of the occurrence. While Figure 2 shows pareto analysis.

Table 1. Issue and frequency of occurrence

Issue	Frequency of occurrence in process
Data Skipping	48
Mismatch in data	42
Missing right data at right place	57
Error in formula	18
Selection mistake	22
Unavailability of resource	2
Late running of tool	10

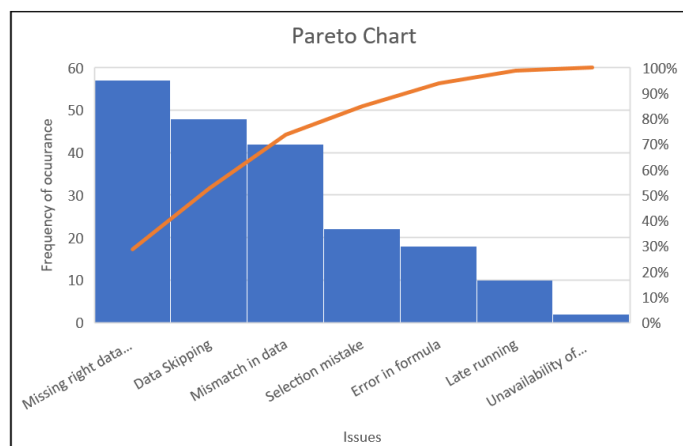


Figure 2. Pareto analysis for resource staffing management

From the above pareto analysis it is found that missing right data and skipping data are major contributing in the issue to overcome these issues, optimization of process by automation tool is necessary which will give required output in fraction of seconds.

1.2 Objectives

The above problem statements led to following objectives:

- Selecting best suitable automation tool among available tools
- Improving quality of the process
- Increase effectiveness and efficiency of program/ space management activities
- Reduce human effort hours and thereby increase cost effectiveness

2. Literature Review

Recently, Velenko and Klansek (2017) worked on the modelling benefits of spreadsheet software are well known, and these programme tools are widely used in variety of human endeavors. VBA is an implementation of Visual Basic, Microsoft's event-driven programming language that enables the creation of automated procedures. Chaudhry et al. (2021) has explained about VBA and its application for material delivery time analysis optimization, additionally he has explained the effectiveness and efficiency of VBA and that VBA saves time, gives accurate results and lowers formulae burden.

Pountney (2013) and Bibi et al.(2014) explained how resource planning is a common process critical to the success of all IT/software projects. It is supported by well-developed methods, processes, and tools. However, IT projects continue to fail due to poor planning effort or when there has been insufficient planning during project initiation. Wang et al. (2009) explained the one of the most crucial aspects of project management which is allocation and optimization of project human resource and showed optimization based on particle swarm algorithm. Ye et al. (2014) has worked on uncertain resource management in portfolio by reducing cost.

Different automation tools are available to optimize the process. Previously, many researchers have worked on varied tools. Timus et al. (2020) worked on power automate/ MS Flow to automate student relationship management to prepare internal regulations and staff for this transformation. Hyun et al. (2021) improved business productivity by applying RPA named CoAP which is replaced to perform the repetitive patterned tasks done by many people.

The selection of alternatives by different criteria is most significant in any process. Rahim et al. (2018) selected best employees by using TOPSIS decision support system by using different criteria. Sarhan (2011) has explained the application of Analytical Hierarchy process (AHP) for selecting best information system re-engineering projects.

Moghaddam (2019) has explained optimization is a tool that helps project managers make optimal decisions such as selecting the most appropriate project from the possible options, determining the best time for the project activities and the level of the overtime work, the rate of ordering and the level of storing materials and equipment, etc. Because of the importance and position of optimization in the project management, two points are worth mentioning: 1) many decisions have key impacts on the project success/failure and their consequences can be irreversible and 2) complicated decisions and the need to consider multiple variables and parameters make the intuitive or manual decisions ineffective.

3. Methodology of implementation of automation tool in staffing management

Methodology is the summary of techniques that have been used for conducting research, under this heading, detailed collection, detailed analysis, tools utilized for the process optimization/ automation.

Below methodology has been used for selection and application of automation tool to optimize the process. Figure 2 shows methodology followed in project. In below methodology, each step has been explained by different substages of the activity. After identification, study and analysis of the process, application and selection of automation tools is carried out and subsequently followed by validation and controlling of activity (Figure 3).

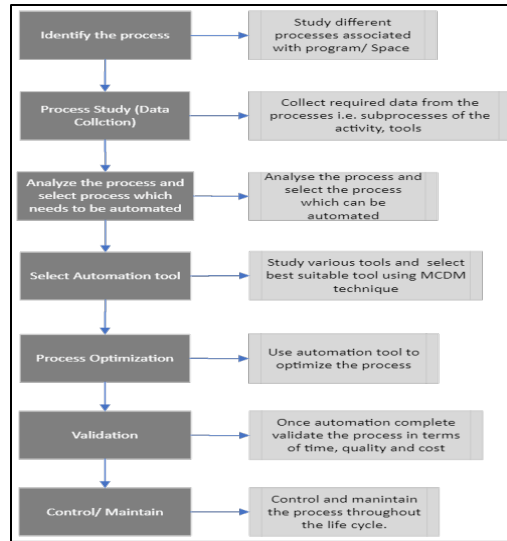


Figure 3. Methodology of implementation of automation tool in staffing management

4. Selection of Tool

Many tools are available in market and therefore, it is essential to select best applicable tool for automating the process. Some of the available tools in market are excel VBA (macro), MS Automate, RPA (Robotic Process Automation). Each tool plays a significant role in different applications. In this paper, based on below criterias, best tool is selected using multi criteria decision making (MCDM) method. The criteria for selecting the tool are given below:

1. Easy to use (U)
2. Easy to learn (L)
3. Programming language knowledge (P)
4. Cost (C) (Non-Beneficial)

From the above-mentioned criteria's, cost is non beneficial criterial while all other were beneficial. By comparing every criterion, against tool available it is found that excel macro can be the best suitable tool for this problem statement.

4.1 Calculate Weightage of Tool using AHP

For selection of tool, it is necessary to calculate weightage for each alternative. To calculate weightage, AHP is most suitable method. In below steps weightage for different alternatives have been achieved using AHP (Figure 4).

Step 1: Develop a Hierarchy Tree

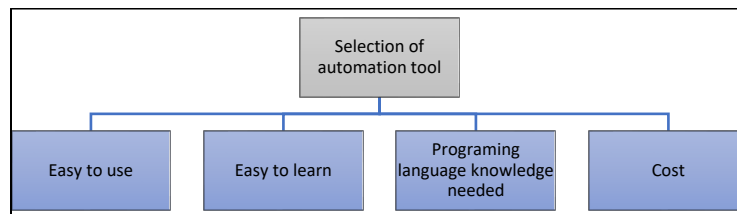


Figure 4. Hierarchical structure for tool selection

Step 2: Criteria Ranking using pair wise comparison Matrix A. Evaluation of alternative was done by using AHP fundamental scale (Saaty's scale)

	C	L	P	U
C	1	4	3	7
L	1/4	1	1/3	3
P	1/3	3	1	5
U	1/7	1/3	1/5	1

- Calculate the criteria weights using geometric mean method

$$W_i = \frac{GM_i}{\sum_{i=0}^n GM_i}$$

Total of geometric mean = 5.5422

- Weight of cost (C) = 3.0274 / 5.5422 = **0.5462**
- Weight of easy to learn (L) = 0.7071 / 5.5422 = **0.1275**
- Weight of programing knowledge needed (P) = 1.4953 / 5.5422 = **0.2698**
- Weight of easy to use (U) = 0.3124 / 5.5422 = **0.0564**

- Calculation of consistency ratio:

Matrix A × [weightages] = Matrix X

1	4	3	7	×	0.54624	=	2.260568
1/4	1	1/3	3		0.127585		0.523179
1/3	3	1	5		0.269809		1.116473
1/7	1/3	1/5	1		0.056366		0.23089

Matrix X		Weightage		Matrix A
2.26056787	/	0.5462403	=	4.138413
0.52317895		0.1275848		4.100637
1.11647306		0.269809		4.138013
0.23089031		0.0563659		4.096275

- Calculate λ_{max}
 $\lambda_{max} = 4.1183$
- Calculate C.I
 $C.I = (\lambda_{max} - M) / (M-1) \dots (M- \text{no of attributes})$
 $= 0.03944$
- Calculate C.R
For n=4 from Table of random index R.I = 0.89
 $C.R = C.I / R.I$
C.R = 0.04431 < 0.1

As CR value is less than 0.1 is means it is consistent.

4.2 Application of TOPSIS in selecting best tool

After calculating weightage of each attribute for each alternative, the next step is application of TOPSIS to select the tool by following the standard process. Following steps show the calculation of TOPSIS method to select best possible tool for automation

- For determining best suiTable tool to overcome problem statement the first initiative is to identify factors which will be most useful or suiTable for this research study of tool selection process.
- The second stage for selecting tool by TOPSIS is to form rank-based matrix with the help of information available for attributes (Table 2).

Table 2. Relative ranking matrix based on attributes

Weight	0.5462	0.1275	0.2698	0.05464
Attribute/Alternative	C	L	P	U
Excel macros	3	4	4	5
MS Automate	4	4	3	4
RPA	5	3	2	2
$(\sum m_{ij}^2)^{1/2}$	7.07107	6.403124237	5.385164807	6.708203932

3. The third stage in this selection process is normalizing the matrix. In this stage the normalized decision matrix is formed. The normalized decision matrix is represented by R_{ij} and below equation shows values for the same (Table 3).

$$R_{ij} = \frac{M_{ij}}{\sqrt{[\sum_{i=0}^n M_{ij}^2]}}$$

Table 3. Normalized Decision matrix for tool selection

Weight	0.5462	0.1275	0.2698	0.05464
Attribute/Alternative	C	L	P	U
Excel macros	0.42426	0.565685425	0.565685425	0.707106781
MS Automate	0.56569	0.565685425	0.424264069	0.565685425
RPA	0.70711	0.424264069	0.282842712	0.282842712

4. The fourth stage of TOPSIS process is to normalized weighted matrix which is denoted by V_{ij} . To obtain this matrix, process is to multiply each element of previous matrix with respective weights (Table 4).

Normalized Weighted Matrix (V_{ij}) = Normalized Decision Matrix (R_{ij}) × Respective Weight (W_j)

Table 4. Weighted normalized matrix for tool selection

Attribute/Alternative	C	L	P	U
Excel macros	0.23173	0.072124892	0.152621928	0.038636315
MS Automate	0.30898	0.072124892	0.114466446	0.030909052
RPA	0.38622	0.054093669	0.076310964	0.015454526

5. The fifth phase of this process is to obtain relative importance matrix which will give positive best and negative worst solution. Positive best is denoted by V_j^+ and negative worst is denoted by V_j^- . which has been calculated Table 5

$V_j^+ =$ [highest value of beneficial; Lowest value of Non beneficial]

$V_j^- =$ [Lowest value of beneficial; HighestValue of Non beneficial]

Table 5. Positive best and negative worst solution for tool selection

Positive best and negative worst with respect to alternative	C	L	P	U
V_j^+	0.23173	0.072124892	0.152621928	0.038636315
V_j^-	0.38622	0.054093669	0.076310964	0.015454526

6. Separation measures gives distance of ideal solution from positive best and negative worst solution, which is sixth stage of TOPSIS method, also known as Euclidean distance. Following equation calculates the Euclidian distance (Table 6).

$$S_i^+ = \sqrt{\sum_{j=1}^M (V_{ij} - V_j^+)^2} \quad i = 1, 2, \dots, N \quad \text{and} \quad S_i^- = \sqrt{\sum_{j=1}^M (V_{ij} - V_j^-)^2} \quad i = 1, 2, \dots, N$$

Table 6. Euclidian distance measurement for tool selection

Alternative Euclidean distance	S_i^+	S_i^-
Excel macros	0	0.174793131
MS Automate	0.0865	0.089367203
RPA	0.17479	0

7. The seventh and most essential stage which gives best selection in this process is to calculate positive ideal solution. Which is represented by P_i . Below formula calculates the solution (Table 7).

$$P_i = \frac{S_i^-}{S_i^+ + S_i^-}$$

Table 7. Positive Ideal Solution for tool selection

Ideal Solution	P_i
Excel macros	1
MS Automate	0.50815
RPA	0

8. The output of previous stage gives positive ideal solution, by arranging those in descending order, the topmost solution gives most suitable solution while lowest value gives least suitable solution. Hence, as per the closeness matrix Excel macro is the best solution.

5. Application of Excel Macro Tool

In this section, the study of resource staffing management is carried out by calculating time needed for each sub activities which were associated with the process and have described flow used for application of excel macro. Since, the old process consumed multiple hours for this activity, and to overcome this challenge the novel methodology of applying excel macro was implemented.

5.1 Previous process

Figure 5 shown in problem statement explains the detailed process of the staffing management. At every stage it is associated with an activity. The aim of this research work is to optimize higher time-consuming activity with the help of automation tool.

Time consumed in previous process

In old method, different time was consumed at each week which is calculated in second and shown in below Table 8.

Table 8. Time consumption of resource by old process

Task associates with activities	Week 1	Week 2	Week 3	Week 4	Average
Move staffing report in required folder	60	54	60	66	60
Align required data by unmerging cells	300	306	282	294	296
Reflect needed data in blank cells	7200	690	660	840	728
Reflect resource data in needed sheet manually	4800	5280	5400	5460	5235
QC of each row	900	780	840	1020	885

Total average time consumed by old method = Sum of all average time of task = 60 + 296 + 728 + 5235 + 885 = 7203Sec equivalent to 120 mins

5.2 Application of macro

Designed interface for execution of macro

To execute macro, we have put one command button (Click here to run macro) on the 1st tab. By simply clicking on button, macro will run and given data will be copied successfully and a pop-up window will appear mentioning the same (Figure 5).

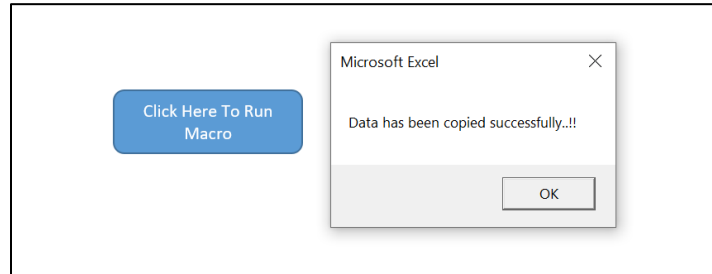


Figure 5. Excel macro execution command(button)

5.3 Needed worksheet

For execution of macro the required sheets are needed from where data is needed and sheet in which data needs to move in required format. The input sheet is staffing report and output is weekly staffing sheet. Following gives brief view of input and output sheet.

Input data:

Every week, from staffing partner overall current staffing/ resource allocation report is received. In received sheet, data is available in segregated form by project and resource wise. From which team needs to collate the data by each resource (Figure 6).

Employee	Location	Level	Role	Client	Project	Project Code	Temp Code	Manager	May 9, 2022 - May 15, 2022	May 16, 2022 - May 22, 2022	May 23, 2022 - May 29, 2022	May 30, 2022 - Jun 5, 2022	Jun 6, 2022 - Jun 12, 2022	Jun 13, 2022 - Jun 19, 2022	
1															
2	Ganesh Chaudhari	Pune	Consultant	AB	XYZ	2022 CIRBUS EU Enhancements - T	0136N4982	Neelesh Nishant	0h	0h	0h	0h	0h		
3	Vinayak Karkale	Pune	Consultant	AC	XYZ	2022 SABRe Operations Support-PP+T+RD	0136N5053	Manpreet Singh	40h	40h	40h	40h	40h	4	
4	Ganesh Chaudhari	New Delhi	Consultant	AD	XYZ	2021 CTA Site Backlog Release-T+RD	0136N4862	Nitesh Rathe	40h	40h	40h	40h	40h	4	
5	Onkar Mandawad	Pune	Consultant	AB	XYZ	2022 BDS Operations-PP+T+RD	0136N5052	Varun Singh	20h	20h	20h	20h	20h	2	
6	Sweta Meshram	Pune	Consultant	AC	XYZ	2022 CTDI Data Ops Support-PP+T+RD	0136N5055	Sandeep Kumar	10h	10h	10h	10h	10h	1	
7	Akash Borkar	Pune	Consultant	AD	XYZ	2022 Davinci Reg Implementation-PP+T+RD	0136N5123	Sandeep Kumar	4h	4h	-	-	-		
8	Vinayak Karkale	Pune	Consultant	AB	XYZ	2022 IAP Operations Support-PP+T+RD	0136N5054	Sandeep Kumar	10h	10h	10h	10h	10h	1	
9	Atishay Patil	New Delhi	Specialist/Coordinator	AC	XYZ	PE Implementation 2022-23-PP+T+RD	0136N5152	CG180220221601	Varun Chauhan	10h	10h	10h	10h	10h	1
10	Arney Datal	New Delhi	Consultant	AD	XYZ	2022 CR&P Ops Support - T + RD	0136N5039	WD11220212105	Rish Kampowale	40h	40h	40h	40h	40h	4
11	Nitin Hinge	New Delhi	Associate Consultant	AB	XYZ	2022 Simphony_JhMayK_TEMP	CG150220221301	Chinmay Avinash Gangakhedkar	40h	40h	40h	40h	40h	4	
12	Pryanka Chauhan	New Delhi	Associate Consultant	AC	XYZ	2022 Data Architecture Sup-T&M+T+RD	0136N5086	SS1217-2157-4567	Aditya Jain	40h	40h	40h	39h	38h	3
13	Kalyani Dhakate	New Delhi	Associate Consultant	AD	XYZ	2022 RDSP & Orion Operations-T+RD	0136N5067	Yogita Shah	40h	40h	40h	40h	40h	4	
14	Ann John	New Delhi	Associate Consultant	AB	XYZ	CTA Workbench Build-T + RD	0136N4699	Nitesh Rathe	40h	40h	40h	40h	40h	4	
15	Arnol Laware	New Delhi	Associate Consultant	AC	XYZ	CTA Workbench Build-T + RD	0136N4699	Nitesh Rathe	40h	40h	40h	40h	40h	4	
16	Namdeo Jadhav	New Delhi	Associate Consultant	AD	XYZ	2022 NRP DASHBOARD BUILD - PP+T+RD	0136N5117	NR1223-1513-0314	Nitesh Rathe	20h	20h	20h	20h	20h	2
17	Rajeshree Pawar	New Delhi	Associate Consultant	AB	XYZ	PE Implementation 2022-23-PP+T+RD	0136N5152	CG180220221601	Varun Chauhan	20h	20h	20h	20h	20h	2
18															
19															
20															
21															
22															

Figure 6. Input data from staffing team

To get collaborated data with easy understanding of staffing type, automation is needed to move all data in single sheet in single row for each resource.

Output data

As the requirement of team/ program leads is to get collaborated data in single sheet. Below shown format shows the required sheet which can give overall idea about staffing status. The whitelisted staffing shows perfect staffing 40hours per week i.e., 8hours per day. Those highlighted by yellow color are overstaffed resources on which action is needed, additionally red highlights understaffed resources on which also action needs to be taken in order to align them to a project (Figure 7).

Resource Name	Role	Other Project	Action Item	May 9, 2022	May 15, 2022	May 22, 2022	May 29, 2022	Jun 5, 2022	Jun 12, 2022	Jun 19, 2022	Jun 26, 2022	Jul 3, 2022	Jul 10, 2022
Ganesh Chaudhari	Consultant	POC		40	40	40	40	40	40	40	40	32	8
Vinayak Karkale	Consultant			50	50	50	50	50	50	50	50	50	50
Onkar Mandawad	Consultant			20	20	20	20	20	20	20	20	20	20
Sweta Meshram	Consultant		Yogita, need to archive old project code	10	10	10	10	10	10	10	10	10	10
Akash Borkar	Consultant			4	4	0	0	0	0	0	0	0	0
Anshay Patil	Specialist/Coordinator			10	10	10	10	10	10	10	10	10	10
Anney Dalal	Consultant			40	40	40	40	40	40	40	40	40	40
Nitin Hinge	Associate Consultant			40	40	40	40	40	40	40	40	40	40
Priyanka Chauhan	Associate Consultant			40	40	40	39	38	38	38	38	39	40
Kalyani Dhakate	Associate Consultant			40	40	40	40	40	40	40	40	32	0
Ann John	Associate Consultant			40	40	40	40	40	40	40	40	40	0
Amol Laware	Associate Consultant			40	40	40	40	40	40	40	40	40	0
Nandoo Jadhav	Associate Consultant			20	20	20	20	20	20	20	20	20	0
Rajeshree Pawar	Associate Consultant			0	0	0	0	0	0	0	0	0	0
#N/A	#N/A			0	0	0	0	0	0	0	0	0	0
#N/A	#N/A			0	0	0	0	0	0	0	0	0	0
#N/A	#N/A			0	0	0	0	0	0	0	0	0	0
#N/A	#N/A			0	0	0	0	0	0	0	0	0	0
#N/A	#N/A			0	0	0	0	0	0	0	0	0	0

Figure 7. Required sheet format for easy understanding of staffing

5.4 Macro flow

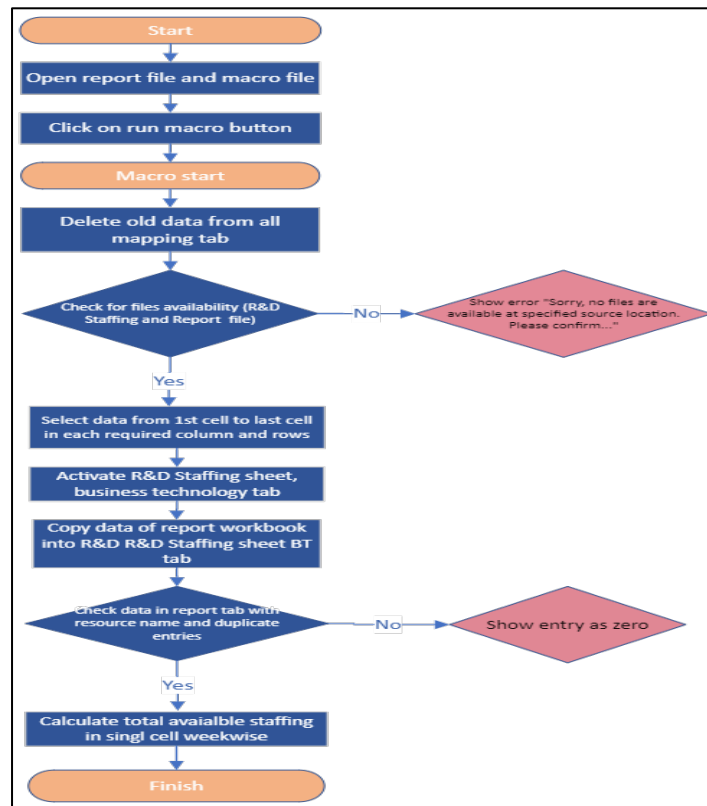


Figure 8. Stages followed by macro program after execution of macro

Above flow diagram shows stages/ steps followed by macro program after initiation of process (by clicking on macro button) from start to end (Figure 8). It follows some checks as well as some processes. After initiating the process first macro clears all old data from file and moves towards checking availability of the required files, if required files found then it moves further otherwise shows error. In next stage, it is used to select data from input file/ workbook from required cells and export that data in the output or needed workbook followed by using formulas, it gives collated data for each resource. By analysing collated data current staffing status is determined and necessary action is taken by project manager.

Time consumed by new method

By automating the process by using excel macro and running macros following time consumption in second were calculated (Table 9).

Table 9. Time consumption of resource by new method

Task Associates with activities	Week 1	Week 2	Week 3	Week4	Average
Move staffing report in required folder	60	54	60	66	60
Align required data by unmerging cells	300	306	282	294	295
Run Macro including moving data and all sub processes	30	48	24	48	38
QC of each row	300	180	240	180	225

Total time consumed by new process = 60 + 295 + 38 + 225 = **618 Sec. equivalent to 10 min 18 sec.**

6. Results and Discussion

From the application of MCDM in selection of tools in this research work the attributes taken into consideration are that the tool is easy to use, easy to learn, programming language knowledge is needed and cost are most affecting factors. Therefore, by using TOPSIS method final output Table i.e. Table 6. gives result that excel macro is most suitable tool to solve this type of problem statement.

With the help of macro automation, the process is carried out and higher result has been seen in time consumption as well cost associated with method or time. Below Table shows the time consumption difference in the process before and after automating the process (Table 10).

Table 10. Comparison of variation in time consumption

After implementation of Macro		Before Implementation of Macro	
Tasks involved in process	Average time (Sec.)	Tasks involved in process	Average time (Sec.)
Move staffing report in required folder	60	Move staffing report in required folder	60
Align required data by unmerging cells	295	Align required data by unmerging cells	296
Reflect needed data in blank cells by using macro	30	Reflect needed data in blank cells	728
Reflect resource data in needed sheet by using macro	30	Reflect resource data in needed sheet manually	5235
QC of each row	225	QC of each row	885
Total	618 Sec	Total	7203 Sec

Therefore, the above comparison shows that reflecting or moving data from one sheet to another was consuming most of the effort hours. After automating the process, it has been reduced from 120 minutes to 10 minutes per week.

Below graph shows graphical view of variation in effort needed for tasks before and after implementation of automation (Figure 9).

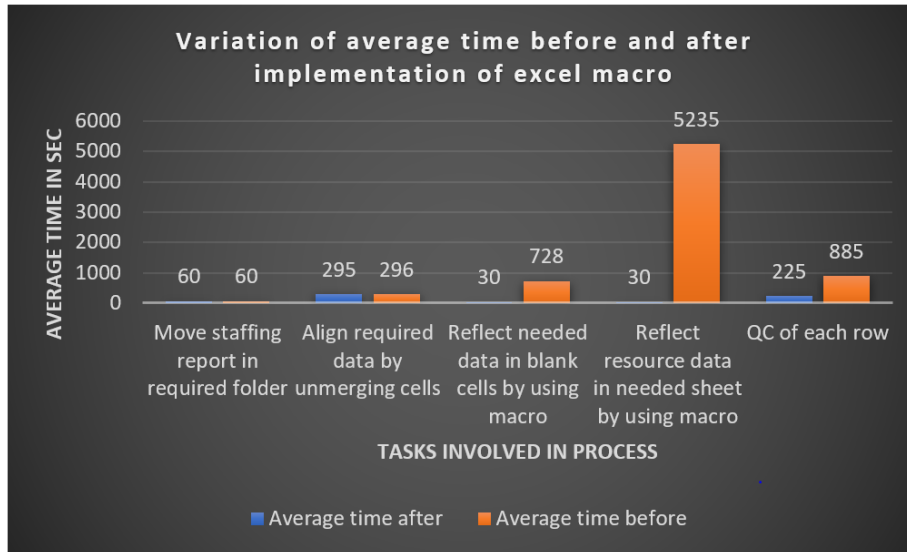


Figure 9. Graphical view of variation in average time before and after implementation of automation

The monthly saving of time is the difference between the product of number of weeks in a month and the time needed for the activity before applying excel macro and the number of weeks in a month and the time needed for the activity after applying excel macro.

The calculation and their results is shown below:

Monthly saving of time

$$= (\text{Number of weeks in a month} \times \text{Time needed for this activity before applying excel macro}) - (\text{Number of weeks in a month} \times \text{Time needed for this activity after applying macro})$$

$$= (5 \text{ weeks} \times 120 \text{ minute}) - (5 \text{ weeks} \times 10 \text{ minute})$$

$$= 600 \text{ minutes} - 50 \text{ minutes} = 550 \text{ minutes}$$

550 minutes is equivalent to 9 hours which is associated with \$50 per hour.

From the above calculation, it is found that the time is reduced by 550 minutes after applying excel macro. If 550 minutes is considered equivalent to 9 hours and the cost associated for one hour is \$50, then the total saving of cost is determined to be \$450 per month.

7. Conclusion

From the application of excel macro automation tool to optimize the process it is found that to sustain in growing space/ program it is essential for industry to move toward automation/ optimization of the processes. The most common objective of automation is to improve effectiveness of space resource/ staffing management, which can be achieved through many ways. Excel macro is most easily available, easy to use, cost effective and effective tool available in market.

As per the application of macro in this research paper the process time/effort has been reduced drastically by 550 minutes monthly which contributes to saving of money as well. It has subsequently improved quality of the staffing management process and thereby the saved effort in this process can be streamlined to increase the quality and effectiveness of parallel/concurrent activities in the space/ program.

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