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AUTOMATION OF PRODUCTION PLAN GENERATING WORKBOOK AT LEATHER FOOTWEAR COMPANY OF LAHORE PAKISTAN BY USING VBA IN MICROSOFT EXCEL

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Abstract:

In Small and Medium Enterprises (SMEs), all the reporting tasks are carried out in Microsoft Excel. The employees spend all of their time working on the reports and in the case of an error in the report; a tremendous amount of their time is incurred on the detection of that error. At one of the leather footwear companies in Lahore, Pakistan, report automation was carried out using visual basic for Application (VBA) in Microsoft Excel. The purpose of automation was to increase the reporting efficiency and minimize the chance of error. The authors automated the generation of production plan papers, which used to take 3.11 minutes to be made per plan paper. 3.11 minutes were required just for a single order of only one footwear article). This research provides the framework for the automation of manual reporting in Microsoft Excel. This automation was conducted by using VBA in Microsoft Excel. In the VBA code, the loops and conditional statements were used to program the manual activities to be performed in the report. Initially, the manual method was demonstrated in detail then way of report automation was the focus of discussion. The comparison of both methods was conducted in terms of time utilization. The manual method encompassed a series of activities whereas; the automated template included the buttons with few clicks. A time study of report-making by manual and automated method was conducted which indicated that the automated method was 1.36 minutes faster than the manual method. This research contributes to the provision of a detailed framework, with the help of which any manual work in Microsoft Excel can be automated. It was also indicated by this research that SMEs who cannot afford the implementation of Enterprise Resource Planning (ERP) software, have the option of VBA in Microsoft Excel by which they can enhance their reporting efficiency and office employees` productivity.

Keywords: production; plan papers; visual basic for applications; macros.

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1. Introduction

In the context of data computation, processing, and recovery, information technology is extremely important. A management information system is the main device used by organizations to store, organize and use data for decision-making (Karim, 2011). Producing useful information from collected sets of data is the goal of data management and organization. For administrative reporting, spreadsheets are frequently utilized in small and medium-sized enterprises, planning, covering costing, etc. spreadsheets can be used for a variety of tasks including data entry, analysis, visualizing, and storing. All of the above-mentioned tasks need the usage of numerous spreadsheet applications (Broman et al., 2017). The practitioner's experiences have demonstrated that it is difficult to produce a reliable spreadsheet (Dunn, 2009). The spreadsheet is the most used application by office employees across the globe these days (Fisher et al., 2002). Spreadsheets are used by both individuals and corporations for a variety of tasks, such as doing rapid calculations (Abraham et al., 2008). Large businesses need a complex information system to complete these duties; nonetheless, a comparable customized application can be made using VBA and Microsoft (MS) Excel if the dataset is not too big. Users of Microsoft Excel applications, use VBA in the form of 'macros' that are used for the automation of routine office work (Perry, 2012). Report automation through VBA in Microsoft Excel is a cost-effective option for organizations, with the help of which a tremendous amount of reporting time can be saved along with high accuracy (Blayney & Sun, 2019). The macros can be executed with just a click of a button after they are properly programmed and individuals can program the user-defined functions (USDFs) in a customized way by using VBA; in this way,

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the calculations and reporting tasks in Microsoft Excel can be made easier and less time-consuming (Abraham et al., 2008). VBA is quite distinctive from Microsoft Excel formulas and is coded in the visual basic editor (VBE) of the Microsoft Office applications (Microsoft Word, Excel, and Access) (Abraham et al., 2008). Balson (2012) provided instructions on how to use user-defined spread functions that can shortly be accessible in Microsoft Excel. It is quite possible to program the relevant USDFs in the VBE module with a dynamic input range (Balson, 2012). Botchkarev (2015) reported that Microsoft Excel VBA is a very good platform to conduct Monte Carlo simulations (MCSs)after investigating its applicability (Botchkarev, 2015). The scope and budget of building work, comprising data mining and Production Planning and Control (PPC), can be carried out using Microsoft Excel (Ajinkya et al., 2017). Raza and Gulwani used VBA in Excel to find suspicious computing opinions and fill in the blanks for misplaced points (Raza & Gulwani, 2017). In the field of industrial reporting, such as price, budgets, scheduling, etc., very few research articles on report automation have been published. It is illustrated in this research how conditional decision-making can automatically be conducted with VBA.

The implementation of enterprise resource planning (ERP), material resource planning (MRP), and various other software that are used for processing the production data; the employees take out reports from them and they require quite less time and are accurately made. SMEs that cannot afford the implementation of enterprise resource planning (ERP) software have the option of VBA in Microsoft Excel by which they can enhance their reporting efficiency and office employees` productivity. This research contributes to the provision of a detailed framework, with the help of which manual work (which is conducted manually in Microsoft Excel) in Microsoft Excel can be automated. This research also provides the VBA code in appendices (that was used during the automation of the present report) for the reference of industry professionals who want to carry out report automation in their routine work.

2. Literature review

The format of the report was kept the same based on the demand of the case company's planning department, and the report no longer contained any manual operation, as it had been completely removed by the usage of visual basic for applications. In this context, the study on automation/optimization utilizing VBA is given. The Air Pollutant Index (API) and Water Quality Index (WQI) were calculated by the research of Zainal Abidin et al. (2015) using VBA in Microsoft Excel. The software was configured to calculate the indices directly. The necessary formulas were converted into code. Additionally, each index description was programmed so that the measured index value's specifics could be displayed automatically alongside it (Abidin et al., 2015). Ahmadi and colleagues (2018) carried out a study to implement the CTR Dairy model through VBA in Excel. The CTR Dairy model is a dynamic simulation model utilized to predict the milk production and profits of grazing lactating dairy cows. The model takes various factors into account such as nutrient absorption and urinal digestion, and considers intermittent feeding schedules to make its predictions. The conversion of the CTR dairy model into Excel VBA transformed its input into output due to the unavailability of its clients and the termination of the SMART software. This research made the model accessible to a wide range of dairy nutrition consultants, academics, dairy farmers, and extension advisers (Ahmadi et al., 2018). The demand management system is improved at logistic centre of civil aviation authority (CAA) Karachi by using VBA which reduced 50% of working time (Chaudhry et al., 2021).

Junior et al. (2011) used Excel VBA to create a new program for post-processing RELAP5 findings. It is said to be a helpful tool for accelerating output data analysis (Belchior Junior et al., 2011). In 2009, Rushit Hila developed an application that automatically identifies outliers and arranges data using VBA in Excel. The application includes automated steps for cleaning and verifying data before importing it into MS Access, which serves as the database (Hila, 2009). A novel Cirujano and Zhu (2013) developed a novel technique using VBA Excel for automatically producing personnel planning reports. The engineers' responsibilities and availability for various projects were gathered using the new methodology. The collected data was assembled, examined, and arranged. Plans for the engineers might be developed in this respect by retrieving the engineer's information on various projects. The technique was tested at a consulting company with more than 100 workers. There was a suggestion that personnel planning reports may be prepared automatically, saving a significant amount of time as well as cash (Cirujano & Zhu, 2013). Sato and Yokoyama (2001) used Excel VBA to create an application that allows users to move picture data from a data set to a spreadsheet by clicking on a Web icon (Sato & Yokoyama, 2001). Lessa et al. (2016) utilized Visual Basic Application (VBA) in Excel to automate a mathematical model for the computation of packing and logic programs. The program automatically generated graphics to display the filling of the packages (Lessa et al., 2016). In 2014, H Evensen used Excel to implement the communication with instruments in Excel, marking the first instance of such implementation (Evensen, 2014). An automatic report production system was created by Donald E. Blattner and Valrico, Florida (2007) using VBA in MS Projects. The created system allowed users to choose, sort the report, and format the filter using the on-screen assistance dialogue box (Blattner & Valrico, 2007). To apply mapping rules, Wettlaufer (2010) created VBA macros in Excel. One macro was coded for each report. The macros wrote the anticipated values in another spreadsheet, referred to as the expected values spreadsheet. The data from the patient follow-up sessions are then sent to the Merlin net server for processing, and a report package in a WinRAR file is created as a result (Wettlaufer, 2010).

Footwear sector is proliferating worldwide but in the context of electronic automation, it lags behind (Arain et al., 2020; Kalwar & Khan, 2020b). The recent automation based applied case studies of footwear industry Pakistan include procurement report (Kalwar & Khan, 2020a), routine report making (Kalwar et al., 2020), purchase order (Kalwar & Khan, 2020c), acquisition report (Kalwar & Khan, 2020a), planning report (Kalwar et al., 2021), Supplier Price Evaluation Report (Khan,

Kalwar, Malik, et al., 2021), material delivery time analysis (Khan, Kalwar, & Chaudhry, 2021), product mix & profit maximization (Kalwar, Khan, Shahzad, et al., 2022), and order costing analysis (Kalwar, Shahzad, et al., 2022). More recently, the automation was implanted at material cost comparative analysis (MCCA) at footwear industry which resulted in 100% accuracy and 72.20% time reduction in 58.51 minutes (Kalwar et al., 2023).

VBA was used by Norton and Tiwari (2013) to create code that would help engineering students grasp the analysis of innovative freezing technology (Norton & Tiwari, 2013). Bartoszewicz and Wdowicz (2019) put forward a novel approach for analyzing and automating the production process. Their approach involved integrating the production planning module of SAP enterprise resource planning (ERP) with an Excel worksheet and VBA to enable a faster and more flexible method of data migration and analysis. This new approach significantly improved the speed of the complex analytical report, reducing operation time from 2 hours to just 5 minutes (Bartoszewicz & Wdowicz, 2019). In 2017, Harahap and Azmi conducted a study aimed at developing a VBA Excel application capable of creating a small rainwater conveyance system using the MSMA 2 logical method. The researchers aimed to produce a new tool that could efficiently implement the MSMA 2 approach (Harahap & Azmi, 2017). In 2017 Yan and Wan created an application using Excel VBA for automatic computation and creation of the gearbox line's bill of materials (BOM). The layout and implementation of the template significantly increased accuracy and efficiency and decreased the number of mistakes made when creating the entire steel BOM (Yan & Wan, 2017).

Optimization of the operations is considered among the top priorities in manufacturing sector (Bukhsh et al., 2021; Iftikhar et al., 2021; Iftikhar, Khan, et al., 2022; Iftikhar, Kumar, et al., 2022; Jaleel et al., 2021; Khan et al., 2021; Rajput et al., 2020). The process industries should utilise the potential of modern production techniques and optimization tools to improve their overall productivity (Haseeb et al., 2023). Operational excellence is much needed to remain competitive for organizations (Kalwar, Khan, Phul, et al., 2022; Kumar et al., 2020). The process industries are required to transform themselves with the dynamic business environment (Kumar et al., 2022). Lean Manufacturing (LM) philosophy is getting popularity for optimizing operations in stitching, pharmaceutical, automobile, textile and manufacturing industries of Pakistan (Khan, Soomro, et al., 2020; Khan, Memon, et al., 2020; Khan, 2018; Khan, Marri, et al., 2020; Khan, Khatri, et al., 2020). The globally practiced concepts of sustainable supply chain (Junejo, Qureshi, et al., 2023), ERP (Kalwar, Khan, Phul, et al., 2022), TQM (Memon et al., 2022) and Circular Economy (Sheikh et al., 2022) still have the great potential in Pakistani Industry.

3. Research methodology

The employee at the case company, who was supposed to make the report manually, provided the information on the procedure and approaches utilized to create the reports as per the manual method. After the authors understood how data is fetched and how it flows across the workbook; the macros were then programmed to automate the manual tasks. The macros were programmed in the default visual basic editor of Microsoft Excel and the code included the nested for loops and conditional statements to fetch and process the data. Moreover, the loops were used to transfer the data from one worksheet to another, and conditional statements were used to verify the data to be transferred in the worksheets. The programmed macros were executed through the command buttons put on the user form, and it was set to pop up on 'Ctrl + Q. The plan papers could be generated by a few clicks in the automated template. The flowcharts representing the sequence of macros` execution were made in Microsoft Word, and the snipping tool (a default snipping app) was used to take snaps of the screens that are included in the discussion of results. A stopwatch was used to record the length of each activity performed during the making of the production plan paper report as per the manual and automated methods. All the observations were entered into MS Excel to compute the average time to complete a particular activity. The comparison of time taken by both methods was conducted to reflect the difference/improvement brought by the automated method. Using a stopwatch was the only way the authors had to use for the measurement of the time consumption in the generation of plan papers via both methods.

This report automation could also be carried out using C# but it will increase the report preparation time because the employees will have to put all the data manually and that would take a tremendous amount of time. The second possibility to carry the automation of plan papers generation was to embed the module for it in Microsoft Dynamics AX, which is presently being used by the company; if the company does this, it would incur a greater cost to the company. These are the reasons, the authors chose VBA programming to automate the generation of production plan papers and the good thing is that the employees are already aware of how to use Microsoft Excel.

4. Results

4.1. Existing method of making papers

Plan papers were created manually in Microsoft Excel as part of the manual process that was in place at the time.

4.1.1. Time required to make report manually

A stopwatch was then used to record the times of the many tasks that had to be completed to create a plan paper. Microsoft Excel was used to calculate the average time to complete each task based on the ten observations for each activity. Table 1 lists all the activities and their corresponding needed times.

Figure 1 shows the average time needed to accomplish each task; the longest time was spent downloading the data (x1) from the ERP, which is shown in Figure 1.

4.2. Suggested method

VB for Application in Microsoft Excel was used to build the template and served as the foundation for the suggested approach.

Table 1: Various tasks necessary to complete the report manually take time.

Symbol	Obs. 1	Obs. 2	Obs. 3	Obs. 4	Obs. 5	Obs. 6	Obs. 7	Obs. 8	Obs. 9	Obs. 10	Average (Sec)	Standard Deviation
x1	56.43	64.19	67.96	63.25	68.37	68.10	67.10	69.49	62.34	61.02	64.825	4.138
x2	11.28	14.92	12.39	11.12	10.19	9.95	12.55	13.68	9.01	12.93	11.802	1.825
x3	5.13	4.56	3.52	4.67	3.94	5.33	5.68	3.95	5.45	4.95	4.718	0.724
x4	4.27	3.54	3.90	3.92	5.10	5.23	3.35	2.65	4.00	5.69	4.165	0.593
x5	24.29	25.59	22.01	26.84	24.94	24.66	22.16	23.70	23.40	26.99	24.458	1.720
x6	13.21	12.82	13.46	11.76	13.13	11.75	13.23	13.45	12.12	13.00	12.793	0.667
x7	35.43	34.81	32.70	20.46	30.66	32.33	33.46	28.06	32.72	27.67	30.830	4.453
x8	35.56	36.38	42.55	31.86	31.72	29.12	30.19	29.77	30.81	34.56	33.252	4.111
Total	185.60	196.81	198.49	173.88	188.05	186.47	187.72	184.75	179.85	186.81	186.843	7.151

x1 = Download bill of material of specific article from Microsoft Dynamics AX
x2 = Paste BOM in the plan paper
x3 = Write the article name and color
x4 = Write plan number
x5 = Write Production numbers
x6 = Write size sequence
x7 = Write basket numbers at the end of the plan paper
x8 = Format plan paper and do necessary settings before getting it printed

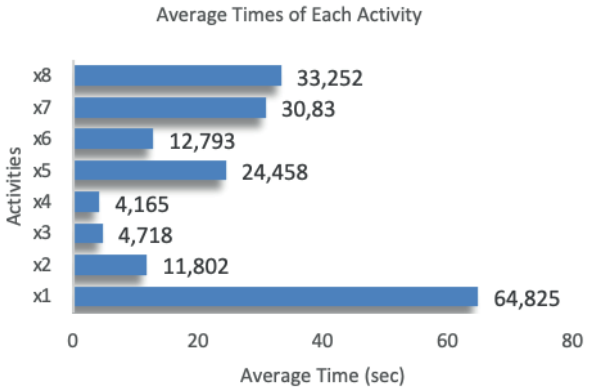

Figure 1: Average time of each activity to make plan papers manually.

4.2.1. Required worksheets and their function in automated template

The APP template needs four worksheets to function as intended. Each worksheet is connected to the minor others, and while a report is being created, data from numerous sheets is fetched at various levels. When downloading bills of material (BOMs) from Microsoft AX Dynamics, copying them into the worksheet for bills of materials (BOMs), and entering the article number and colour as shown in Figure 2, is showing examples of how to use the worksheet.

The “freeze articles” worksheet asks for information on the articles (such as article number, colour, sale order (SO) number, and week number) for which the plan papers are to be created (see Figure 3).

	A	B	C	D	E	F	G	H	I	J	K
1	Article	Color	Component	Configuration	Item number	Size	Color	Quantity	Unit	Oper. No.	Remarks
2	SS-9102	TimberLand	Upper T1	Cow	Nubuck Milled Plated	1.4-1.6 mm	Camello	1.31	Sft	10	Hot Emboss upper "Urban Sole" APS
3	SS-9102	TimberLand	Upper T2	Cow	Polisher	1.4-1.6 mm	Namibia	0.23	Sft	10	
4	SS-9102	TimberLand	Upper T3	Buff	Lining Snuffed	0.7-0.9 mm	Canapa	0.51	Sft	10	Binding in Buttom Side
5	SS-9102	TimberLand	Quater lining	AirMaish	Air Maish Sand Imp	Default	Beige	0.08	M2	10	
6	SS-9102	TimberLand	Collar Foam	EvaSpunchF	Eva With Spunch Foam	2+10 mm	Beige&Grey	0.02	M2	10	
7	SS-9102	TimberLand	Tounge Foam	RbrFomSock	Rubber Foam Socks	4 mm	Beige	0.00	M2	10	
8	SS-9102	TimberLand	Socks full	synthetic	PU Soft Pin Dot	Default	Beige	0.05	M2	10	Screen Printing on Socks "Soft Step" APS
9	SS-9102	TimberLand	Insocks ful	RbrFomSock	Rubber Foam Socks	4 mm	Beige	0.05	M2	10	
10	SS-9102	TimberLand	Toe Puff	ShetToePuf	Sheet ToePuf 25	0.8 mm	White	0.03	M2	10	
11	SS-9102	TimberLand	Back Counter Stiffner	ShetToePuf	Sheet ToePuf 25	0.8 mm	White	0.02	M2	10	
12	SS-9102	TimberLand	Vamp Lining	Cloth	Crimping Cloth Local	Default	White	0.06	M2	10	
13	SS-9102	TimberLand	fussing Cloth	ClothFusng	Fusing Clth Singl FLN-130	Default	White	0.07	m2	10	
14	SS-9102	TimberLand	Elastic Tape	ElasticImp	Elastic Imported	80 mm	D/Brown	0.16	RM	10	
15	SS-9102	TimberLand	None Elastic Tape	TapeNnStr	None Stretchable Tape	10 mm	Black	0.16	RM	10	
16	SS-9102	TimberLand	Thread Upper	Thread Loc	Polyester Thread Local	30/3	Beige 265	14.00	rm	20	
17	SS-9102	TimberLand	Thread lining	Thread Loc	Polyester Thread Local	30/3	Beige 265	12.00	rm	20	
18	SS-9102	TimberLand	Thread Zig Zaig Upper	Thread Loc	Polyester Thread Local	40/3	Beige 265	6.00	rm	20	
19	SS-9102	TimberLand	Turnover Stitching	Thread Loc	Polyester Thread Local	40/3	Beige 265	3.00	rm	20	
20	SS-9102	TimberLand	Thread For Back Sewing	Thread Loc	Polyester Thread Local	40/3	Beige 265	1.00	rm	20	
21	SS-9102	TimberLand	Hand Stitching	Thread H/S	Hand Stitch Waxy Thread Local	1 mm	Beige	8.00	RM	20	
22	SS-9102	TimberLand	Adhesive	Chemical	Pasting Solution Ltr	Default	Yellow	0.03	Litre	30	
23	SS-9102	TimberLand	Adhesive	Chemical	Latex	Default	White	0.02	Kg	30	
24	SS-9102	TimberLand	Edge Tape	Perlon Tap	Perlon Tape	4 mm	Black	0.55	RM	30	
25	SS-9102	TimberLand	Seaming Tape	Tape	Seaming Tape	14 mm	White	0.15	RM	30	
26	SS-9102	TimberLand	Sole	EVM	EVA 150 / 15 A	50	Lt.Brown	0.21	kg	40	Clair Eva Sole Last # 1U192928
27	SS-9102	TimberLand	Rubber Tag	Rubber Tag	Rubber Tag "Urban Sole"	Default	D.Brn-Beig	2.00	pcs	40	Out Sole
28	SS-9102	TimberLand	Insocks Cup	SockCmfrt	Comfort Half Engraved	41-43Mdium	Red	1.00	Pair	40	
29	SS-9102	TimberLand	Helogenation	Chemical	Keck Priemer 875-P	Default	Default	0.01	Kg	40	
30	SS-9102	TimberLand	Halogenation	Chemical	Ethylestate	Default	Default	0.00	Litre	40	
31	SS-9102	TimberLand	Insole Full	ShetInsole	Fiber Tech Sheet	1.5 mm	Default	0.07	M2	40	
32	SS-9102	TimberLand	Sole Filling	ShetWintex	Insole Wintex Sheet	1 mm	Default	0.04	M2	40	You can Also Use Shoe Box Cut Pieces
33	SS-9102	TimberLand	Adhesive	Chemical	Pasting Solution Ltr	Default	Yellow	0.01	Litre	40	

BOMS | Freeze Articles | Assortment | Sale Order Detail | Leather Cons. | SS-9102(TimberLand 0) | SS-9102(TimberLand 10) | SS-9102(Grey 0)

Figure 2: Worksheet of a bill of materials (BOMs).

	A	B	C	D	E	F
1	SS-9103	Brown	544	1	9463-3	123
2	SS-9103	Brown	480	2	9464-3	123
3	SS-9103	Brown	312	0	9464-3	123
4	SS-9103	D.Brown	480	4	9465-3	123
5	SS-9103	D.Brown	348	5	9465-3	123
6	SS-9103	D.Brown	528	0	9471-3	123
7	SS-9103	Fawn	424	7	9463-3	123
8	SS-9103	Fawn	540	0	9466-3	123
9	SS-9102	Grey	156	0	9461-3	123
10	SS-9102	TimberLand	480	10	9461-3	123
11	SS-9102	TimberLand	192	0	9461-3	123
12						
13						

Figure 3: Details of frozen articles as discussed in the freeze meeting.

Templates for doing computations are arranged as shown in Figure 5. Figure 4 illustrates how the sale order detail worksheet offers the article specifics while the plan documents include information about the number of pairs and sale order number.

4.2.2. Data Fetching Across Various Worksheets

Figure 6 shows how several worksheets are connected in terms of automatic data access. The details about articles, such as colour, production week, pairings, and SO number are first transferred into each production plan paper using BOMs, and these details are taken from the worksheet titled “frozen articles”.

For data processing for the APP template, the “Assortment” worksheet is left empty. The assortment worksheet’s template compares the values in the worksheet for “sell order details” to the number of pairs that must be scheduled that were entered in the worksheet for “freeze goods” for the APP template to function in the context of producing plan papers, the data is therefore gathered from several worksheets.

4.2.3. The function of Automated Template

The user form was created with command buttons as shown in Figure 7 to execute the macros that were built

	A	B	C	D	E	F
1	Prods Number	Art	Color	Size	Quantity	Sale Order #
2	Prod_00170000	ND-AZ-0023	Brown	40	40	SO_00021011
3	Prod_00170001	ND-AZ-0023	Brown	41	80	SO_00021011
4	Prod_00170002	ND-AZ-0023	Brown	42	120	SO_00021011
5	Prod_00170003	ND-AZ-0023	Brown	43	120	SO_00021011
6	Prod_00170004	ND-AZ-0023	Brown	44	80	SO_00021011
7	Prod_00170005	ND-AZ-0023	Brown	45	40	SO_00021011
8	Prod_00170006	ND-AZ-0023	Brown	40	10	SO_00021011
9	Prod_00170007	ND-AZ-0023	Brown	41	20	SO_00021011
10	Prod_00170008	ND-AZ-0023	Brown	42	30	SO_00021011
11	Prod_00170009	ND-AZ-0023	Brown	43	30	SO_00021011
12	Prod_00170010	ND-AZ-0023	Brown	44	20	SO_00021011
13	Prod_00170011	ND-AZ-0023	Brown	45	10	SO_00021011
14	Prod_00170012	ND-AZ-0023	Brown	40	1	SO_00021011
15	Prod_00170013	ND-AZ-0023	Brown	41	1	SO_00021011
16	Prod_00170014	ND-AZ-0023	Brown	42	2	SO_00021011
17	Prod_00170015	ND-AZ-0023	Brown	43	2	SO_00021011
18	Prod_00170016	ND-AZ-0023	Brown	44	1	SO_00021011
19	Prod_00170017	ND-AZ-0023	Brown	45	1	SO_00021011
20	Prod_00170018	ND-AZ-0023	Coffee	40	30	SO_00021011
21	Prod_00170019	ND-AZ-0023	Coffee	41	60	SO_00021011
22	Prod_00170020	ND-AZ-0023	Coffee	42	90	SO_00021011
23	Prod_00170021	ND-AZ-0023	Coffee	43	90	SO_00021011
24	Prod_00170022	ND-AZ-0023	Coffee	44	60	SO_00021011
25	Prod_00170023	ND-AZ-0023	Coffee	45	30	SO_00021011
26	Prod_00170024	ND-AZ-0023	Coffee	40	1	SO_00021011
27	Prod_00170025	ND-AZ-0023	Coffee	40	1	SO_00021011
28	Prod_00170026	ND-AZ-0023	Coffee	42	1	SO_00021011
29	Prod_00170027	ND-AZ-0023	Coffee	43	1	SO_00021011
30	Prod_00170028	ND-AZ-0023	Coffee	44	1	SO_00021011
31	Prod_00170029	ND-AZ-0023	Coffee	45	1	SO_00021011
32	Prod_00170030	ND-AZ-0038	D.Brown	40	10	SO_00021011
33	Prod_00170031	ND-AZ-0038	D.Brown	41	20	SO_00021011
34	Prod_00170032	ND-AZ-0038	D.Brown	42	30	SO_00021011
35	Prod_00170033	ND-AZ-0038	D.Brown	43	30	SO_00021011
36	Prod_00170034	ND-AZ-0038	D.Brown	44	20	SO_00021011
37	Prod_00170035	ND-AZ-0038	D.Brown	45	10	SO_00021011
38	Prod_00170036	ND-AZ-0038	D.Brown	40	1	SO_00021011

BOMS | Freeze Articles | Assortment | Sale Order Detail

Ready

Figure 4: Worksheet of Sale order detail as pasted from sale order detail report.

	Prods Nur	Art	Color	Size	Quantity	Sale Order #		Article	Color	Cell1	Cell2	Total Pairs
2	Prod_001	SS-9103	Brown	40	80	SO_00021317		SS-9103	Brown	2	6	480
3	Prod_001	SS-9103	Brown	41	80	SO_00021317		SS-9103	Brown	8	12	312
4	Prod_001	SS-9103	Brown	42	120	SO_00021317		SS-9103	Brown	14	18	12
5	Prod_001	SS-9103	Brown	43	120	SO_00021317		SS-9103	Brown	20	24	528
6	Prod_001	SS-9103	Brown	44	80	SO_00021317		SS-9103	Brown	26	30	12
7	Total Pairs				480			SS-9103	Brown	32	36	544
8	Prod_001	SS-9103	Brown	40	52	SO_00021317		SS-9103	Brown	38	42	8
9	Prod_001	SS-9103	Brown	41	52	SO_00021317		SS-9103	D.Brown	44	48	480
10	Prod_001	SS-9103	Brown	42	78	SO_00021317		SS-9103	D.Brown	50	54	348
11	Prod_001	SS-9103	Brown	43	78	SO_00021317		SS-9103	D.Brown	56	60	12
12	Prod_001	SS-9103	Brown	44	52	SO_00021317		SS-9103	D.Brown	62	66	528
13	Total Pairs				312			SS-9103	D.Brown	68	72	12
14	Prod_001	SS-9103	Brown	40	2	SO_00021317		SS-9103	Fawn	74	78	540
15	Prod_001	SS-9103	Brown	41	2	SO_00021317		SS-9103	Fawn	80	84	12
16	Prod_001	SS-9103	Brown	42	3	SO_00021317		SS-9103	Fawn	86	90	424
17	Prod_001	SS-9103	Brown	43	3	SO_00021317		SS-9103	Fawn	92	96	8
18	Prod_001	SS-9103	Brown	44	2	SO_00021317		SS-9102	Grey	98	102	480
19	Total Pairs				12			SS-9102	Grey	104	108	156
20	Prod_001	SS-9103	Brown	40	44	SO_00021318		SS-9102	Grey	110	114	12
21	Prod_001	SS-9103	Brown	41	88	SO_00021318		SS-9102	TimberLand	116	120	480
22	Prod_001	SS-9103	Brown	42	176	SO_00021318		SS-9102	TimberLand	122	126	192
23	Prod_001	SS-9103	Brown	43	132	SO_00021318		SS-9102	TimberLand	128	132	12
24	Prod_001	SS-9103	Brown	44	88	SO_00021318		SS-9102	TimberLand	134	134	26
25	Total Pairs				528					136		
26	Prod_001	SS-9103	Brown	40	1	SO_00021318						
27	Prod_001	SS-9103	Brown	41	2	SO_00021318						
28	Prod_001	SS-9103	Brown	42	4	SO_00021318						
29	Prod_001	SS-9103	Brown	43	3	SO_00021318						
30	Prod_001	SS-9103	Brown	44	2	SO_00021318						
31	Total Pairs				12							
32	Prod_001	SS-9103	Brown	40	68	SO_00021311						
33	Prod_001	SS-9103	Brown	41	136	SO_00021311						
34	Prod_001	SS-9103	Brown	42	136	SO_00021311						
35	Prod_001	SS-9103	Brown	43	136	SO_00021311						
36	Prod_001	SS-9103	Brown	44	68	SO_00021311						
37	Total Pairs				544							
38	Prod_001	SS-9103	Brown	40	1	SO_00021311						

BOMS | Freeze Articles | Assortment | Sale Order Detail | Leather Cons. | SS-9102(TimberLand 0)

Figure 5: Worksheet of assortment; this worksheet is required for the automated processing of data taken from the sale order detail worksheet.

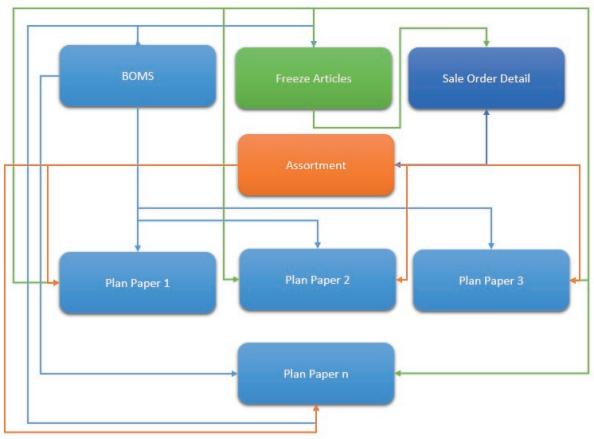

Figure 6: Data fetching among worksheets in the automated template.

to automate the generation of plan documents. The user form appears when the user taps Ctrl+Q.

Figure 7: Designed form to execute macros in the automated plan papers template.

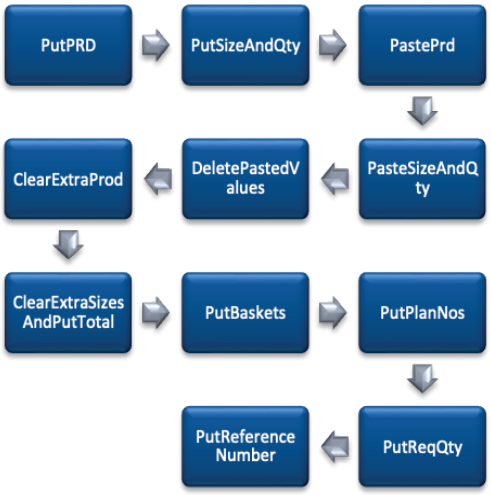

Figure 9: Macros and their execution sequence when the command button (initialize is clicked).

1.1.1. Execution Sequence of Command Buttons

The numbers of macros programmed into the backs of five of the command buttons, as well as the order in which they are executed, are shown in Figure 8.

4.2.3.1. Initialize

Eleven macros are located behind the first command button, “initialize” and they are executed in the order shown in Figure 9. Appendix 1 contains the macro code that powers the “initialize” command button.

The output in the automatically inserted worksheets for plan papers is received as shown in Figure 10 when all of the macros in Figure 9 are executed.

4.2.3.2. Generate

Nine macros are located behind the second command button, “create” and they are run sequentially as seen in Figure 11. Appendix 2 contains the macro code that powers the “initialize” command button.

The output in the automatically inserted worksheets for plan papers is received as shown in Figure 12 when all of the macros in Figure 11 are executed.

4.2.3.3. Convert to PDF

Back of the command button, there is only one macro labelled “convert to pdf”, and the VBA code for it is provided in Appendix 3. The created plan papers, as seen in Figure 13, contain a pdf document that is the macro’s output.

4.2.3.4. Delete Sheets

The automated inserting of sheets by the template for the development of plan papers is deleted as the fourth phase of command buttons and macros. Appendix 4 contains the code for the “remove sheets” command button.

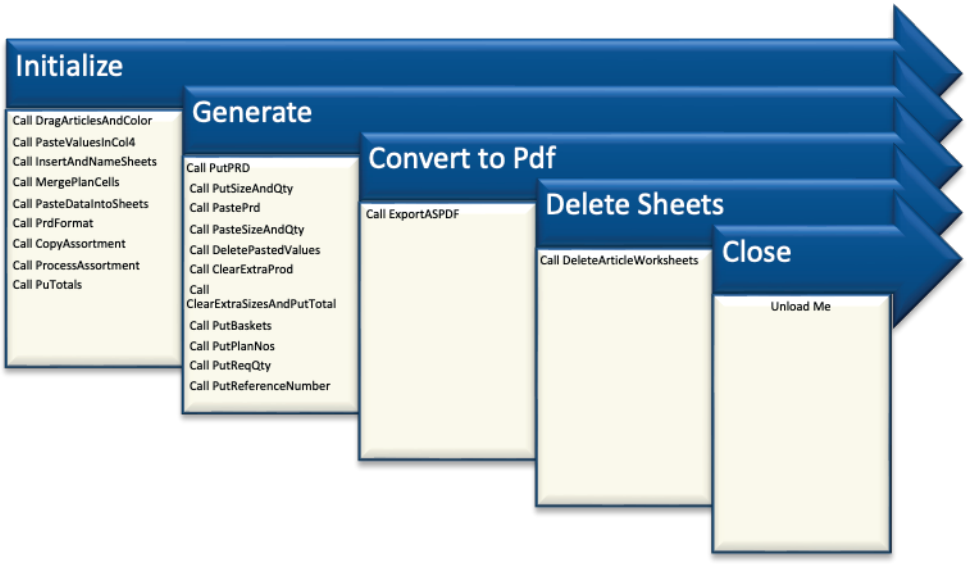

Figure 8: Command buttons and macros at their back end.

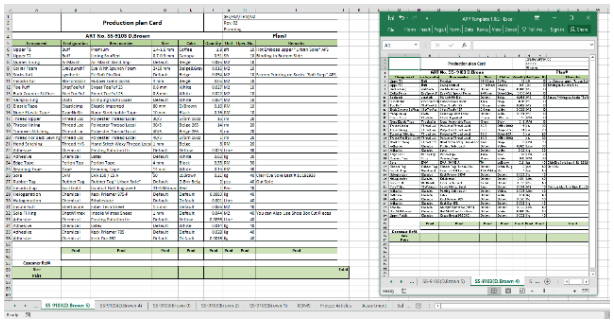

Figure 10: Obtained output after clicking the 'initialize' command button.

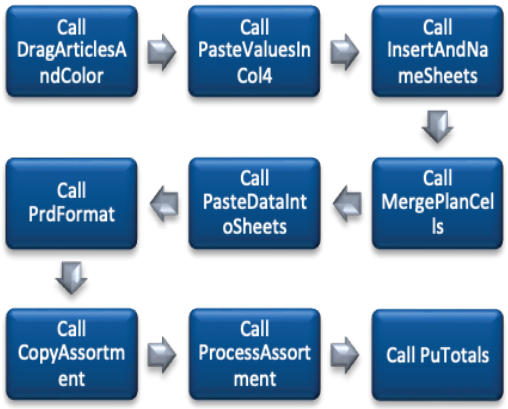

Figure 11: Macros and their execution sequence when the command button (initialize is clicked).

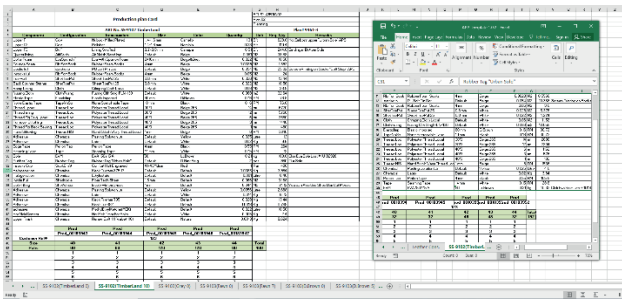

Figure 12: Obtained output after clicking the 'generate' command button.

4.2.4. Time Required to Make plan papers with Automated Template

The time required to make the plan papers by APP template is given in Table 2. The table is enlisted with the execution time of each command button. In summing up the time of all the activities, it totals 81.875 seconds or 1.36 minutes.

4.3. Comparison of old and suggested methods

The manual production plan paper for one article used to take 186.843 seconds or 3.11 minutes from the employee's time. Since there were 11 plan papers; thus 34.21 minutes were supposed to be spent on making plan papers. Eleven plan documents were created using the

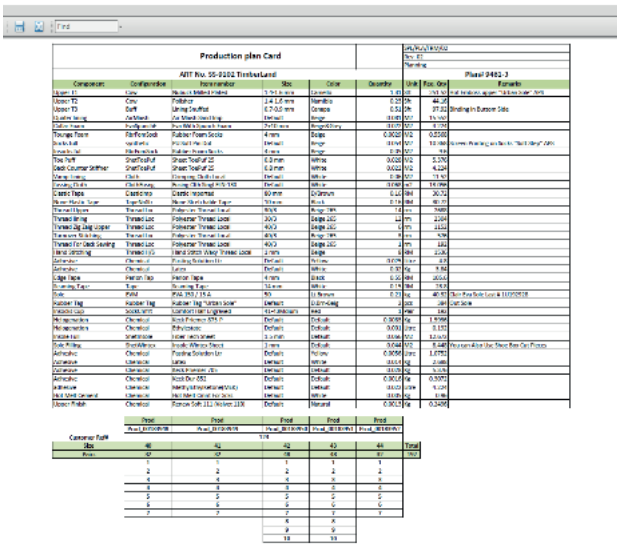

Figure 13: Obtained output after clicking the 'convert to PDf' command button.

Table 2: Average time of execution of automated plan papers template.

Activity	Average Time (sec)
Download the BOMs from Microsoft AX Dynamics	60
Execution of command button: Initialize	3.512
Execution of command button: Generate	10.250
Execution of command button: Convert to PDF	5.987
Execution of command button: Delete Sheets	2.126
Total	81.875

APP template in 1.36 minutes. The comparison showed that using this template helped the employee save 96.02% of their time.

5. Discussion

Every small and medium-sized company hires personnel to produce Excel reports on a monthly, quarterly, daily, and annual basis. Employee time is wasted on manual Excel operations, and manual labour has a higher likelihood of mistakes. In this way, software providers have maintained the automation option in office programs like Excel, PowerPoint, and Word as well as Microsoft Projects, etc. As a result, Microsoft created technologies like VSTO, VBA, ActiveX, and a lot more to meet user demands (Ding et al., 2017; Porter & Stretcher, 2012). There are various software applications available on the Windows platform that incorporate VBA technology (Kuka & Karamani, 2011; Norton & Tiwari, 2013; Harahap & Azmi, 2017). Currently, businesses encourage their staff to learn how to use Excel and Visual Basic for Applications. (Chatvichiencha, 2015) VBA technology pertains to simplifying and automating complex and repetitive tasks through development and customization within the integrated development environment (IDE) of office applications (Ding et al., 2017; Evensen, 2014; Minto,

2009; Harahap & Azmi, 2017; Kuka & Karamani, 2011). The routine tasks carried out by existing productivity at work programs are automated using it (Ding et al., 2017; Chatvichiencha, 2015). The goal of the current study was to completely automate all manual processes, including creating the report. VBA uses user forms to collect information from users (Evensen, 2014). The author of the current work employed a combo box on the form to collect input from the user (a report he wishes to work on). In order to carry out the duties automatically, user forms may additionally have codes and activities at their back (Evensen, 2014; Harahap & Azmi, 2017; Kalwar & Khan, 2020c). To automate the creation of plan papers, a user form was developed with command buttons that execute specific tasks through macros with a single click.

Bartoszewicz and Wdowicz (2019) utilized VBA technology to redesign and implement a faster and more flexible process for data migration and analysis. This allowed for a complex analytical report to be generated in a shorter amount of time, reducing the operation time from two hours to five minutes (Bartoszewicz & Wdowicz, 2019). Using VBA in Excel, Cirujano and Zhu (2013) automated the manpower resource planning report. Prior to automation, an experienced reporter would take thirty hours to complete the report manually. However, after the implementation of VBA technology, the report can now be generated in just ten minutes, resulting in a 994% reduction in the time required (Cirujano & Zhu, 2013). Seventy-five percent (75%) of the time that staff would have otherwise spent manually creating the procurement report was saved by automation in footwear operations (Kalwar & Khan, 2020c). The process of generating the order costing report was significantly faster after automation compared to the manual technique, with a time reduction of 8592%. Yan and Wan (2017) created an application using Excel VBA for automatic computation and creation of the gearbox line's bill of materials (BOM). The design and use of the template significantly increased accuracy and efficiency and decreased the number of mistakes made when creating the entire steel BOM (Yan & Wan, 2017). With the use of VBA, Abidin et al. (2013) automatically computed WQI and API. The program offered a useful method for calculating WQI and API, while also reducing computation time as well as error after automation (Abidin et al., 2015). Dynamic HRM policies are the need of time for industries now and improved HR Architecture (Khan et al., 2021), Green HR (Rahoo, Khan, et al., 2020), Emotional Intelligence (Arain, Rahoo et al., 2021), modern HR practices (Khan, 2003), Organizational Culture (Rahoo, Channar, et al., 2020; Rahoo, Hasnain, et al., 2021) improve the job satisfaction. ICT implementation can improve the operations performance & customer satisfaction (Kalhoro et al., 2019; Kalhoro, Abro, Shaikh, et al., 2018; Arshad et al., 2018; Kalhoro, Abro, Kalhoro, et al., 2018; Memon et al., 2020) but the main hurdle in it is the lack of fund (Nagar et al., 2018) and footwear industry has no exception. The post Covid-19 situation and E-Commerce changed the purchase intentions of local customers (Junejo, Kumar, et al., 2023; Rahoo, Ramejo, et al., 2021; Baladi et al., 2021).

6. Conclusion

When technology or the science of art is embedded in a machine, it repeatedly performs that operation with the desired accuracy; whereas, if humans are supposed to perform the same task, the chance of human error is certain. In this regard, the work that was repeatedly done by the employees and they used to spend a lot of time fixing the mistakes made by them. In this regard, the repetitive manual work in Microsoft was automated and left for a computer to perform. The computer did that work with 100% accuracy and after the automation, the production plan papers were made in 96.02% time as compared to the manual method. It means 960.2% time of an employee was saved that was supposed to be spent only on the generation of production plan papers. Additionally, programming and output verification for the template took a week. An employee had the work which needed human attention and in this way, the other creative ideas were focused by the help of which everyday processes at the organization could be developed further. After the automation of this report, whose time was saved came up with greater creativity and innovative thinking.

7. Future Implications

The template's user lacked the expertise required to fix any coding mistakes. The researcher provided VBA instruction, but due to his hectic schedule, no one was able to take the course. The entire company neither acted simultaneously nor had the necessary VBA expertise.

8. Limitations

This template was adequate for the generation of production plan papers up to 200, if the number exceeds 200, the template will take more time to generate the output. Since the company owns an ERP, it can hire the developers to get the module developed for the generation of production plan papers but it will incur a greater cost to the company. This is the reason, the author chose VBA for this automation.

9. Acknowledgement

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10. Conflict Of Interest

The authors of the current study had no conflicts of interest.

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APPENDICES

APPENDIX 1

Macro 1

```
Sub DragArticlesAndColor()
rowscount = Worksheets("BOMS").Cells(Rows.count, 4).End(xlUp).row
For i = 1 To rowscount
   If Worksheets("BOMS").Cells(i, 1).Value = "" Then
      With Worksheets("BOMS")
         .Cells(i, 1).Value = .Cells(i - 1, 1)
         .Cells(i, 2).Value = .Cells(i - 1, 2)
      End With
   End If
Next
Application.ScreenUpdating = True
Application.DisplayAlerts = True
Application.Calculation = xlCalculationAutomatic
End Sub
```

Macro 2

```
Sub PasteValuesInCol4()
Dim rowscount As Long
rowscount = Worksheets("Freeze Articles").Cells(Rows.count, 1).End(xlUp).row
Range("A1:F" & rowscount).Sort key1:=Range("B1:B" & rowscount), order1:=xlAscending, Header:=xlNo
   For i = 1 To rowscount
      If Worksheets("Freeze Articles").Cells(i, 1).Value = Worksheets("Freeze Articles").Cells(i + 1, 1).Value And Worksheets("Freeze Articles").Cells(i, 2).Value = Worksheets("Freeze Articles").Cells(i + 1, 2).Value Then
         Worksheets("Freeze Articles").Cells(i, 4).Value = i
      Else
         Worksheets("Freeze Articles").Cells(i, 4).Value = "0"
      End If
   Next
End Sub
```

Macro 3

```
Sub InsertAndNameSheets()
On Error Resume Next
Dim rowscount As Long
Dim SheetName As String
rowscount = Worksheets("Freeze Articles").Cells(Rows.count, 1).End(xlUp).row
   For i = 1 To rowscount
   SheetName = Worksheets("Freeze Articles").Cells(i, 1).Value & "(" & Worksheets("Freeze Articles").Cells(i, 2).Value & " " & Worksheets("Freeze Articles").Cells(i, 4).Value & ")"
      Worksheets.Add.Name = SheetName
      'MsgBox (SheetName)
   Next
End Sub
```

Macro 4

```
Sub MergePlanCells()
Dim rowscountfreeze As Integer
'MsgBox (rowscount)
rowscountfreeze = Worksheets("Freeze Articles").Cells(Rows.count, 1).End(xlUp).row
'MsgBox (rowscountfreeze)
   For i = 1 To rowscountfreeze
      SheetName = Worksheets("Freeze Articles").Cells(i, 1).Value & "(" & Worksheets("Freeze Articles").Cells(i, 2).Value & " " & Worksheets("Freeze Articles").Cells(i, 4).Value & ")"
      'MsgBox (SheetName)
         Worksheets(SheetName).Select
         With ActiveSheet
            .Range("B1").Value = "Production plan Card"
            .Range("B1").Font.Size = 16
            .Range("B1").Font.Bold = True
            .Range("B1:E3").MergeCells = True
            .Range("B1:E3").HorizontalAlignment = xlCenter
            .Range("B1:E3").VerticalAlignment = xlCenter
            .Range("A4").Value = "ART No. " & Worksheets("Freeze Articles").Cells(i, 1).Value & " " & Worksheets("Freeze Articles").Cells(i, 2).Value
            .Range("A4").Font.Size = 14
            .Range("A4").Font.Bold = True
            .Range("A4:F4").MergeCells = True
            .Range("A4:F4").HorizontalAlignment = xlCenter
            .Range("A4:F4").VerticalAlignment = xlCenter
            .Range("G1").Value = "SPL/PLA/FRM/02"
            .Range("G2").Value = "Rev: 02"
            .Range("G3").Value = "Planning"
            .Range("G1:I1").MergeCells = True
            .Range("G2:I2").MergeCells = True
            .Range("G3:I3").MergeCells = True
            .Range("G4").Value = "Plan# "
            .Range("g4").Font.Size = 14
            .Range("G4").Font.Bold = True
            .Range("G4:I4").MergeCells = True
            .Range("G4:I4").HorizontalAlignment = xlCenter
            .Range("G4:I4").VerticalAlignment = xlCenter
            .Range("F1:F3").MergeCells = True
            .Range("A1:A3").MergeCells = True
            .Range("A1:I4").Borders.LineStyle = xlContinuous
            .Range("A1:I4").Borders.weignt = xlThin
         End With
   Next
End Sub
```

Macro 5

```
Sub PasteDataIntoSheets()
Dim rowscountfreeze As Integer
Dim rowscount As Integer
Dim article As String
Dim color As String
rowscount = Worksheets("BOMS").Cells(Rows.count, 1).End(xlUp).row
'MsgBox (rowscount)
rowscountfreeze = Worksheets("Freeze Articles").Cells(Rows.count, 1).End(xlUp).row
'MsgBox (rowscountfreeze)
   For i = 1 To rowscountfreeze
      SheetName = Worksheets("Freeze Articles").Cells(i, 1).Value & "(" & Worksheets("Freeze Articles").Cells(i, 2).Value & " " & Worksheets("Freeze Articles").Cells(i, 4).Value & ")"
      article = ThisWorkbook.Worksheets("Freeze Articles").Cells(i, 1)
      color = ThisWorkbook.Worksheets("Freeze Articles").Cells(i, 2)
      row = 6
      'MsgBox (SheetName)
      For j = 2 To rowscount
         If Worksheets("BOMS").Cells(j, 1) = article And Worksheets("BOMS").Cells(j, 2) = color Then
            Worksheets(SheetName).Select
            With ActiveSheet
               .Range("A5:I5").Value = Worksheets("BOMS").Range("C1:K1").Value
```

```
            .Range("A5:I5").Interior.color =
RGB(196, 215, 155)
            .Range("A5:I5").Font.Bold = True
            .Range("A5:I5").Borders.LineStyle =
xlContinuous
            .Range("A5:I5").Borders.Weight =
xlThin
            .Range("A5:I5").HorizontalAlignment =
xlCenter
            .Cells(row, 1).Value =
Worksheets("BOMS").Cells(j, 3)
            .Cells(row, 2).Value =
Worksheets("BOMS").Cells(j, 4)
            .Cells(row, 3).Value =
Worksheets("BOMS").Cells(j, 5)
            .Cells(row, 4).Value =
Worksheets("BOMS").Cells(j, 6)
            .Cells(row, 5).Value =
Worksheets("BOMS").Cells(j, 7)
            .Cells(row, 6).Value =
Worksheets("BOMS").Cells(j, 8)
            .Cells(row, 7).Value =
Worksheets("BOMS").Cells(j, 9)
            .Cells(row, 8).Value =
Worksheets("BOMS").Cells(j, 10)
            .Cells(row, 9).Value =
Worksheets("BOMS").Cells(j, 11)
          End With
          row = row + 1
        End If
      Next
   Next
End Sub
```

Macro 6

```
Sub PrdFormat()
Dim rowscountfreeze As Integer
Dim rowscount As Integer
'MsgBox (rowscount)
rowscountfreeze = Worksheets("Freeze
Articles").Cells(Rows.count, 1).End(xlUp).row
'MsgBox (rowscountfreeze)
   For i = 1 To rowscountfreeze
      SheetName = Worksheets("Freeze
Articles").Cells(i, 1).Value & "(" &
Worksheets("Freeze Articles").Cells(i, 2).Value & " "
& Worksheets("Freeze Articles").Cells(i, 4).Value &
")"
      'MsgBox (SheetName)
         Worksheets(SheetName).Select
            With ActiveSheet
               rowscount = .Cells(Rows.count,
2).End(xlUp).row
               .Range(Cells(6, 1), Cells(rowscount,
9)).Borders.LineStyle = xlContinuous
               .Range(Cells(6, 1), Cells(rowscount,
9)).Borders.Weight = xlThin
               rowscount = rowscount + 2
               .Cells(rowscount, 2).Value = "Prod"
               .Cells(rowscount, 3).Value = "Prod"
               .Cells(rowscount, 4).Value = "Prod"
               .Cells(rowscount, 5).Value = "Prod"
               .Cells(rowscount, 6).Value = "Prod"
               .Cells(rowscount, 7).Value = "Prod"
               .Cells(rowscount, 8).Value = "Prod"
               .Cells(rowscount, 9).Value = "Prod"
               .Range(Cells(rowscount, 2),
Cells(rowscount, 9)).Interior.color = RGB(216, 228,
188)
               .Range(Cells(rowscount, 2),
Cells(rowscount, 9)).Font.Bold = True
               .Range(Cells(rowscount, 2),
Cells(rowscount, 9)).HorizontalAlignment = xlCenter
               .Range(Cells(rowscount, 2),
Cells(rowscount, 9)).VerticalAlignment = xlCenter
               .Range(Cells(rowscount, 2),
Cells(rowscount + 1, 9)).Borders.LineStyle =
xlContinuous
               .Range(Cells(rowscount, 2),
Cells(rowscount + 1, 9)).Borders.Weight = xlThin
               .Cells(rowscount + 2, 1).Value =
"Customer Ref#"
               .Cells(rowscount + 2, 1).Font.Bold =
True
               .Cells(rowscount + 2,
1).HorizontalAlignment = xlCenter
               .Cells(rowscount + 2,
1).VerticalAlignment = xlCenter
               .Cells(rowscount + 3, 1).Value = "Size"
               .Cells(rowscount + 3, 10).Value =
"Total"
               .Cells(rowscount + 4, 1).Value = "Pairs"
               .Range(Cells(rowscount + 3, 1),
Cells(rowscount + 4, 10)).Interior.color = RGB(216,
228, 188)
               .Range(Cells(rowscount + 3, 1),
Cells(rowscount + 4, 10)).Font.Bold = True
               .Range(Cells(rowscount + 3, 1),
Cells(rowscount + 4, 10)).HorizontalAlignment =
xlCenter
               .Range(Cells(rowscount + 3, 1),
Cells(rowscount + 4, 10)).VerticalAlignment =
xlCenter
               .Range(Cells(rowscount + 3, 1),
Cells(rowscount + 4, 10)).Borders.LineStyle =
xlContinuous
               .Range(Cells(rowscount + 3, 1),
Cells(rowscount + 4, 10)).Borders.Weight = xlThin
            End With
   Next
End Sub
```

Macro 7

```
Sub CopyAssortment()
Dim rowscountfreeze As Integer
Dim rowscount As Integer
Dim article As String
Dim color As String
rowscount = Worksheets("Sale Order
Detail").Cells(Rows.count, 1).End(xlUp).row
'MsgBox (rowscount)
rowscountfreeze = Worksheets("Freeze
Articles").Cells(Rows.count, 1).End(xlUp).row
'MsgBox (rowscountfreeze)
Worksheets("Assortment").Range("A1:F1").Value =
Worksheets("Sale Order
Detail").Range("A1:F1").Value
row = 2
   For i = 1 To rowscountfreeze
      If Worksheets("Freeze Articles").Cells(i,
4).Value = 0 Then
         article = ThisWorkbook.Worksheets("Freeze
Articles").Cells(i, 1)
         color = ThisWorkbook.Worksheets("Freeze
Articles").Cells(i, 2)
         For j = 2 To rowscount
            If Worksheets("Sale Order Detail").Cells(j,
2) = article Then
               If Worksheets("Sale Order
Detail").Cells(j, 3) = color Then
                  With Worksheets("Assortment")
                     .Select
                     .Cells(row, 1).Value =
Worksheets("Sale Order Detail").Cells(j, 1).Value
                     .Cells(row, 2).Value =
Worksheets("Sale Order Detail").Cells(j, 2).Value
                     .Cells(row, 3).Value =
Worksheets("Sale Order Detail").Cells(j, 3).Value
                     .Cells(row, 4).Value =
Worksheets("Sale Order Detail").Cells(j, 4).Value
                     .Cells(row, 5).Value =
Worksheets("Sale Order Detail").Cells(j, 5).Value
```

```
                    .Cells(row,          6).Value          =
Worksheets("Sale Order Detail").Cells(j, 6).Value
                End With
                row = row + 1
              End If
            End If
          Next j
        End If
    Next i
End Sub
```

Macro 8

```
Sub ProcessAssortment()
rowscount                                                  =
Worksheets("Assortment").Cells(Rows.count,
1).End(xlUp).row
'MsgBox (rowscount)
row = 2
RowIn = 2
    For i = 1 To rowscount
        If Worksheets("Assortment").Cells(RowIn + 1,
4).Value < Worksheets("Assortment").Cells(RowIn,
4).Value Then
            With Worksheets("Assortment")
                .Rows(RowIn + 1).Insert
                .Cells(RowIn + 1, 1).Value = "Total Pairs"
                .Cells(row,    8).Value    =    .Cells(RowIn,
2).Value
                .Cells(row,    9).Value    =    .Cells(RowIn,
3).Value
                .Cells(row + 1, 10).Value = RowIn + 2
                .Cells(row, 11).Value = RowIn
            End With
            row = row + 1
            RowIn = RowIn + 1
        End If
        RowIn = RowIn + 1
    Next
Worksheets("Assortment").Cells(2, 10).Value = 2
End Sub
```

Macro 9

```
Sub PuTotals()
rowscount                                                  =
Worksheets("Assortment").Cells(Rows.count,
1).End(xlUp).row
'MsgBox (rowscount)
row = 2
With Worksheets("Assortment")
    .Cells(1, 8).Value = "Article"
    .Cells(1, 9).Value = "Color"
    .Cells(1, 10).Value = "Cell1"
    .Cells(1, 11).Value = "Cell2"
    .Cells(1, 12).Value = "Total Pairs"
End With
    For i = 1 To rowscount
    cell1    =    Worksheets("Assortment").Cells(row,
10).Value
    cell2    =    Worksheets("Assortment").Cells(row,
11).Value
        If Worksheets("Assortment").Cells(i, 1).Value =
"Total Pairs" Then
            With Worksheets("Assortment")
                .Cells(i,                5).Value          =
Application.WorksheetFunction.Sum(.Range(Cells(c
ell1, 5), Cells(cell2, 5)))
                .Cells(row, 12).Value = .Cells(i, 5)
            End With
            row = row + 1
        End If
    Next
End Sub
```

APPENDIX 2

Macro 1

```
Sub PutPRD()
On Error Resume Next
Dim rowscountfreeze As Integer
Dim rowscount As Integer
Dim SheetName As String
Dim article As String
Dim cell1 As Long
Dim cell2 As Long
Dim color As String
Dim quantity As Long
rowscount                                                  =
Worksheets("Assortment").Cells(Rows.count,
8).End(xlUp).row
'MsgBox (rowscount)
rowscountfreeze          =          Worksheets("Freeze
Articles").Cells(Rows.count, 1).End(xlUp).row
'MsgBox (rowscountfreeze)
    For i = 1 To rowscountfreeze
        SheetName          =          Worksheets("Freeze
Articles").Cells(i,          1).Value          &          "("          &
Worksheets("Freeze Articles").Cells(i, 2).Value & " "
& Worksheets("Freeze Articles").Cells(i, 4).Value &
")"
        article    =    ThisWorkbook.Worksheets("Freeze
Articles").Cells(i, 1)
        color    =    ThisWorkbook.Worksheets("Freeze
Articles").Cells(i, 2)
        quantity = ThisWorkbook.Worksheets("Freeze
Articles").Cells(i, 3)
        row = 6
        'MsgBox (SheetName)
        For j = 2 To rowscount
            cell1                                          =
ThisWorkbook.Worksheets("Assortment").Cells(j,
10).Value
            cell2                                          =
ThisWorkbook.Worksheets("Assortment").Cells(j,
11).Value
                If Worksheets("Assortment").Cells(j, 8) =
article And Worksheets("Assortment").Cells(j, 9) =
color Then
                    If      Worksheets("Assortment").Cells(j,
12) = quantity Then
                        Worksheets("Assortment").Select

Worksheets("Assortment").Range(Cells(cell1,      1),
Cells(cell2, 1)).Copy
                        Worksheets(SheetName).Select
                            With ActiveSheet
                                .Cells(1,          10).PasteSpecial
Transpose:=True
                            End With
                    End If
                End If
        Next
    Next
End Sub
```

Macro 2

```
Sub PutSizeAndQty()
Dim rowscountfreeze As Integer
Dim rowscount As Integer
Dim SheetName As String
Dim article As String
Dim cell1 As Long
Dim cell2 As Long
Dim color As String
Dim quantity As Long
rowscount                                                  =
Worksheets("Assortment").Cells(Rows.count,
8).End(xlUp).row
'MsgBox (rowscount)
```

```
rowscountfreeze = Worksheets("Freeze Articles").Cells(Rows.count, 1).End(xlUp).row
'MsgBox (rowscountfreeze)
  For i = 1 To rowscountfreeze
    SheetName = Worksheets("Freeze Articles").Cells(i, 1).Value & "(" & Worksheets("Freeze Articles").Cells(i, 2).Value & " " & Worksheets("Freeze Articles").Cells(i, 4).Value & ")"
    article = ThisWorkbook.Worksheets("Freeze Articles").Cells(i, 1)
    color = ThisWorkbook.Worksheets("Freeze Articles").Cells(i, 2)
    quantity = ThisWorkbook.Worksheets("Freeze Articles").Cells(i, 3)
    row = 6
    'MsgBox (SheetName)
    For j = 2 To rowscount
      cell1 = ThisWorkbook.Worksheets("Assortment").Cells(j, 10).Value
      cell2 = ThisWorkbook.Worksheets("Assortment").Cells(j, 11).Value
        If Worksheets("Assortment").Cells(j, 8) = article And Worksheets("Assortment").Cells(j, 9) = color Then
          If Worksheets("Assortment").Cells(j, 12) = quantity Then
            Worksheets("Assortment").Select

Worksheets("Assortment").Range(Cells(cell1, 4), Cells(cell2, 5)).Copy
            Worksheets(SheetName).Select
              With ActiveSheet
                .Cells(2, 10).PasteSpecial Transpose:=True
              End With
              With Worksheets("Assortment")
                .Select
                Application.CutCopyMode = False
                .Range(Cells(j, 8), Cells(j, 12)).Value = ""
              End With
          End If
        End If
    Next
  Next
End Sub
```

Macro 3

```
Sub PastePrd()
Dim rowscountfreeze As Integer
Dim rowscount As Integer
Dim colcount As Integer
rowscountfreeze = Worksheets("Freeze Articles").Cells(Rows.count, 1).End(xlUp).row
  For i = 1 To rowscountfreeze
    SheetName = Worksheets("Freeze Articles").Cells(i, 1).Value & "(" & Worksheets("Freeze Articles").Cells(i, 2).Value & " " & Worksheets("Freeze Articles").Cells(i, 4).Value & ")"
      Worksheets(SheetName).Select
      With ActiveSheet
        rowscount = ActiveSheet.Cells(Rows.count, 1).End(xlUp).row
        colcount = ActiveSheet.Cells(1, Columns.count).End(xlToLeft).Column
        For j = 1 To rowscount
          If ActiveSheet.Cells(j, 2).Value = "Prod" Then
            ActiveSheet.Range(Cells(1, 10), Cells(1, colcount)).Copy
            .Cells(j + 1, 2).PasteSpecial xlPasteValues
            .Range(Cells(j + 1, 2), Cells(j + 1, colcount)).Font.Bold = True
            .Range(Cells(j + 1, 2), Cells(j + 1, colcount)).HorizontalAlignment = xlCenter
            .Range(Cells(j + 1, 2), Cells(j + 1, colcount)).VerticalAlignment = xlCenter
          End If
        Next
      End With
  Next
End Sub
```

Macro 4

```
Sub PasteSizeAndQty()
Dim rowscountfreeze As Integer
Dim rowscount As Integer
Dim colcount As Integer
rowscountfreeze = Worksheets("Freeze Articles").Cells(Rows.count, 1).End(xlUp).row
  For i = 1 To rowscountfreeze
    SheetName = Worksheets("Freeze Articles").Cells(i, 1).Value & "(" & Worksheets("Freeze Articles").Cells(i, 2).Value & " " & Worksheets("Freeze Articles").Cells(i, 4).Value & ")"
      Worksheets(SheetName).Select
      With ActiveSheet
        rowscount = ActiveSheet.Cells(Rows.count, 1).End(xlUp).row
        colcount = ActiveSheet.Cells(1, Columns.count).End(xlToLeft).Column
        For j = 1 To rowscount
          If ActiveSheet.Cells(j, 1).Value = "Size" Then
            ActiveSheet.Range(Cells(2, 10), Cells(3, colcount)).Copy
            .Cells(j, 2).PasteSpecial xlPasteValues
            .Range(Cells(j, 2), Cells(j, colcount)).Font.Bold = True
            .Range(Cells(j, 2), Cells(j, colcount)).HorizontalAlignment = xlCenter
            .Range(Cells(j, 2), Cells(j, colcount)).VerticalAlignment = xlCenter
          End If
        Next
      End With
  Next
End Sub
```

Macro 5

```
Sub DeletePastedValues()
Dim rowscountfreeze As Integer
Dim colcount As Integer
rowscountfreeze = Worksheets("Freeze Articles").Cells(Rows.count, 1).End(xlUp).row
  For i = 1 To rowscountfreeze
    SheetName = Worksheets("Freeze Articles").Cells(i, 1).Value & "(" & Worksheets("Freeze Articles").Cells(i, 2).Value & " " & Worksheets("Freeze Articles").Cells(i, 4).Value & ")"
      Worksheets(SheetName).Select
      With ActiveSheet
        colcount = ActiveSheet.Cells(1, Columns.count).End(xlToLeft).Column
        .Range(Cells(1, 10), Cells(3, colcount)).ClearContents
```

```
            .Range(Cells(1, 10), Cells(3, colcount)).ClearFormats
        End With
    Next
End Sub
```

Macro 6

```
Sub ClearExtraProd()
Dim rowscountfreeze As Integer
Dim rowscount As Integer
Dim colcount As Integer
rowscountfreeze = Worksheets("Freeze Articles").Cells(Rows.count, 1).End(xlUp).row
    For i = 1 To rowscountfreeze
        SheetName = Worksheets("Freeze Articles").Cells(i, 1).Value & "(" & Worksheets("Freeze Articles").Cells(i, 2).Value & " " & Worksheets("Freeze Articles").Cells(i, 4).Value & ")"
        Worksheets(SheetName).Select
        With ActiveSheet
            rowscount = ActiveSheet.Cells(Rows.count, 1).End(xlUp).row
            For j = 1 To rowscount
                If ActiveSheet.Cells(j, 2).Value = "Prod" Then
                    colcount = ActiveSheet.Cells(j, Columns.count).End(xlToLeft).Column
                    For k = 2 To colcount
                        If .Cells(j + 1, k).Value = "" Then
                            .Range(Cells(j, k), Cells(j + 1, k)).ClearContents
                            .Range(Cells(j, k), Cells(j + 1, k)).ClearFormats
                        Else
                            .Cells(j, k).Value = "Prod"
                        End If
                    Next
                    colcount = ActiveSheet.Cells(j, Columns.count).End(xlToLeft).Column
                    .Range(Cells(j, 2), Cells(j + 1, colcount)).Borders.LineStyle = xlContinuous
                    .Range(Cells(j, 2), Cells(j + 1, colcount)).Borders.Weight = xlThin
                End If
            Next
        End With
    Next
End Sub
```

Macro 7

```
Sub ClearExtraSizesAndPutTotal()
Dim rowscountfreeze As Integer
Dim rowscount As Integer
Dim colcount As Integer
rowscountfreeze = Worksheets("Freeze Articles").Cells(Rows.count, 1).End(xlUp).row
    For i = 1 To rowscountfreeze
        SheetName = Worksheets("Freeze Articles").Cells(i, 1).Value & "(" & Worksheets("Freeze Articles").Cells(i, 2).Value & " " & Worksheets("Freeze Articles").Cells(i, 4).Value & ")"
        Worksheets(SheetName).Select
        With ActiveSheet
            rowscount = ActiveSheet.Cells(Rows.count, 1).End(xlUp).row
            For j = 1 To rowscount
                If ActiveSheet.Cells(j, 1).Value = "Size" Then
                    colcount = ActiveSheet.Cells(j, Columns.count).End(xlToLeft).Column
                    For k = 1 To colcount
                        If .Cells(j + 1, k).Value = "" Then
                            .Range(Cells(j, k), Cells(j + 1, k)).ClearContents
                            .Range(Cells(j, k), Cells(j + 1, k)).ClearFormats
                        End If
                    Next
                    colcount = ActiveSheet.Cells(j, Columns.count).End(xlToLeft).Column
                    .Cells(j, colcount + 1).Value = "Total"
                    .Range(Cells(j, 1), Cells(j + 1, colcount + 1)).Borders.LineStyle = xlContinuous
                    .Range(Cells(j, 1), Cells(j + 1, colcount + 1)).Borders.Weight = xlThin
                    .Cells(j + 1, colcount + 1).Value = Application.WorksheetFunction.Sum(.Range(Cells(j + 1, 2), Cells(j + 1, colcount)))
                    .Range(Cells(j, colcount + 1), Cells(j + 1, colcount + 1)).Font.Bold = True
                    .Range(Cells(j, colcount + 1), Cells(j + 1, colcount + 1)).Interior.color = RGB(216, 228, 188)
                    .Range(Cells(j, colcount + 1), Cells(j + 1, colcount + 1)).HorizontalAlignment = xlCenter
                    .Range(Cells(j, colcount + 1), Cells(j + 1, colcount + 1)).VerticalAlignment = xlCenter
                End If
            Next
        End With
    Next
End Sub
```

Macro 8

```
Sub PutBaskets()
Dim rowscountfreeze As Integer
Dim rowscount As Integer
Dim colcount As Integer
Dim qty As Integer
Dim NumofBaskets As Integer
Dim row As Integer
rowscountfreeze = Worksheets("Freeze Articles").Cells(Rows.count, 1).End(xlUp).row
    For i = 1 To rowscountfreeze
        SheetName = Worksheets("Freeze Articles").Cells(i, 1).Value & "(" & Worksheets("Freeze Articles").Cells(i, 2).Value & " " & Worksheets("Freeze Articles").Cells(i, 4).Value & ")"
        Worksheets(SheetName).Select
        With ActiveSheet
            rowscount = ActiveSheet.Cells(Rows.count, 1).End(xlUp).row
            For j = 1 To rowscount
                If ActiveSheet.Cells(j, 1).Value = "Pairs" Then
                    colcount = ActiveSheet.Cells(j, Columns.count).End(xlToLeft).Column
                    For k = 2 To colcount - 1
                        qty = .Cells(j, k).Value
                        NumofBaskets = qty / 5
                        If qty > NumofBaskets * 5 Then
                            NumofBaskets = NumofBaskets + 1
                        End If
                        row = j + 1
                        For l = 1 To NumofBaskets
                            .Cells(row, k).Value = l
                            row = row + 1
                        Next l
```

```
                .Range(Cells(j, k), Cells(row - 1, k)).Font.Bold = True
                .Range(Cells(j, k), Cells(row - 1, k)).HorizontalAlignment = xlCenter
                .Range(Cells(j, k), Cells(row - 1, k)).VerticalAlignment = xlCenter
                .Range(Cells(j, k), Cells(row - 1, k)).Borders.LineStyle = xlContinuous
                .Range(Cells(j, k), Cells(row - 1, k)).Borders.Weight = xlThin

            Next
        End If
    Next
  End With
 Next
End Sub
```

Macro 9

```
Sub PutPlanNos()
Dim rowscountfreeze As Integer
Dim CompFilePath As String
Dim logo As Picture
Dim ArticleName As String
Dim mypic As Picture
rowscountfreeze = Worksheets("Freeze Articles").Cells(Rows.count, 1).End(xlUp).row
 For i = 1 To rowscountfreeze
  SheetName = Worksheets("Freeze Articles").Cells(i, 1).Value & "(" & Worksheets("Freeze Articles").Cells(i, 2).Value & " " & Worksheets("Freeze Articles").Cells(i, 4).Value & ")"
  ArticleName = "spl"
    Worksheets(SheetName).Select
    With ActiveSheet
      ' Insert Plan Number
      .Cells(4, 7).Value = "Plan# " & Worksheets("Freeze Articles").Cells(i, 5).Value
      .Cells(5, 8).Value = "Req. Qty"
      'Insert Logo
      .Range("A1:A3").Select
      CompFilePath = "Y:\\Pictures\Art Pics\" & ArticleName & ".PNG"
      Set logo = ActiveSheet.Pictures.Insert(CompFilePath)
      ActiveSheet.Range("A1:A3") = logo
      logo.Height = "55"
      logo.Width = "90"
      'Insert Artilce Picture
      ArticleName = Worksheets("Freeze Articles").Cells(i, 1).Value
      .Range("F1:F3").Select
      CompFilePath = "Y:\\Pictures\Art Pics\" & ArticleName & ".PNG"
      Set mypic = ActiveSheet.Pictures.Insert(CompFilePath)
      ActiveSheet.Range("F1:F3") = mypic
      mypic.Height = "32"
      mypic.Width = "60.99"
    End With
 Next
End Sub
```

Macro 10

```
Sub PutReqQty()
Application.ScreenUpdating = False
Application.DisplayAlerts = False
Application.Calculation = xlCalculationManual
On Error Resume Next
Dim rowscountfreeze As Integer
Dim Pairs As Double
Dim qty As Double
Dim ReqQty As Double
rowscountfreeze = Worksheets("Freeze Articles").Cells(Rows.count, 1).End(xlUp).row
 For i = 1 To rowscountfreeze
  SheetName = Worksheets("Freeze Articles").Cells(i, 1).Value & "(" & Worksheets("Freeze Articles").Cells(i, 2).Value & " " & Worksheets("Freeze Articles").Cells(i, 4).Value & ")"
  Pairs = Worksheets("Freeze Articles").Cells(i, 3).Value
    Worksheets(SheetName).Select
    With ActiveSheet
    row = 6
      Do Until ActiveSheet.Cells(row, 2).Value = ""
        .Cells(row, 8).Value = ActiveSheet.Cells(row, 6).Value * Pairs
        row = row + 1
      Loop
    End With
 Next
End Sub
```

Macro 11

```
Sub PutReferenceNumber()
Dim rowscountfreeze As Integer
rowscountfreeze = Worksheets("Freeze Articles").Cells(Rows.count, 1).End(xlUp).row
 For i = 1 To rowscountfreeze
  SheetName = Worksheets("Freeze Articles").Cells(i, 1).Value & "(" & Worksheets("Freeze Articles").Cells(i, 2).Value & " " & Worksheets("Freeze Articles").Cells(i, 4).Value & ")"
  RefNum = Worksheets("Freeze Articles").Cells(i, 6).Value
    Worksheets(SheetName).Select
    With ActiveSheet
      rowscount = .Cells(Rows.count, 2).End(xlUp).row
      For j = 1 To rowscount
        If .Cells(j, 1).Value = "Customer Ref#" Then
          colcount = .Cells(j - 1, Columns.count).End(xlToLeft).Column
          .Cells(j, 2).Value = RefNum
          .Cells(j, 2).Font.Bold = True
          .Range(Cells(j, 2), Cells(j, colcount)).MergeCells = True
          .Range(Cells(j, 2), Cells(j, colcount)).HorizontalAlignment = xlCenter
          .Range(Cells(j, 2), Cells(j, colcount)).VerticalAlignment = xlCenter
          .Range(Cells(j, 2), Cells(j, colcount)).Borders.LineStyle = xlContinuous
          .Range(Cells(j, 2), Cells(j, colcount)).Borders.Weight = xlThin
        End If
      Next
    End With
 Next
End Sub
```

APPENDIX 3

```
Sub ExportASPDF()
Dim rowscountfreeze As Integer
rowscountfreeze = Worksheets("Freeze Articles").Cells(Rows.count, 1).End(xlUp).row
 For i = 1 To rowscountfreeze
  SheetName = Worksheets("Freeze Articles").Cells(i, 1).Value & "(" &
```

```
Worksheets("Freeze Articles").Cells(i, 2).Value & " "
& Worksheets("Freeze Articles").Cells(i, 4).Value &
")"
            Worksheets(SheetName).Select
            With ActiveSheet
                .Columns("A:I").AutoFit
                Application.PrintCommunication        =
False
                With ActiveSheet.PageSetup
                    .FitToPagesWide = 1
                    .FitToPagesTall = 1
                End With
                Application.PrintCommunication = True
            End With
    Next
Worksheets("Sale Order Detail").Visible = False
Worksheets("Assortment").Visible = False
Worksheets("Freeze Articles").Visible = False
Worksheets("BOMS").Visible = False
Dim wb As Workbook
Set wb = ActiveWorkbook
    wb.ExportAsFixedFormat        Type:=xlTypePDF,
Filename:="Ahmed",      Quality:=xlQualityStandard,
IncludeDocProperties:=True,
IgnorePrintAreas:=False, OpenAfterPublish:=True
Worksheets("Sale Order Detail").Visible = True
Worksheets("Assortment").Visible = True
Worksheets("Freeze Articles").Visible = True
Worksheets("BOMS").Visible = True
End Sub
```

APPENDIX 4

```
Sub DeleteArticleWorksheets()
Dim rowscountfreeze As Integer
rowscountfreeze          =          Worksheets("Freeze
Articles").Cells(Rows.count, 1).End(xlUp).row
    For i = 1 To rowscountfreeze
        SheetName          =          Worksheets("Freeze
Articles").Cells(i,        1).Value        &        "("        &
Worksheets("Freeze Articles").Cells(i, 2).Value & " "
& Worksheets("Freeze Articles").Cells(i, 4).Value &
")"
            Worksheets(SheetName).Select
            With ActiveSheet
                .Delete
            End With
    Next
End Sub
```