

## A Novel Program to Enhance Production Data Management (PDM) System in Apparel Industry

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### Abstract:

A novel program as a data management program for clothing mills called Lady Bird was created using c sharp (c#) program language as well as visual studio 2008. It was evaluated in 7 mills have already data management program and 5 mills have not. The program was full filled what the user need, its screens are enough, improves performance, fast the work arrangement and may meet the user expectation in the future. The study has concluded that; The program was fulfilling what the user need. The screen of lady bird program is enough in the clothing mills. The lady bird program improves performance in mills. The LadyBird program able to ease the usages of material and accessories of mill. Lady bird program may meet user expectation in the future.

### Keywords:

The product data management (PDM), Enterprise resource plans (ERP), Customer relationship management (CRM), product life cycle management (PLM) supply chain management (SCM), Fashion Lifecycle Management (FLMT).

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### Introduction:

Computer is an electronic device used in almost every field even where it is most unexpected. For this reason, the currently age is called as the era of Information Technology (IT). and now we cannot imagine a world without computers. <sup>(4)</sup> It is made up of two things one is the hardware and other is software. Production data management system is considered as the major problem opposed the clothing mills. It has a great effect on the capital of mills and the good program even manual or automated means mill successive saving money, effort, raw material, accessories and so on. <sup>(5)</sup>

There are two types of programs produce product data management (PDM) system and Enterprise resource plans (ERP) system. <sup>(3)</sup>

The product data management (PDM) system has been developed to improve the product and the process of the product development cycle. These systems provide an automated means to control and facilitate the flow of up-to-date information to authorized participants throughout the organization <sup>(8)</sup> PDM systems can manage the critical path, which helps keep track through reports on the progress of each product and by identifying potential problems. This technology system can identify how manufacturing can improve response to customer demand, enabling the supply chain to respond in terms of performance to the demands of customers.

Product data management is focused on capturing and maintaining information on products and/or services through its development and useful life. <sup>(2)</sup>

This program offer by some company like Gerber technology, lectra system, some Turkish Companies, Echo Company, Almotakamel Company etc. PDM systems combine all style information, including photographs, block pattern, fabric, trims, size specification and sketches. <sup>(1)</sup>

The term "Enterprise Resource Plans" originally derived from manufacturing resource planning (MRP II) that followed material requirements planning (MRP). MRP evolved into ERP when "routings" became a major part of the software architecture and a company's capacity planning activity also became a part of the standard software activity. <sup>(6)</sup> ERP systems typically handle the manufacturing, logistics, distribution, inventory, shipping, invoicing, and accounting for a company. ERP software can aid in the control of many business activities, including sales, marketing, delivery, billing, production, inventory management, quality management, and human resource management. <sup>(7)</sup> This program offer by some company like StyleMan ERP, Enterprice 21 ERP, Sentez, Intvitive ERP, Assyst bullmer.

In this work a novel automated program is created to avoid the disadvantages of the above programs as

well as to enhance production data management system.

## 2- Experimental work:

### 2-1 The language used:

The c sharp (C#) language is used in our work.

### 2-2 Specimen description:

There are 12 clothing mill were chosen to carry out our experiment on them. They specification were as follow as shown table <sup>[1]</sup>.

Table [1] Mills description

Mill name	Type of production	Automated program used	Department of mill
Shamsi For Trading and Agencies	Knitting wear	Fashion Lifecycle Management (FLMT)Gerber Technology	Customer services/ Planning/ Pattern & fitting/ Sample manufacturing/ Cutting section/ Production line/ Warehouse (raw material & finished product)/ Finance.
Sheeba International garment company	Knitting wear	_____	Customer services/ Planning/ Pattern & fitting/ Sample manufacturing/ Cutting section/ Production line/ Ironing/ Warehouse (raw material & finished product)/ Packing/Finance.
Future Fashion	Blouse&skirt for women	Alpha Technology Software Private Limited	Customer services/ Planning/ Pattern section/ Cutting section/Production line/ Ironing/ Warehouse (raw material & finished product)/ Packing/ Finance.
Lonetes for Garment and Textile	Knitting underwear.	Echo Program	Customer services/ Planning/ Pattern & fitting/ cutting section/Production line/ Ironing/ Warehouse (raw material & finished product)/ Packing/ Finance.
Raja	Men wear	_____	Customer services/ Planning/ Pattern & fitting/ Sample manufacturing/ Cutting section/ Production line/ Ironing/ Warehouse (raw material & finished product)/ Packing/ Finance.
Yesmina	Shirt	Almotakamel	Customer services/ Planning/ Pattern & fitting/ Sample manufacturing/ cutting section/ Test section/ Production line/ Ironing/ Warehouse (raw material & finished product)/ Packing/ Finance.
Faran Textile	Night and indoor wear.	Sentez Vogue Web Apparel Management System	Customer services/ Planning/ Pattern & fitting/ Sample manufacturing/ Cutting section/ Printing section/ Embroider section/ Production line/ Ironing/ Warehouse (raw material & finished product)/ Packing/ Finance.
Daly dress	Shirt & blouse.	Sentez Vogue Web Apparel Management System	Customer services/ Planning/ Pattern & fitting& Sample manufacturing/ Cutting section/ Production line/ Ironing/ Warehouse (raw material & finished product)/ Packing/ Finance.
Bell Dona	Knitting wear	_____	Customer services/ Planning/ textile section/ Pattern & fitting/ Sample manufacturing/ Cutting section/ Printing section/ Production line/ Ironing/ Warehouse (raw material & textile& finished product)/ Packing/ Finance.
Egyptian Knitting	home wear	_____	Customer services/ Planning/ textile section/ Pattern & fitting/ Sample manufacturing/Cutting section/ Printing section/ Production line/ Ironing/ Warehouse (raw material & textile& finished product)/ Packing/ Finance.
Alpha Omega	cut and made	_____	Customer services/ Planning/ Cutting section/ Production line/ Ironing/ Warehouse (raw material & finished product)/ Packing/ Finance.
BTM	men wear,	BTM System	Customer services/ Planning/ textile section/ Pattern & fitting/ Sample manufacturing. Cutting

	women wear, children wear		section/ Printing section/ Embroider section/ Production line/ Ironing/ Warehouse (raw material & textile& finished product)/ Packing/ Finance.
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### 2-3 Clothing mills self- study:

A questionnaire sheet was designed and judged by expert in industry was used in self-study of the chosen mills it composed of 12 queries covered the mill need, the answer of the queries is displayed as yes or no:

#### 1-Current account

- Customer name (yes, no).
- Customer type local & export (yes, no).
- Customer telephone (yes, no).
- Customer code / supplier code (yes, no).
- Insert rate or the production for that customer (yes, no).
- Account rate for customer (yes, no).
- There is credit risk limit of that customer (yes, no).
- Price of the product (yes, no).
- Current account monthly details (month, credit, despite, balance ) (yes, no).

#### 2-Style

- Style name (yes, no).
- Style code (yes, no).
- Style group (yes, no).
- General explanation (yes, no).
- Packing type / explanation / instruction (yes, no).
- Style card measurement table definition (yes, no).
- Fabric code /color /print / dye /unit of measurement (m, cm) (yes, no).
- Material width / length (yes, no).
- Trim specification (yes, no).
- Trim quantity used (yes, no).
- Picture for the style (yes, no).
- Clip (to define any step) (yes, no).
- Analysis of the production system to that product (yes, no).
- Time study for (preparing/collect/ironing) (yes, no).
- Machine work (yes, no).
- Code for machine (yes, no).
- Size (enters the size use) (yes, no).
- Attachment (word, pdf) (yes, no).

#### 3-Order

- Order number (yes, no).
- Total pieces (yes, no).
- Size quantity (yes, no).
- Order date (start /end) (yes, no).
- Shipment (yes, no).
- Photo of the product (yes, no).
- Size set (that enters in style) (yes, no).

#### 4- Requirement • Order no (yes, no).

- Style no (yes, no).
- Fabric & trim explanation (yes, no).
- Delivery date (yes, no).
- Customer (yes, no).
- Current account (yes, no).

#### 5-Inventory

- Inventory name (yes, no).
- Inventory code (yes, no).
- Unit (quantity/ kg/meter) (yes, no).
- Price Explanation (purchase/sales) (yes, no).
- Photo defines the inventory (yes, no).
- Receipt number in an inventory receipts (yes, no).
- Color card for inventory (yes, no).

#### 6-Purchasing

- Inventory name /inventory code (yes, no).
- Size of the product (yes, no).
- Order quantity (yes, no).
- Delivery date (yes, no).
- Purchase (yes, no).
- Purchase agreement (yes, no).
- Account code (yes, no).
- Account name (yes, no).
- Unit price (yes, no).
- Purchasing discount (yes, no).
- Sales discount (yes, no).

#### 7- Cutting

- The quantity (yes, no).
- Marker number (yes, no).
- Spreader, ACD operator and cutter (yes, no).
- Fabric code (yes, no).
- Fabric length&weighth (yes, no).
- Number of plies (yes, no).
- Cutting loss (yes, no).
- Fabric code (lot quantity/ producer) (yes, no).

#### 8-Productivity

- Operation code (yes, no).
- Machine code (yes, no).
- Operation time (yes, no).
- Operation explanation (yes, no).
- Code for department (yes, no).
- Capacity of employer (yes, no).
- Capacity of the work (yes, no).
- Quantity of the product (day/ week /month) (yes, no).
- Price for the step of operation (yes, no).
- Analysis the product (yes, no).

- Time over (yes, no).
- Extra time (yes, no).

**9-Piece work**

- Preparation (yes, no).
- Assembling (yes, no).
- Embroidery (yes, no).
- Packing (yes, no).

**10- Cost**

- Cost table (style no, cost date customer sales price, order no, loss rate profit, cost selection (fabric, garment, and sewing) (yes, no).
- Default unit price (kg, item unit, meter.....) (yes, no).

**11- Shipment**

- Packing no (yes, no).
- Order no (yes, no).
- Style no (yes, no).
- Package date (yes, no).
- Deliver date (yes, no).
- Shipment date (yes, no).
- Status (shipped, no shipped) (yes, no).

**12-Report**

- Shipment date /delivery date /order date /order no/style no /customer (yes, no).

**2.3.1. The created novel program chart:**

As a result of clothing mill self-study, the following supposed program chart was done, which show in figure [1].

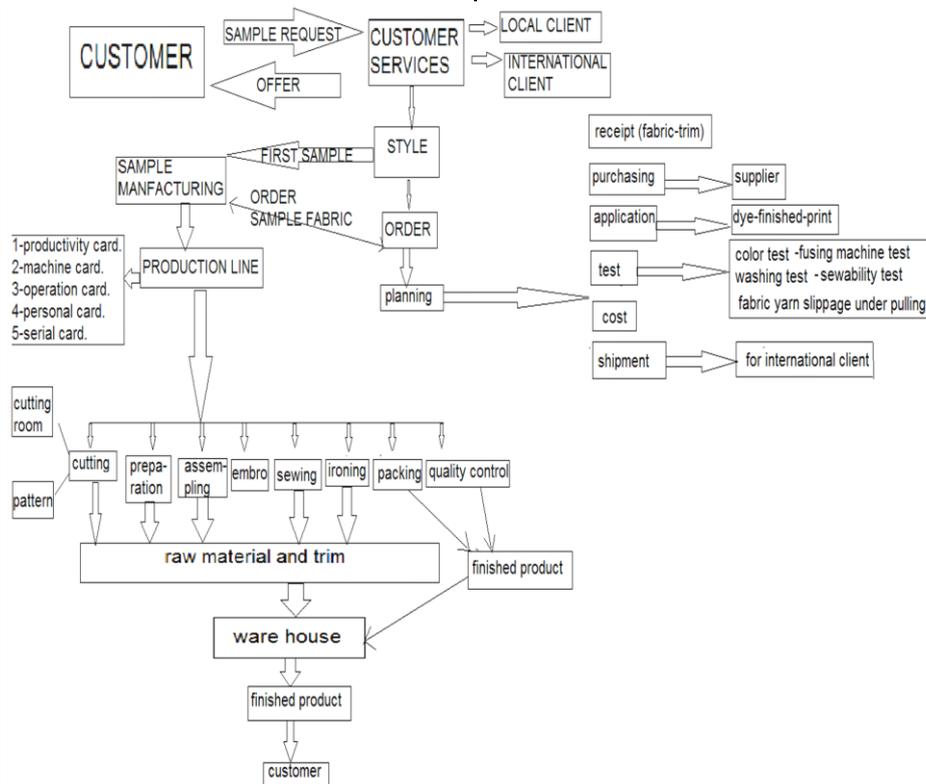


Figure [1]: Supposed program chart.

**2.4. Design the novel program screens:**

The creative program is called lady bird.it is windows application program, GUI (Graphical User Interface) as shown in basic screen of the program in figure [3].

**2.4.1. The Login screen:**

The login screen contains user name plus password they add in data base from the screen of new user .the available button in this screen are login as well the cancel button as shown in figure [3].



Figure [2]: The login screen

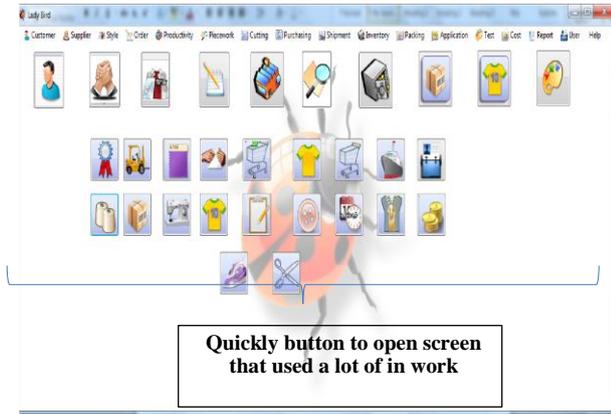
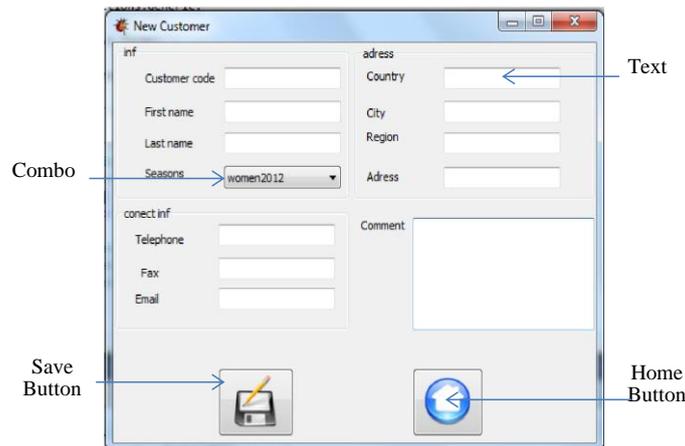


Figure [3]: The basic screen of ladybird program

**2.4.2. Customer card screen:**

When the program start as shown in figure [2], the basic screen of the program appears, then customer icon as shown in figure[4] which contains all information needed to start the work in the mill.



Figure[4]: The new customer screen of lady bird program.

**2.4.3. Style screen:**

To make the first sample style screen main details needed, which contain all combo box of information required, as shown in figure[5].

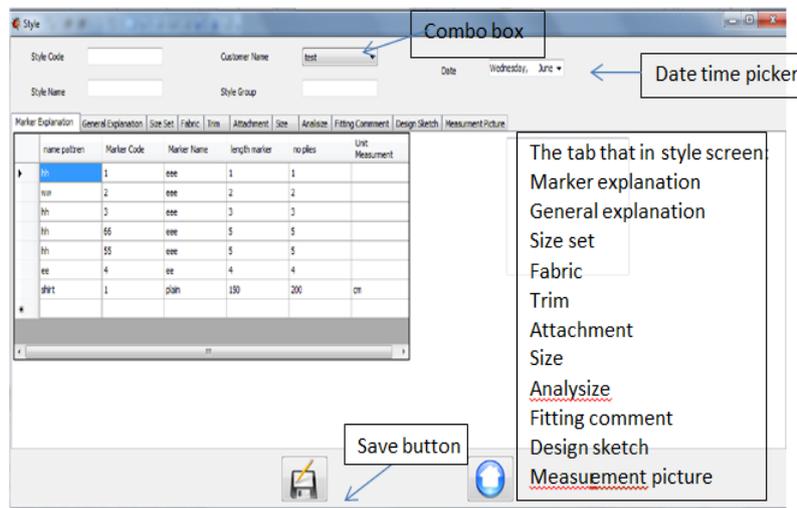
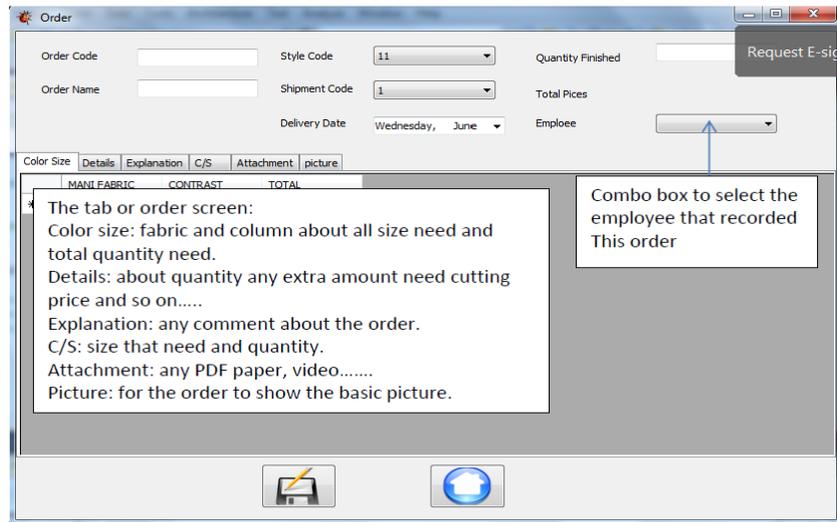


Figure [5]: style screen for customer need in lady bird program

**2.4.4. Order screen:** order is a second step in the factory to accomplish the customer need, it arranges

the mill's work. figure[6] show the order screen its required combo box.



Figure[6]: Order screen of lady bird program

**2.4.5. The Fabric Inventory Receipt screens:**

In this screen, all the variants required to accomplish the customer order are displayed. Receipt and derived date total, extra amount, receipt no and order code is also displayed as shown figure [7].

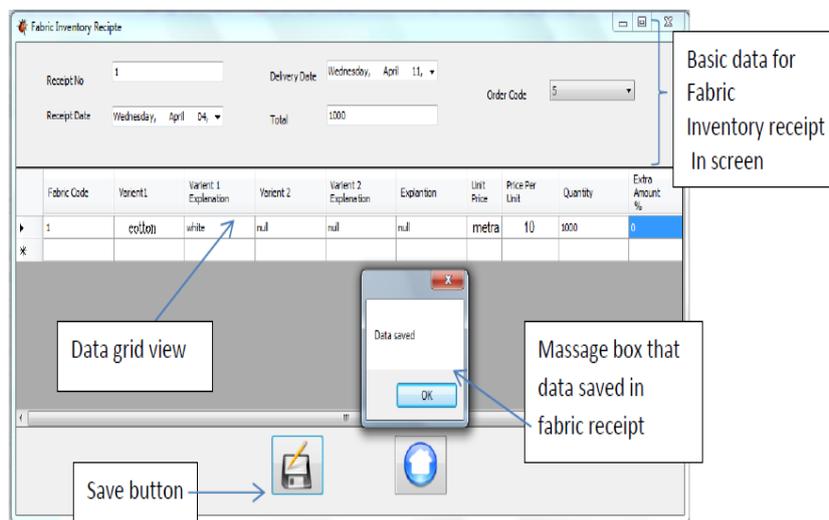


Figure [7]: The Fabric inventory receipt screen of lady bird program.

**2.4.6. The Trim Inventory Receipt screens:**

The entire variants required to the trim were appeared in this screen as shown in figure [8].

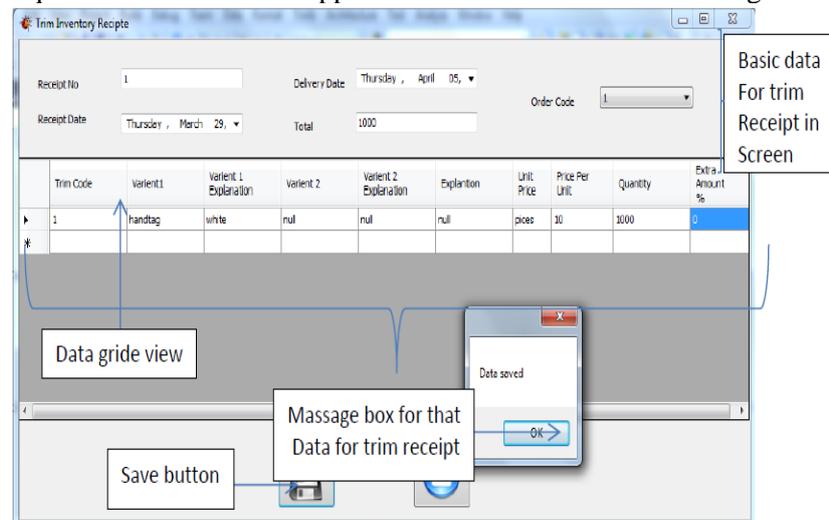


Figure [8]: The trim inventory receipt screen of lady bird program.

**2.4.7. Cutting screen:**

Cutting screen is accompanied screen first screen the marker as shown in figure[9] another screen the cutting table as shown in figure [10].

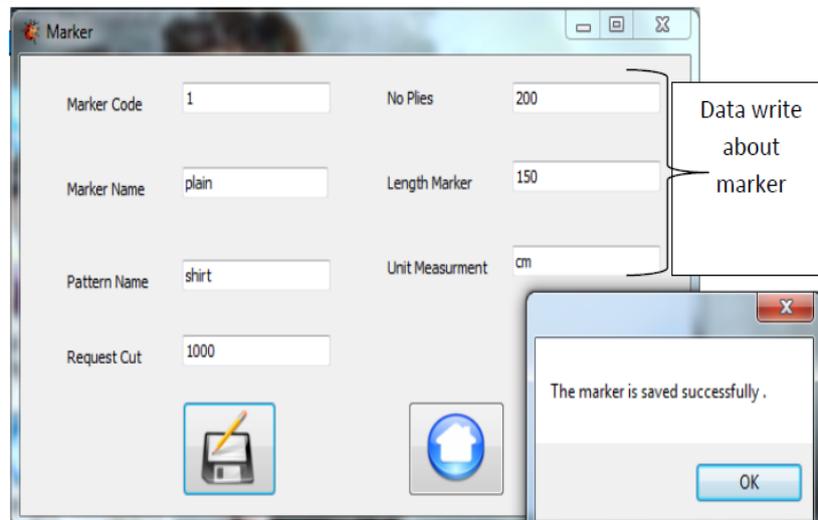


Figure [9]: The marker screen of lady bird program.

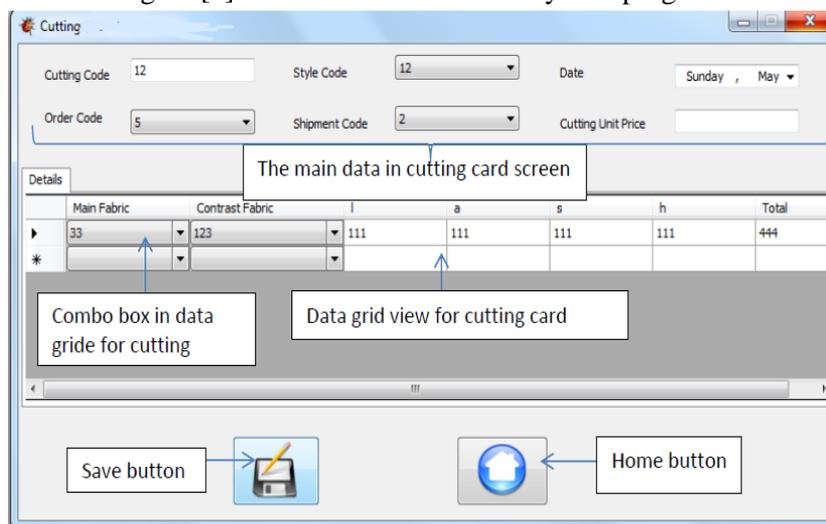


Figure [10]: The cutting card screen of lady bird program.

#### 2.4.8. Piece work screen:

It is a screen in which all the department register from it, what done along it ,it is consider as report collection this screen can be down from the main of the lady bird program ,as show in figure [11].

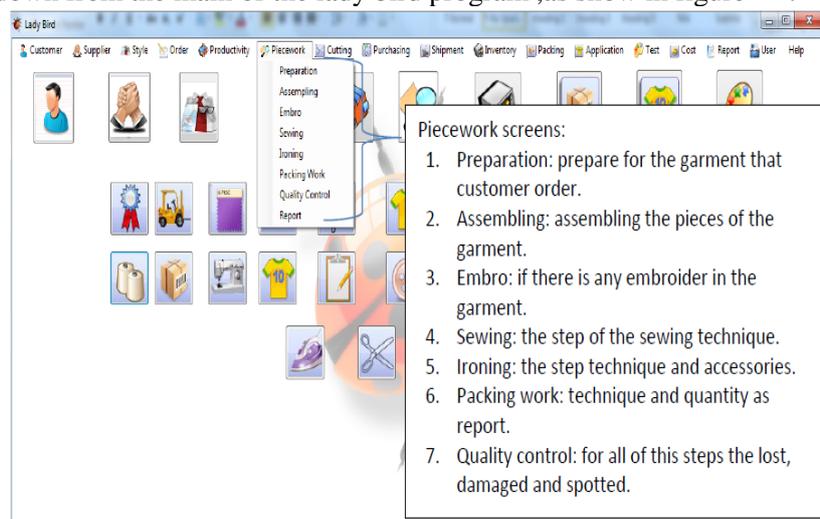


Figure [11]: The piecework screens of lady bird program.

#### 2.4.9. Productivity:

These are screens which enter data about Productivity, Machine card, Operation card, personal card, Serial card. These are considering as data enter this screens can be down from the main of the lady bird program, as show in figure [12].

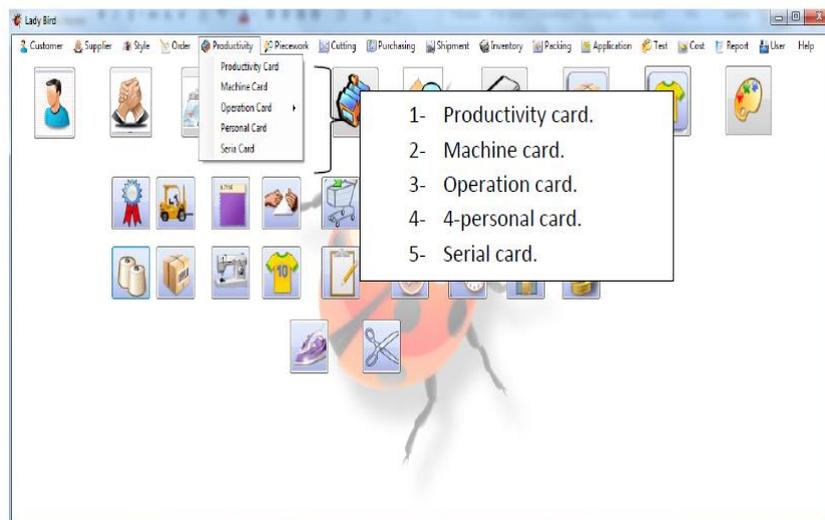


Figure [12]: The piecwork screens of lady bird program.

#### 2.4.10. Application screen:

Any requirement application needed in the order of the customer as print, dye finished...etc. can be displayed in application screen as shown in figure [13].

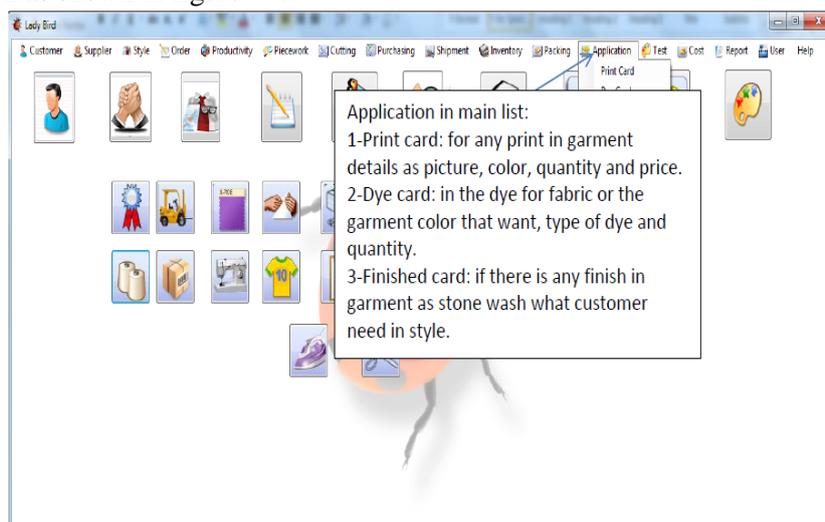


Figure [13]: The main list for application in main screen of lady bird program

#### 2.4.11. Test screen:

In this screen list of the test, made in the mill are displayed as shown in figure [14].

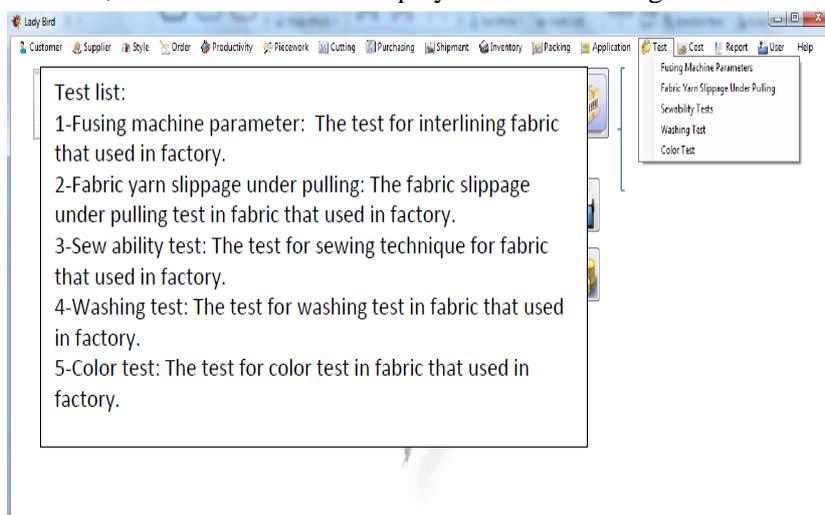


Figure [14]: The test list screen of the lady bird program.

**2.4.12. Cost screen:**

These screens contain all the step of production and their cost as shown in figure [15].

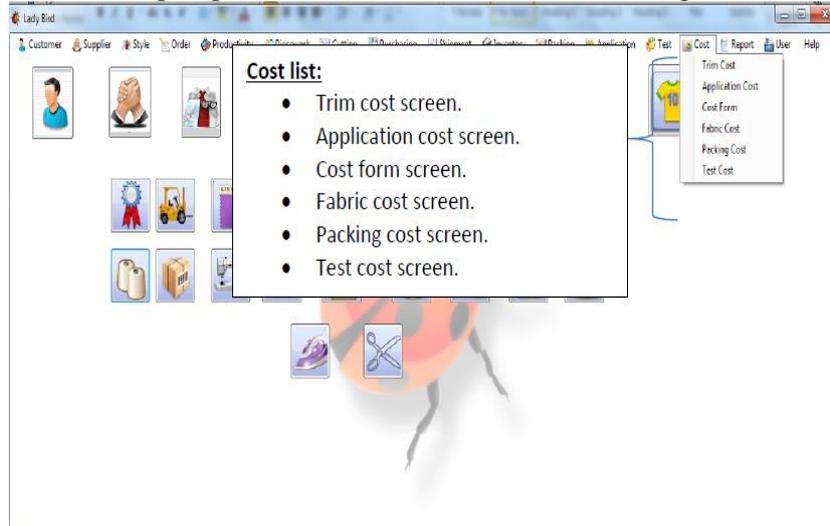


Figure [15]: The Cost screen of the lady bird program.

**2.4.13. Packing screen:**

Figure[16] shows the packing screen in which the picture of the selected sample displayed as well as all the information of the order.

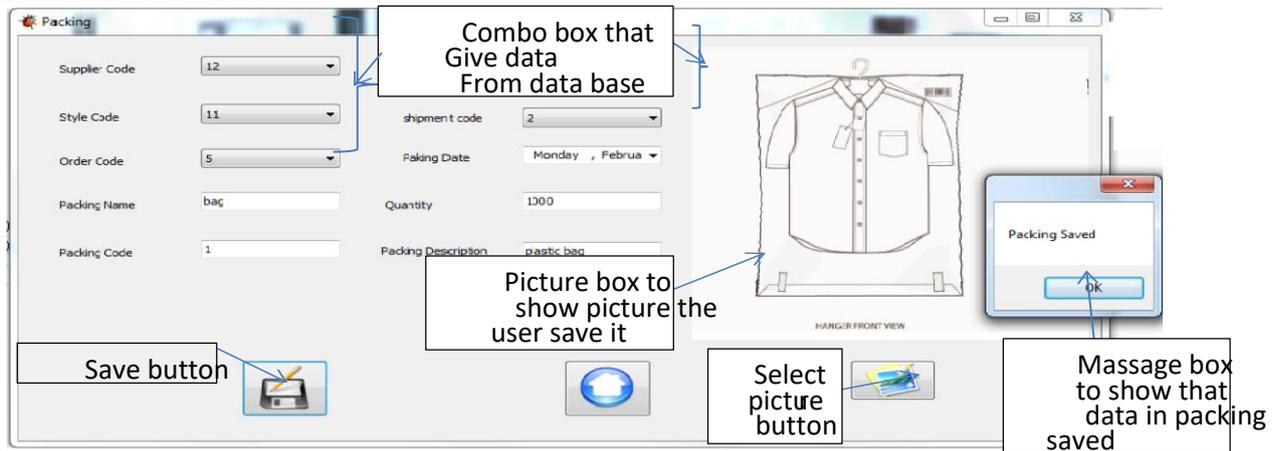


Figure [16]: Packing screen of the lady bird program.

**2.4.14. Shipment screen:**

Shipment screen is shown in figure[17] in it the information that requested and send to the customer displayed.

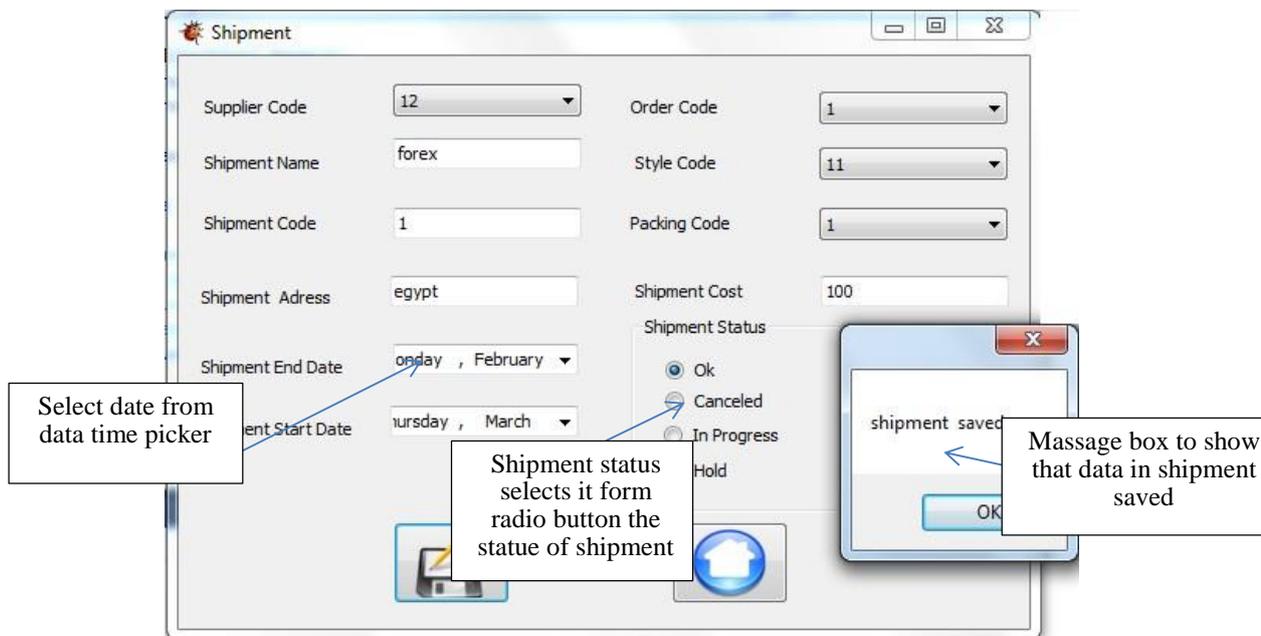


Figure [17]: Shipment screen of the lady bird program

**2.5. Questionnaire sheet of final evaluation of Lady Bird program:**

After performed the different screens of the program, the following questionnaire sheet was done to evaluate the program efficiency by the different mills choose.

- 1. Is Lady Bird products feel filling your needs?  
 no  partially  mostly  wholly
- 2. Evaluate Lady Bird product screen?  
 no  partially  mostly  wholly
- 3- Do you think Lady Bird products improve performance?  
 no  partially  mostly  wholly
- 4- Evaluate Lady Bird materials of your mill?  
 no  partially  mostly  wholly
- 5- Do you think Lady Bird product will meet your expectations in the future?  
 no  partially  mostly  wholly
- 6- Do you know other product as Lady Bird program?  
 no  partially  mostly  wholly
- 7- Do you eager to follow up the developments will be done in Lady Bird program?  
 no  partially  mostly  wholly

First Last Name   
 E-mail Address

Company   
 Name

**2.6. Data Analysis:**

In this study, analysis of obtained data was performed using the SPSS software version 16, T-test was used to test the research there is 12 mills for test.

**Result and discussion:**

A novel data management program for clothing mills called Lady Bird was created using c sharp (c#) program language as well as visual studio 2008. It was evaluated by expert in programming as well as 7 mills have already data management program and 5 mills have not. As illustrated before the following tables and figures show the statistics analysis of computed result of the questionnaire sheet.

**3-1 Question (1) Is Lady Bird products fulfill your needs?**

Table 2 displays mean, standard deviation and standard error mean for question1. The result „zero“ for no answer in table shows that the program LadyBird satisfied what the mill need.

Table [2]: descriptive statistics of question one

Answers	N	Mean	Std. Deviation	Std. Error Mean
no	12	.0000	.00000a	.00000
Partially	12	.3333	.49237	.14213
Mostly	12	.1667	.38925	.11237
Wholly	12	.5000	.52223	.15076

Tables 3 display mean, standard deviation, standard error mean, the correlation and the significant difference between mills Such tables show the meaningful of question1.

Table [3]: T. Test result of question 1

	Test Value = 0					
	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Partially	2.345	11	0.39	.33333	.0205	.6462
Mostly	1.483	11	.166	.0807		.4140
Wholly	3.317	11	.007	.50000	.1682	.8318

From the above results we can observed, most of the clothing mills have a program or not the answer of question one, reflect they need to the program mostly to fulfill their mill requirements.

**3-2 Question (2)** Evaluate Lady Bird product screen. Table 4 displays mean, standard deviation and standard error mean for question 2. The result „zero“ for no answer in table shows that program LadyBird screen is satisfied what the mill need.

Table [3]: descriptive statistics of question two.

Answers	N	Mean	Std. Deviation	Std. Error Mean
No	12	.0000	.00000a	.00000
partially	12	.6667	.49237	.14213
mostly	12	.2500	.45227	.13056
wholly	12	.2500	.45227	.13056

Tables 5 display mean, standard deviation, standard error mean, the correlation, and the significant difference between mills Such tables show the meaningful of question2.

Table [5]: T. Test result of question 2.

Test Value = 0						
				95% Confidence Interval of the Difference		
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Partially	2.803	11	.017	.41667	.0895	.7438
Mostly	2.803	11	.017	.41667	.0895	.7438
Wholly	1.483	11	.166	.16667	-.0807	.4140

From the above results we can observed, most of the clothing mills have a program or not the answer of question two, reflect they need to the program wholly to fulfill their mill requirements.

**3. Question (3)** Do you think Lady Bird products improve performance?

Table 6 displays mean, standard deviation and standard error mean for question3. The result „.0.1667“ for wholly answer in the table indicate shows that the program Lady Bird improve performance.

Table [6]: descriptive statistics of question three.

Answers	N	Mean	Std. Deviation	Std. Error Mean
No	12	.0833	.28868	.08333
Partially	12	.3333	.49237	.14213
Mostly	12	.5000	.52223	.15076
Wholly	12	.1667	.38925	.11237

Tables 7 display mean, standard deviation, standard error mean, the correlation and the significant difference between mills such tables show the meaningful of question3.

Table [7]: T. Test result of question 3.

Test Value = 0						
				95% Confidence Interval of the Difference		
	T	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Partially	4.690	11	.001	.66667	.3538	.9795
Mostly	1.915	11	.082	.25000	.0374	.5374
Wholly	1.915	11	.082	.25000	.0374	.5374

	T	df	Sig. (2-tailed)	Mean Difference	Interval of the Difference	
					Lower	Upper
No	1.000	11	.339	.08333	-.1001	.2667
Partially	2.345	11	.039	.33333	.0205	.6462
Mostly	3.317	11	.007	.50000	.1682	.8318
Wholly	1.483	11	.166	.16667	-.0807	.4140

From the above results we can observed, most of the clothing mills have a program or not the answer of question three, reflect they need to the program wholly to fulfill their mill requirements.

**3.4. Question (4)** is the LadyBird program able to ease the usages of material and accessories of mill?

Table 8 displays mean, standard deviation and standard error mean for question 4. The result „zero“ for no answer in table shows that the Lady Bird program able to ease the usages of material and accessories in mill satisfied what the mill need.

Table [8]: descriptive statistics of question four

Answers	N	Mean	Std. Deviation	Std. Error Mean
No	12	.0000	.00000a	.00000
Partially	12	.4167	.51493	.14865
Mostly	12	.4167	.51493	.14865
Wholly	12	.1667	.38925	.11237

Tables 9 display mean ,standard deviation, standard error mean, the correlation and the significant difference between mills such tables show the meaningful of question4.

Table [9]: T. Test result of question 4.

Test Value = 0						
				95% Confidence Interval of the Difference		
	T	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Partially	4.690	11	.001	.66667	.3538	.9795
Mostly	1.915	11	.082	.25000	.0374	.5374
Wholly	1.915	11	.082	.25000	.0374	.5374

From the above results we can observed, most of the clothing mills have a program or not the answer of question four, reflect that the mills partially need to the program to fulfill their requirements.

**5. Question (5)** Do you think Lady Bird product will meet your expectations in the future?

Table 10 displays mean, standard deviation and standard error mean for question 5. The result „zero“ for no answer in table shows that program LadyBird product will meet the mill need expectations in the future.

Table [10]: descriptive statistics of question five

Answers	N	Mean	Std. Deviation	Std. Error Mean
No	12	.0000	.00000a	.00000
Partially	12	.0000	.00000a	.00000
Mostly	12	.9167	.28868	.08333

Wholly	12	.3333	.49237	.14213
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Tables 11 display mean ,standard deviation, standard error mean, the correlation and the significant difference between mills such tables show the meaningful of question5.

Table [11]: T.Test result of question 5.

	Test Value = 0					
	T	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Mostly	11.000	11	.000	.91667	.7333	1.1001
Wholly	2.345	11	.039	.33333	.0205	.6462

From the above results we can observed, most of the clothing mills have a program or not the answer of question five, reflect that the mills mostly need to the program to fulfill their requirements.

**6. Question (6)** Do you know other product as Lady Bird program?

Table 12 displays mean, standard deviation and standard error mean for question 6. The result „0.2500“ for wholly answer in table shows that they know other product as Lady Bird program.

Table [12]: descriptive statistics of question six

Answers	N	Mean	Std. Deviation	Std. Error Mean
No	12	.1667	.38925	.11237
Partially	12	.2500	.45227	.13056
Mostly	12	.3333	.49237	.14213
Wholly	12	.2500	.45227	.13056

Tables 13 display mean, standard deviation, standard error mean, the correlation, and the significant difference between mills such tables show the meaningful of question6.

Table [13]: T. Test result of question 6

	Test Value = 0					
	T	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
No	c	11	.166	.16667	-.0807	.4140
Partially	1.915	11	.082	.25000	-.0374	.5374
Mostly	2.345	11	.039	.33333	.0205	.6462
Wholly	1.915	11	.082	.25000	-.0374	.5374

From the above results we can observed, most of the clothing mills have a program or not the answer of question six, reflect that no product as Lady Bird program.

**7. Question (7)** Do you eager to follow up the developments will be done in Lady Bird program?

Table 14 displays mean, standard deviation and standard error mean for question 7. The result „0.0833“ for wholly answer in the table indicate shows that they eager to follow up the developments will be done in Lady Bird program.

Table [14]: descriptive statistics of question seven

Answers	N	Mean	Std. Deviation	Std. Error Mean
No	12	.3333	.49237	.14213
Partially	12	.1667	.38925	.11237
Mostly	12	.4167	.51493	.14865
Wholly	12	.0833	.25568	.08333

Tables 15 display mean ,standard deviation, standard error mean, the correlation and the significant difference between mills such tables show the meaningful of question7.

Table [15]: T. Test result of question 7

	Test Value = 0					
	T	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
No	2.345	11	.039	.33333	.0205	.6462
Partially	1.483	11	.166	.16667	-.0807	.4140
Mostly	2.803	11	.017	.41667	.0895	.7438
Wholly	1.000	11	.339	.08333	-.1001	.2667

From the above results we can observed, most of the clothing mills have a program or not the answer of question seven, reflect they need to the program wholly to fulfill their mill requirements.

**4- Conclusion**

- 1- The program was fulfilling what the user need.
- 2- The screen of lady bird program is enough in the clothing mills.
- 3- The lady bird program improves performance in mills.
- 4- The LadyBird program able to ease the usages of material and accessories of mill.
- 5- Lady bird program may meet user expectation in the future.

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