# CREATING UI DESIGN FOR INVENTORY TRACKING MOBILE APPLICATION USING TONDREAU'S PRINCIPLES

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Abstract—The inventory is only as good as the data put into it. Okamura (2004) noted in his paper that real-time inventory management is the process of recording sales and purchases of inventory immediately. Often, jewelers count inventory periodically which causes a delay in recording stock status. Today, buyers expect same-day delivery. Same-day delivery combines the convenience of online shopping with the immediate product access of stationary retail (Hausmann, Herrmann & Krause, 2014). It integrates the convenience of online retail with the immediacy of bricks-and-mortar stores. (Hausmann, Hermann, & Krause, 2014).

Technologies like mobile applications can be a great solution to this kind of problem. Mobile applications are running on a small handheld mobile device which is moveable, easy to use, and accessible from anywhere and any place (Islam & Mazumder, 2010). It will enhance the customer experience. Sales agents can be more responsive to customer requests where they must provide when and where the item is available. The objective of this study is to create a mobile application design application using Tondreau's principles for Twin Princess Gems' staff to help keep the inventory database up-to-date on the current location of the jewelry. This study will find the most intuitive way of designing a mobile application for updating jewelry location.

*Index Terms*—User Interface Design, Tondreau's Principles of using Grids, Jewelry Inventory App.

#### I. INTRODUCTION

According to Whitin, T. M. (2007), an inventory is an itemized catalog of tangible goods. Inventory tracking is timeconsuming to set up and like all inventory, programs must be maintained and up-to-date or it loses its integrity. In a jewelry store, jewelry is one of the items that need to be tracked.

William Maloney (2001) mentioned that many objects have intrinsic value or have value because they provide access to other valuable objects. For instance, jewelry and coins have inherent and intrinsic value while keys, such as keys to vehicles, have value because they provide access to other valuable objects, namely automobiles and trucks (Maloney, 2001). Each piece is unique, very few are sold in uniform designs and Business store staff are always worried about where the missing jewelry items are located. Proper management of jewelry inventories can save time for staff. It will avoid the piling of dead stock and help monitor loss due to theft. In effect, this frees up more time for customer engagement and selling off pieces, (Brown R. G., 1997). There is a serious need to be able to track, catalog access to, and control such objects in a way that is reliable, simple to implement, and virtually tamper-proof (Maloney, 1998). Such a manual system of tracking has numerous shortcomings due in large part to the very real potential of human error and forgetfulness in carrying out the sign-in and sign-out procedures (Maloney, 2001).

The inventory is only as good as the data put into it. Okamura (2004) noted in his paper that real-time inventory management is the process of recording sales and purchases of inventory immediately. It is more preferred than periodic inventory management. Often, jewelers count inventory periodically which causes a delay in recording stock status. Today, buyers expect same-day delivery. Same-day delivery combines the convenience of online shopping with the immediate product access of stationary retail (Hausmann, Herrmann & Krause, 2014). It integrates the convenience of online retail with the immediacy of bricks-and-mortar stores. (Hausmann, Hermann, & Krause, 2014). Upon the client's request, the staff must be able to provide the status and location of specific jewelry.

Technologies like mobile applications can be a great solution to this kind of problem. Mobile applications are running on a small handheld mobile device that is moveable, easy to use, and accessible from anywhere and any place (Islam & Mazumder, 2010). It will enhance the customer experience. Islam (2010) also mentioned that mobile applications run in a mobile environment in which usability depends on several factors such as Screen Resolution, Hardware limitations, Expensive Data Usage, Connectivity

issues, Limited Interaction possibilities. Sales agents can be more responsive to customer requests where they must provide when and where the item is available. The overall inventory system will be more organized if updated regularly. As cited in the study of Lee, (2011) design and development of logistics workflow systems for demand management with RFID. Management can also have accurate profit reporting and a regular update on where the valued jewelry items are without waiting for periodic update of staff. Warehouses and vaults will have less recount if inventory is diligently managed thus saves time.

Many designers work without relying on using grids at all and yet it is spacious and textured. Without consciously doing so, most designers adhere to the basic tenets of good design to enhance the material and make it clear (Beth Tondreau, 2009). Beth Tondreau aims to relate typography and layout to the material. Tondreau's theory about the importance of using grids using her principles of design in using grids will be of help to the UI design for the mobile application. Tondreau also stated that a grid is used to organize space and information for the reader; it maps out a plan for the overall project. a range of regulations using the grid (2009).

The objective of this study is to create a mobile application design application using Tondreau's principles for business' staff to help keep the inventory database up-to-date on the current location of the jewelry. This study will find the most intuitive way of designing a mobile application for updating jewelry location.

#### II. STATEMENT OF THE PROBLEM

A jewelry business store had issues on its current website for the staff. About the jewelry store, the store's job order has either have their existing jewelry or they avail customized ones for their clients. The business's setting is they create jewelry using their jewelry's metal will be inserted with gems. Their repair process avails old pieces of jewelry to be fixed or remodel. The business doesn't have the document thus the manufacturing site was explained. All these had issues on the website's usability and its user interface wherein there is no use or help to their staff to update and track the jewelry status with a location. Although the stores have existing websites through branches, each was too separated and not synced to track pieces of jewelry. Their system wasn't effective enough to support their needs and all were prototypes up until now. Business uses manual Google Drive and traditional ways of tracking inventories which created complications to the overall management. Distance issues were also mentioned by their auditor and staff wherein there is a slow update or no update at all to the jewelry statuses.

Managing jewelry inventory requires an infinite amount of space to store things. Not only in traditional ways of storing jewelry but also applies when designing a mobile application linked to storing data information of the jewelry. Space involves creating grids for the items to be viewed in the application. Size and shape for the item to fit in must always take up at least organized sections for an inventory to have its tidy list. Applying Tondreau's principles of using grids, Tondreau stated that, a grid is used to organize space and information for the reader; it maps out a plan for the overall project, a range of regulations using a grid (2009). Using grids helps make the hierarchy of information sorted.

The problem with several companies today provide jewelry inventory management. The problem is that it is expensive and most small businesses cannot afford that. There are also cloudbased solutions like for example, Businessmind for Jewelers. However, most businesses want a customized solution that fits their current business process and can adapt to their changing business needs. Some businesses require a direct conversion of their existing manual inventory format to inventory management software.

#### • Will the research project creating UI design using Tondreau's principles for mobile apps help the staff organize jewelry inventory?

- 1. What composes the UI design to be convenient for the mobile app and its users?
- 2. How will the jewelry staff be satisfied with the application's user interface design?
- 3. How will Tondreau's principles work for the UI design of the mobile application?

The purpose of this paper is to create a prototype UI design of the jewelry inventory mobile application for the business store staff.

#### **III. OBJECTIVES**

This research project aims to create a mobile application UI design in inventory tracking software, in the year 2019, for jewelry store staff using Tondreau's principles.

1. To be able to make a prototype for the UI design of the mobile application.

2. To evaluate the user interface design and its usability of the application for the system of inventory

3. To apply Tondreau's principles of using grids in the UI design project.

#### IV. SIGNIFICANCE

#### A. To Nation and Community

A mobile application is developed on mobile devices which are now commonly used in app stores being market-driven nowadays. Sawyer, Sommerville, and Kotonya (1999) mentioned that application development is market-driven similar to traditional marketdriven software. The requirements for an app are usually derived from strategic business goals or market opportunities (Natt Och Dag, 2002). Mobile applications are supported by the app stores which face the application market competitively. The app store concept has democratized the software industry—almost anyone can build

and sell apps to a worldwide population of users via app stores (Lim, Bentley, Kanakam, Ishikawa, & Honiden, 2015).

#### B. To Business and Individual

In undertaking the research, I hope to contribute to the business' development especially for the staff. To the problems identified in the business, developing an android application with the design project will contribute as the application's main container. As the problem is an administrative problem with the owners having lost track of their items, this research project would help businesses having a userfriendly mobile application. This project will involve designing a mobile application to view and update the current location of jewelry. A front-end, user interface (UI) designed for easy navigation and control will be provided to update and monitor the movement of jewelry. The mobile application will be able to update its inventory with the central database server of the business. It can be browsed offline to view the current jewelry description, prices, location, and location history. In the business, the jewelry staff do not need to use the branch's computer and can only view the items. But with the use of a mobile application, they can view the location of the jewelry upon clients anywhere they are. Its contribution to multimedia will be the use of grids as its major element applied for the mobile application to have its UI design interface designed with Tondreau's applied principles.

#### V. SCOPES AND LIMITATIONS

This study is under the development of a mobile application design that applies Tondreau's principle by using grids to help organize the application's usability and UI design. This study is limited to designing only the application software in tracking jewelry inventories. The application itself is limited to using Android Studio's user interface part following its APK format. The application was only for inventory tracking software exclusively for the jewelry business. During tests and its function for usability, respondents of the survey will only be locally from Manila, Philippines. The mobile application design will only be available to jewelry staff but not to clients.





#### Aesthetics – Tondreau's Principles of using grids (2009) – Beth Tondreau

The targeting tool for designing the system is using Tondreau's Principles of using grids. For a good system design, the system analysis report should be properly documented (Senn, 1989).

## Technology – Systems and Methods for Interactive Jewelry Design (2017) – Moshe Klein

Moshe Klein claims there are methods and systems for designing a customized jewelry item on-line. Which he also mentioned that some embodiments include generating an interactive design tool. This tool compromises customized settings of sections. User-input data is received, in which the user-input data comprises a selection of a section of the customized setting; and a selection of at least one customizable feature of the selected section (Klein, 2017). This method can help the mobile application create a selection feature that comprises a customized design for the business. This sums up that there should be a graphical representation of the generated. customized setting when The graphical representation of the customized setting is displayed on a display (Klein, 2017).

## Mobile application for jewelry inventory management (2011) – Gandhi, Hoffman, and Parikh

There is a requirement gathering needed for the project and that is to know the inventory system process. Information gathered: Customer Job Order, Setting, and Repair

Service Process by Twin Princess Gems Store. This aims to understand what the jewelry staff wants by analyzing their needs/ the user needs. Interviews need to be carried out to determine what is needed. Then the needs will be carried out to

a solution of creating a mobile app design. Because the jewelry customer may want to inspect multiple jewelry arrangements, a comparison feature is available on the mobile application to allow the jewelry customer to compare one arrangement with another arrangement (Gandhi, Hoffman and Parikh, 2011). Among many other features, the mobile application provides an appraisal functionality as well as order tracking in real-time of the shipment of placed orders for jewelry (Gandhi, Hoffman and Parikh, 2011).

# Communication – User-Centered Design and Development (2008) – Baek, Cagiltay,

# Boling and Frick| Android Studio (2015) – Gerber and Craig

Iterative design is a methodology that positions your digital experience is a living project that you should regularly tweak and improve upon as you go, rather than building it in one fell swoop and being done for good (ENGINESS, 2018). This supports the process of a continuous cycle of prototyping, testing, and creating adjustments to the design. Considering the method of using Android Studio Development which has design and program tools, will contribute greatly to the final output of the project. Mobile software should use the standard user interface and interaction style of the user's native phone wherever possible, although a balance has to be struck between this and providing an attractive and engaging interface (Doherty & Coyle, 2008).

Technically, the graph explains the purpose of creating a mobile application design for an inventory tracking system inclusion to Tondreau's principles of using grids. The inventory management goes around with the tracking system of jewelry then implanting Tondreau's theory of using grids applied to the UI Design that will be widely used for the study with the advantage of the Android Studio Program for jewelry staff. The study associates with applying Tondreau's principles of using grids.

#### Output Context Input Process UI Design using Tondreau's MOBILE User Interface Design (UI) Principles Tondreau's APPLICATION Principles for Design Materials Jewelry Interactive Jewelry System Inventory Mobile App Content Iterative Design Methodology Twin Princess Gems Jewelry Store Inventory

#### VII. CONCEPTUAL FRAMEWORK

Figure 2 Conceptual Flow

The figure shows the aim of this study which is to apply and utilize Tondreau's principles in UI design of the inventory tracking system and develop an Android application as its output for the concept.

The process that will be followed in developing the mobile application design is based on the figure. Principles by Tondreau using grids will be implemented to the design that serves as the main element in the design to focus on together with supporting theory by Samara. The process will be through the use of Adobe Illustrator together with Adobe Photoshop for the mockup and Android Studio for the final output. Iterative Design Methodology and its design process will be also used following its usability rules and approach to the design to match the program's needs for the staff to easily understand how the program works. Translating the program using 'Mobile application for jewelry inventory management' (2011) by Gandhi, Hoffman, and Parikh together with the business' traditional inventory system is included to be able to identify the system of the mobile application program especially to match the UI design. The main output will come up with a design integrated with the Android Studio program for testing to evaluate its interface design in its actual form. Interviews will be used for feedback and evaluation results to identify future problems from the application.

#### A. Methodology

The research is a case study of one case on the business with the staff facing problems managing their jewelry inventory. This study focuses on creating a UI design for the mobile application which the business staff will need to help manage their inventory with its convenient and friendly approach by the design to adapt and to easily understand how the application works. A user interface design using Tondreau's theory as a study for the jewelry mobile app with the concept of using the Android app as its final output.

The research project is a qualitative study since it only involves one case about Tondreau's principles importance of using grids to UI design for a mobile app. Jewelry staff is related to qualitative since they are needed for an interview gathering information for the study to sort out which can be improved or changed on factors contributing to the research itself. As the researcher has developed the research statement, this is a qualitative type of research wherein creating the design in inventory software for staff can be evaluated focusing on the usability and overall appeal of the software. There is a focus on the user interface across a wide range of users and handsets as well as on content created and emotional engagement with the software. (Doherty & Coyle, 2008). Qualitative research has different interpretations from written documents, interviews, or others. Its approach is on the natural side of things, letting things happen without much outside force influencing the events being observed (Creswell, 2007). This type has been used for observation, social studies, and naturalistic results that leave the researcher a space to interpret the data from a different perspective other than what is generally seen by many (Guest, Bounce & Johnson, 2006; Lewis, 2015).

#### B. Design and Development



Figure 3 Production Procedure

#### C. Pre-Production

Here the researcher started to make a sketch and concept first of how the user interface works with the functionality using the Flutter program in Android Studio. Gathered data based on the business prototype website about the issues store staff had for years. The researcher was able to find out the cons of the old website wherein it lacks appeal and interaction to users on updating statuses of the jewelry inventory. This project begins with identifying the problem which is to use Tondreau's design principles on an inventory tracking mobile application applying its relationship to each other. The study requires identifying and focusing on its objectives first before proceeding on the next phase. This is done to clarify the objectives of the organization and summarize the objectives along with a feasibility report which checks the worthiness of the project (Kendall and Kendall, 2001).

There is a requirement gathering needed for the project and that is to know the inventory system process. Information gathered: Customer Job Order, Setting, and Repair

Service Process by Twin Princess Gems Store. This phase aims to understand what the jewelry staff wants by analyzing their needs/ the user needs.

#### D. Production

This step deals with the coding and documenting the software.

Android Studio Program. Considering the method of using Android Studio Development which has design and program

tools, will contribute greatly to the project. This phase thus requires the researcher to include the issues that need to overcome with the program to meet the user's requirements increasing the development of its use/service. Bad quality requirements are another major issue in this stage, not only causing a great increase in development and sustainment costs, but also the destruction of the software (Thayer and Dorfman, 1997). Jewelry staff requires online updating of jewelry's status and location for easy tracking of inventories.



Figure 4 Pre-Production Process

### E. Post Production

In this last part, all files were compiled by the format of Flutter that needs to be installed on mobile. The format can only be run by the Android Studio application installed with Flutter for the dart files to open and android mobile.



Figure 5 Data Files

In testing and maintaining the UI design of the mobile app, collecting results after testing the mobile application is one of the most important parts. It is the process of executing a program and finding as many errors as possible through a series of test steps before they become a defect (Pressman, 2009).

Interviews are carried out to determine what is needed. For this purpose when carrying out interviews the analyst might face issues because the users/customers are not technical people, due to this which they might give some unnecessary technical details, some ambiguous information, or may not give information thinking it is already obvious which will confuse rather than clarifying the system objectives (Schulmeyer and McManus, 1998).

Here the researcher does the implementation and evaluation. Evaluating the software after a series of tests corrects errors. This phase is the process of doing revisions/updates to improve on and implementing upgrades to the project. The process of ensuring that the system is working, successful installation into organizations' hardware, and allowing users to operate and evaluate is called implementation (Kendall and Kendall, 2001).

#### VIII. RESEARCH DESIGN

The researcher employed that it is qualitative research in the gathering of data and techniques. Aside from the existing data, the content will be served for the application regarding the jewelry issues.

The research design of the mobile app itself will serve as a guide in creating UI design for the application aside from the theories. The research project will follow the Iterative Design Process creating a prototype to fully focus on its UI Design for the said business. The study involved the collection of information from owners, agents, and storekeepers with significant experience in jewelry inventory. The information gathered was used to develop the application with a defined program flow and interface. The development process involved a series of test runs. The developed application was distributed so that it could be tested for its user interface in place of a Tondreau design.



Figure 6 Research Design of the Mobile Application will be served as a reference guide creating UI Design on each flow.

#### IX. INSTRUMENTS

#### Interviews

Interviews will be conducted for the researcher to collect information regarding what to improve on. Comments, remarks, and suggestions are raised by four (4) user staff will be taken as for the application development and associated. Participants must have a contribution to help the research focus on its key strategies used to successfully apply Tondreau's principles in design. Questions:

- 1. How the UI design solved past issues from the jewelry website?
- 2. How do users feel when using the prototype design for the app?
- 3. How likely or unlikely would they be to use this UI design once it's finished?

- 4. How did the product match its product's purpose using the design?
- In terms of using the grid design.
- 5. What features in the mobile app design missing?
- What was completely ignored in the process?
- What possible features weren't included in the design?
- What could distract them or get in their way?
- 6. What Tondreau's principle of using grids help organize with the design on the UI?
- Margins
- Headings and Subheadings Placement
- Modules
- Image Placement
- 7. How did the design help to complete tasks easily?
- Compare past issues from the jewelry store website

	Most Negative	Negative	Normal	Positive	Most Positive
Delete	0	0	0	0	0
Clear	0	0	0	0	0
Add	0	0	0	0	0
Are the icons	, text sizes and	colors visible	?		
	Most Negative	Negative	Normal	Positive	Most Positive
Title Area	0	0	0	0	0
Are the appe	arance types a	nd forms of s	ubmenu cons	sistent?	
	Most Negative	Negative	Normal	Positive	Most Positive
View state	0	0	0	0	0
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lsing grids he	lp identify hier	archies maint Negative	aining order f Normal	rom the follo Positive	owing: Most Positive
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Is the menu ea	sy to recogniz	e? visually sin	nple and clea	r?	
	Most Negative	Negative	Normal	Positive	Most Positive
Icon	0	0	0	0	0
Navigation	0	0	0	0	0
Is the indication	n of the items	clear?			
	Most Negative	Negative	Normal	Positive	Most Positive
Soft Key Policies	0	0	0	0	0
When users sel	lect an item, is	s there feedba	ick on select	ion?	
	Most Negative	Negative	Normal	Positive	Most Positive
Input pop-up	0	0	0	0	0
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Inventory List

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Y	bur answer
D	o you think the design matches its purpose?
Y	bur answer
D	oes anything distracts you or gets in the way?
Y	bur answer
v	lere grids used to help organize the design well on the mobile application?
Y	our answer
D	oes the design help to complete tasks easily?
Y	our answer

Figure 7 Usability Checklist

#### X. SAMPLING AND POPULATION

This case study involves Tondreau's principles for UI design and jewelry inventory management wherein these two serve a specific population.

The population will be a group of users, staff from Twin Princess' Gems jewelry store. This jewelry staff is involved since back to the statement of the problem, jewelry business provides jewelry inventory management. Most businesses want a customized solution that fits their current business process and can adapt to their changing business needs that serve as guides/help to jewelry staff tracking the jewelry items.

There will be four (4) main interviewees/ testers of the program from the selected staff of the specified jewelry business. A response distribution is expected to be 80% of the users agreeing the application's usability to be learnable and interactive.

#### A. Results & Findings

The researcher used a qualitative method since it only involves one case on the business, conducted a face to face interview explaining the purpose of creating a mobile application design for an inventory tracking system inclusion to Tondreau's principles of using grids. The researcher surveyed the questions answers the researcher's statement of the problem and objectives of the study. Then the gathering of data was conducted by branches: Greenhills and Mariott meeting the staff for interviews. The research was done by making a schedule/appointment with the client with no time limit as the researcher conducts the usability checklist for evaluation and interview. There was no need to put a pre-survey since the staff already approved conducting a oneday survey per branch. Agreed on that name will be confidential as they answer the usability checklist and conduct an interview with the researcher.

In the survey of the output, with 4 respondents/store staff, it shows that 75%, mostly voted for a "Most Positive" impression and evaluation from the checklist regarding the UI design created for such users. And 25% shows that they are "Positive" on the evaluation. After sharing the video of the design tested and well explained, the researcher also made a live test that allows the users also to test it afterward. The majority wanted the application to be used with its main functions and satisfied with the UI design with its elements used from Tondreau's Principles. The grid's purpose was well explained which made them have the comment on its positive effects on the whole design.

#### B. Analysis

In analyzing the data collected from the research, the researcher assumes that all testers/users will get a better improvement from the application compared to their unused website. Tondreau also stated that a grid is used to organize space and information for the reader; it maps out a plan for the overall project. a range of regulations using the grid (2009). The user interface (UI) design of the new mobile application for tracking jewelry inventory is assumed to improve the business store staff's progress in updating locations, statuses, and prices of the jewelry. Assuming that the design project will help the users with Tondreau's principles of using grids in organizing tasks and design form. Beth Tondreau aims to relate typography and layout to the material. Tondreau's theory about the importance of using grids using her principles of design in using grids will be of help to the UI design for the mobile application.

#### XI. DISCUSSION

#### CONCLUSION AND RECOMMENDATION

This research focuses on creating a mobile application design application using Tondreau's principles for business' staff to help keep the inventory database up-to-date on the current location of the jewelry. This study focuses on creating a UI design for the mobile application which the business staff will need to help manage their inventory with its convenient and friendly approach by the design to adapt and to easily understand how the application works.

There are three theories followed:

#### Tondreau's Principles of Using Grids,

Mobile Application for Jewelry (by Hoffman and Parikh) to comply with the needs of the users/clients using jewelry inventory as its backbone of the mobile application, and User-Centered Design and Development (by Baek, Cagiltay, Boiling and Frick) how the program develops its user interface and how it supports the process of testing and creating adjustments to the design. In the Methodology, Chapter4 explains the study is a one case study of a jewelry store with the staff facing problems managing their jewelry inventory. The research project is a qualitative study since it only involves one case about Tondreau's principles importance of using grids to UI design for a mobile app aside from its other functions and supported by design elements.

Tondreau's Principles of using Grids (2009) helps the researcher used as a target tool for designing the system, then followed by Hoffman and Parikh's (2011) requirements to avail features on the mobile application to attain its UI design with its basic functionality as well as order tracking in real-time of the place statuses and location of the jewelry. Iterative Design Theory believes that your digital experience is a living project that you should regularly tweak and improve upon as you go, rather than building it in one fell swoop and being done for good (ENGINESS, 2018). This helped support the process of prototyping, testing, and creating adjustments to the design. Using Android Studio Program, with its latest version on android compatible with versions and APK, become beneficial for users to test the application's UI design. Mobile software should use the standard user interface and interaction style of the user's native phone wherever possible, although a balance has to be struck between this and providing an attractive and engaging interface (Doherty & Coyle, 2008).

In conclusion, the three theories help the researcher by providing guides and connect the relationship between what is needed for the objectives. Combining Iterative Design with Hoffman and Parikh's Theory, Tondreau's grids had shown positive results to the respondents and testers that its use in applying the content, margins, amount of imagery, the desired number of pages, screens, and panels all factor into deciding how to set up a grid (Tondreau, 2009). The application gave the users easy tasks in tracking jewelry on their inventory after following Tondreau's guidelines. Tondreau (2009) also mentioned that, above all, the content determines the structure of the grid. The grid you use depends on each specific design problem.

Research findings found out the three theories helped the mobile applications' user interface to improve, enhanced its structure better than the website, respondents showed a positive reaction, and were satisfied by its usability. Although there had limitations on its main functionality since the study had only provided its UI design with its basic functionality at least, four (4) respondents which are the main sales staff and courier of the business, found the application beneficial enough for them to make their task easier. Further study should also include other latest programming language in Android Studio Program since Flutter and its other file format needed for an Android phone to work changes and upgrades from time to time. The researcher recommends more studies on Tondreau's Principles of Grids since not all grids can be applicable for some mobile applications depending on their purpose. Other

recommendations are always to provide more study and research about the content to match its information to the design aside from it.

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