

# THE DEVELOPMENT OF APP SHEETS FOR DATABASE DESIGN TO APPLY TRANSPORT PLANNING APPLICATION

**Tanawat Wisedsin \*, Tanasarn Panichayakorn \*\*, Piyamas Klakhaeng, Phitphisut Thitart & Pornkiat Phakdeewongthep**

*\*, \*\* Suan Sunandha Rajabhat University, 1-U-Thong Nok, Dusit, Bangkok, Thailand,*

*E-Mail: [\\*.Tanawat.wi@ssru.ac.th](mailto:*.Tanawat.wi@ssru.ac.th), [\\*\\*Tanasarn.pa@ssru.ac.th](mailto:**Tanasarn.pa@ssru.ac.th), [Piyamas.kl@ssru.ac.th](mailto:Piyamas.kl@ssru.ac.th), [Phitphisut.th@ssru.ac.th](mailto:Phitphisut.th@ssru.ac.th), [Pornkiat.ph@ssru.ac.th](mailto:Pornkiat.ph@ssru.ac.th)*

## ABSTRACT

Abstract—This study aims to reduce the time of operation planning of transport businesses. Main activity 1) Coordinating Employers 2) Assign Truck Drivers 3) Readiness Trucks and 4) Operation Planning. They are working update changing, canceling, and Increasing before in a few hours or 1 – 2 Days to confirm. The maintenance department inspects the engine and light systems of the truck and reports. Planners are reading the report matching 3 - 4 destinations and truck drivers. All of the operations using time about 4 – 6 hours per day. The researchers and planning department staff set a time interval to confirm the employer's transportation work by 2:00 p.m. and create a web application for operation planning by database design using App Sheets is a web application for creating with low code and no code applications. Create 4 categories: 1) Recording of Companies and Partner Vehicles 2) Recording of Transport Employment 3) Operation planning 4) Cost Calculation. that refers to the coordinates of Google Maps and the company can add different expenses as needed. Result overall of the operation reduces time by about 1 – 2 hours per day (33.33 %) and the remaining 2 – 4 hours per day.

Keywords— Transportation, Operation Planning, Web Application, Database, App Sheets

## INTRODUCTION

From studying the problems of small and medium-sized transport companies in Thailand compared with the work of large transport companies with more jobs and trucks. Large companies can operate faster than small and medium companies because large companies use efficient and expensive transportation management (TMS) programs that use artificial intelligence (AI) to assist in planning. Complex transport routes make it possible for large companies to perform better than small and medium companies. However, the work of small and medium-sized transport companies The surveyed work was divided into 4 parts: 1) coordinating employers, 2) assigning truck drivers, 3) truck availability, and 4) planning operations. Each part must be coordinated based on the employer and use Excel software for all records and planning. And in higher income transportation companies, there is a GPS vehicle tracking system that only reports where the vehicle is. And there is no ability to plan routes or load jobs at all. The work in these 4 parts will require a minimum of 4-6 hours of planning work. This is the time that transportation planners waste every day.

However, the work of small and medium transport companies has no rules for accepting jobs from employers. because it must be weak to the employer in order to get a job in the long run Causing the work of the team of the transportation company to adjust the plan greatly From finding a truck driver in the employer's transportation area Verifying the position of the customer at the transportation destination, which, if any, will cause the backhaul transportation to increase the revenue of the company. In all, the plan must be revised every time the employer makes a job change. which must take an average of more than 2 hours to adjust the plan. From the above work problems, the researcher knows well that the work must support the work of employers who change plans at all times. As a result, working in the small and medium transport planning department has to change the work plan. The work plan adjustment of the company relies on the Excel operating system used to record all tasks and separate them into available data files. Scattered in different parts of the computer. There is no standard data type management, and in some companies transportation planning officers are unable to make hyperlinks, resulting in

data linking. Take the delay to the next level Transport planners must open a large number of data files in planning. However, in some companies using a Transportation Management System (TMS) that is cheap or does not have a route planner mode option.

The researcher therefore saw that all 3 parts must be improved: 1) Issuing rules for working with employers 2) Designing databases 3) Creating applications that are easy to use. The researcher started with the design of the regulations with the appropriate flexible employer company by determining the time to change the work plan, which is not difficult and creates a good standard of work for both sides. As a result, the work of the transport company is going smoothly and more structured. Only part 2, database design, and 3, application creation are left. The researcher therefore used the digital management course for logistics work for online businesses to apply App Sheets that are websites to develop applications in connection with the work through the base system. Google's Google Sheets data with a simple application design by developers, there will be little programming, Low Code and No Code, from studying the development of App Sheets in conjunction with various functions that can be viewed. Research the review as follows.

## LITERATURE REVIEWS

### 1. Research on Technology Affects the Supply Chain of Transportation Business

Tanasarn Panichayakorn & Kittisak Jersittiparsert (2019) have organized a work on Mobilizing Organizational Performance through Robotic and Artificial Intelligence Awareness in Mediating Role of Supply Chain Agility, discussing artificial intelligence technology and Thai tourism. Through the work of artificial intelligence and robotics will have a significant impact on the supply chain. Due to the ability to recognize artificial intelligence as a medium to link information cause continuous technology development with work.

In which the usage will have to design a database by analyzing from the actual work site and asking for information that is necessary to create an information database. However, the complex work requires multiple databases, which are necessary to find the data correlation point, which is consistent with the research of Adel M. Abdallah (2019) as a research on water management by analyzing and creating a database. related to management resulting in more efficient water management. However, from the research topics that have to be used to solve transport planning problems with large amounts of data, it is therefore clearly consistent that the design of the database is what helps the work. Help reduce and cut the work of unnecessary parts, resulting in faster work.

The research of Andrey Borodin et al. (2020) examined the use of Truck Transport Management System (TMS) in the management of company trucks and partner trucks based on collaborative work plans. The database must be improved in order to be used for analysis. Compare the volume of trucks. and employer information By adjusting the plan to receive the use of transportation services, resulting in better transportation results with partners.

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In accordance with Vladimír Klapita (2021), transport companies can simplify and speed up all processes within the transport chain by using EDI and appropriate interfaces for programming applications. Inside the expensive Transport Management System (TMS), there will be algorithms to work like in the next research group.

## 2. Algorithm Research for Transportation

This group of research studies the transportation planning process that uses algorithms to help analyze transportation planning, that the researcher will apply and provide knowledge to transportation planners to develop and exchange knowledge in education and actual practice.

By bringing the research of Xiao Yin et al. (2017) to do the case of refrigerated cargo that needs to be transported as quickly as possible. Based on the penalty when delivering products beyond the specified time limit by using the CC-Ant Algorithm together with the customer's location database and other parts to be processed. Make delivery on time and reduce the cost from being fined. And the research of Artūras Petraška et al. (2017) presents a technique for routing by transport. Heavy and oversized items

But since this research is not focused on creating applications capable of advanced transportation planning analysis. Therefore only doing in part of database management to create stability in working with real work and transfer knowledge from Algorithm research to transportation planning officers in order to develop techniques for managing the basics for transportation planning officers. which, when the officers received this part, made the officers aware of the techniques for better planning of transportation However, when creating a simple application, the researcher can search for related research as in the next section.

## 3. Application Building with App Sheets

In this section, research has been studied with the application of AppSheets to create a simple application. The research guidelines will be adapted to be used in the application of creating applications for transportation planning In this regard, there are related researches as follows.

Damrongrit Chantra (2021) has research on the application of the AppSheets program to develop an application for teaching sports referee symbols. As a result, the score of learning symbols increased from 75% to 85.45%, showing that the use of AppSheets in conjunction with knowledge can clearly increase the ability to understand more functions. This is consistent with the work that symbols will promote memory and in practice, route planning requires a lot of information. Using symbols instead of some information will help speed up the work.

Sansawat Ngamsong (2021) has conducted a research on Create a non-programming mobile application for field surveys for local government tax management tasks with AppSheets, which can create a simple application without programming. can help increase the efficiency of data recording Positioning, capturing, and displaying data resulting in average satisfaction at  $\bar{x} = 4.22$

Nopparat Prathumnok (2022) has research on the development of an application to check participation in activities. By applying the application of AppSheets from the database with Google Sheets and checking the results from the application performance evaluation results, the level of satisfaction is very high  $\bar{x} = 4.22$ , S.D. = 0.72, resulting in the work of the team being able to check Examine the job correctly, the worker understands, and it is convenient, resulting in satisfaction for the user.

From both studies, it can be seen that building applications with App Sheets can create applications that require no coding or very little coding. When searching for App Sheets data, there will be a Google Sheets database in conjunction with Google Drive, making it easy to write and update work data. There are also example researches that can connect Google's work with App Sheets in various areas, such as the research of Maneerat Paranan and Jeerapa Petwatthananon (2021) on A Study of IoT with ICT Implementation in Bang Nam Phung Floating Market. 4.0 has brought App Sheets together with a variety of applications in the sales network that integrate the work of various technologies such as IoT , Google Sheets , Google Site , Google API , Line , Shopee , Website and Facebook Fanpage together.

From the study of research on the application of App Sheets for transportation planning, there is no research in Thailand that has written this application, so this is a good opportunity to test the capabilities of App Sheets and be another An opportunity to apply knowledge gained from academic experience to practical work and transfer it into an application that helps plan transportation for small and medium sized businesses. The order of work for the research steps is as follows.

## METHODS

From the study of 3 research groups 1) Technology that affects the supply chain of transportation business 2) Algorithm work for transportation work and 3) Creating applications with App Sheets allows researchers to create operational guidelines. Research is as follows.

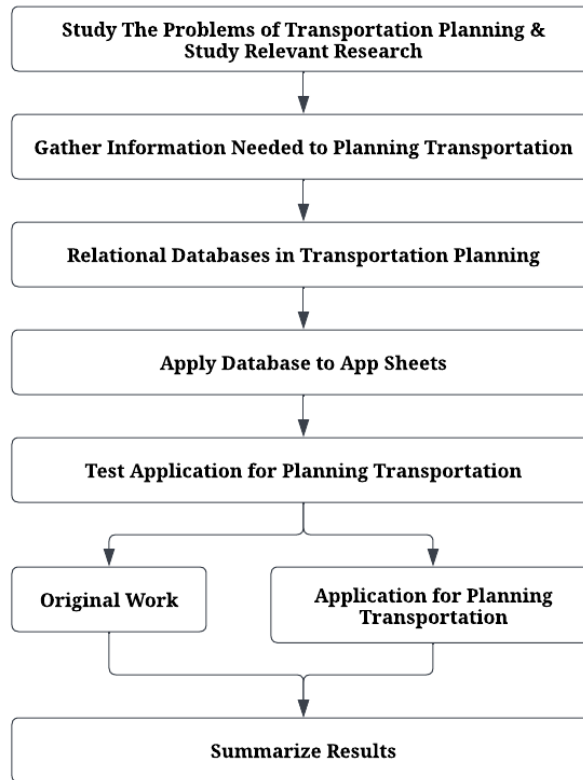


Figure 1: Application Development by App Sheets for Planning Transportation

- 1) Study transportation planning problems and related researches that support structured work styles to support work that requires high flexibility. And strengthen planning skills, such as in the category of algorithmic research
- 2) Gather information needed to plan transportation. At this stage, the researcher must conduct a field survey and work with a transportation planner. To know the database needed to work in transportation planning.
- 3) In this section, we create a database with a network of relationships. that connects to make planning work as a network system that can support changes in work and adjust it in Google Sheets format.
- 4) Apply a database in the form of Google Sheets to combine with App Sheets to create an application for transportation planning.
- 5) Test the operation of the application for transport planning tasks compared to normal operation by comparing the working time mainly.
- 6) Summary of test results of the transportation planning application.

## RESULTS

### 1. Database Design for Transportation Planning

From research studies, fieldwork and collaboration with transport planning departments in small and medium transport companies give us information that is required in transport planning. Which can be divided into 6 categories as follows

**Table 1 An Essential Database Used in Planning Transportation.**

Truck	Employer Information	Order Detail
<ol style="list-style-type: none"> <li>1. Vehicle Number</li> <li>2. Truck photos</li> <li>3. Truck type</li> <li>4. Carrying weight</li> <li>5. Size of the area</li> <li>6. Depreciation</li> </ol>	<ol style="list-style-type: none"> <li>1. Employer Code</li> <li>2. Name of the employer</li> <li>3. Contact number</li> <li>4. Source name</li> <li>5. Phone number - origin</li> <li>6. Province - Origin</li> <li>7. District - Origin</li> <li>8. Coordinates – Origin</li> <li>9. Destination Name</li> <li>10. Phone number - destination</li> <li>11. Province - destination</li> <li>12. District - destination</li> <li>13. Coordinates – Destination</li> <li>14. Work code</li> <li>15. Distance from Google Map</li> </ol>	<ol style="list-style-type: none"> <li>1. Rank</li> <li>2. Date/Time</li> <li>3. Work order code</li> <li>4. Work code</li> <li>5. Job Title</li> <li>6. Employer's name</li> <li>7. Telephone number - origin</li> <li>8. Province - Origin</li> <li>9. District - Origin</li> <li>10. Coordinates – Origin</li> <li>11. Destination Name</li> <li>12. Phone number - destination</li> <li>13. Province - destination</li> <li>14. District - destination</li> <li>15. Coordinates – Destination</li> <li>16. Type of goods transported</li> <li>17. Work code</li> <li>18. Distance from Google Map</li> <li>19. Displacement distance</li> <li>20. Distance Allowance</li> <li>21. Displacement distance + Distance Allowance</li> <li>22. Distance from Google Map</li> <li>23. Truck weight</li> <li>24. Depreciation</li> <li>25. Fuel Consumption Rate</li> </ol>
<p style="text-align: center;">Origin / Start</p> <ol style="list-style-type: none"> <li>1. Rank</li> <li>2. Source code</li> <li>3. Work code</li> <li>4. Employer's name</li> <li>5. Phone number - origin</li> <li>6. Province - Origin</li> <li>7. District - Origin</li> <li>8. Coordinates – Origin</li> </ol>	<ol style="list-style-type: none"> <li>10. Phone number - destination</li> <li>11. Province - destination</li> <li>12. District - destination</li> <li>13. Coordinates – Destination</li> <li>14. Work code</li> <li>15. Distance from Google Map</li> </ol>	<ol style="list-style-type: none"> <li>11. Destination Name</li> <li>12. Phone number - destination</li> <li>13. Province - destination</li> <li>14. District - destination</li> <li>15. Coordinates – Destination</li> <li>16. Type of goods transported</li> <li>17. Work code</li> <li>18. Distance from Google Map</li> <li>19. Displacement distance</li> <li>20. Distance Allowance</li> <li>21. Displacement distance + Distance Allowance</li> <li>22. Distance from Google Map</li> <li>23. Truck weight</li> <li>24. Depreciation</li> <li>25. Fuel Consumption Rate</li> </ol>
<p style="text-align: center;">Destination / Stop</p> <ol style="list-style-type: none"> <li>1. Rank</li> <li>2. Source code</li> <li>3. Work code</li> <li>4. Employer's name</li> <li>5. Phone number - destination</li> <li>6. Province - destination</li> <li>7. District - destination</li> <li>8. Coordinates – Destination</li> </ol>	<p style="text-align: center;">Delivery Order / Open DO</p> <ol style="list-style-type: none"> <li>1. Rank</li> <li>2. Date/Time</li> <li>3. Order number</li> <li>4. Transportation costs</li> <li>5. Transportation income</li> <li>6. Transportation profit by route</li> <li>7. Operation Status                             <ul style="list-style-type: none"> <li>• Planning</li> <li>• Done</li> </ul> </li> <li>8. Payment Status</li> <li>9. Change</li> </ol>	<ol style="list-style-type: none"> <li>26. Current fuel price</li> <li>27. Rafting fee</li> <li>28. Other expenses</li> <li>29. Amount of fuel used for traveling</li> <li>30. Total cost of expenses (THB /Ton)</li> <li>31. The employer proposes the transportation cost (THN/Ton).</li> <li>32. 32. Income</li> </ol>

**Calculation**

## 2. Apply Database to App Sheets

From the study of the database design, the researcher brought a set of databases forwarded in the App Sheets program and customized the application to have a linked database as designed, as well as increase cost and revenue calculations. occurring on the transport route Including adjusting the route and status of planning as shown in Figure 2

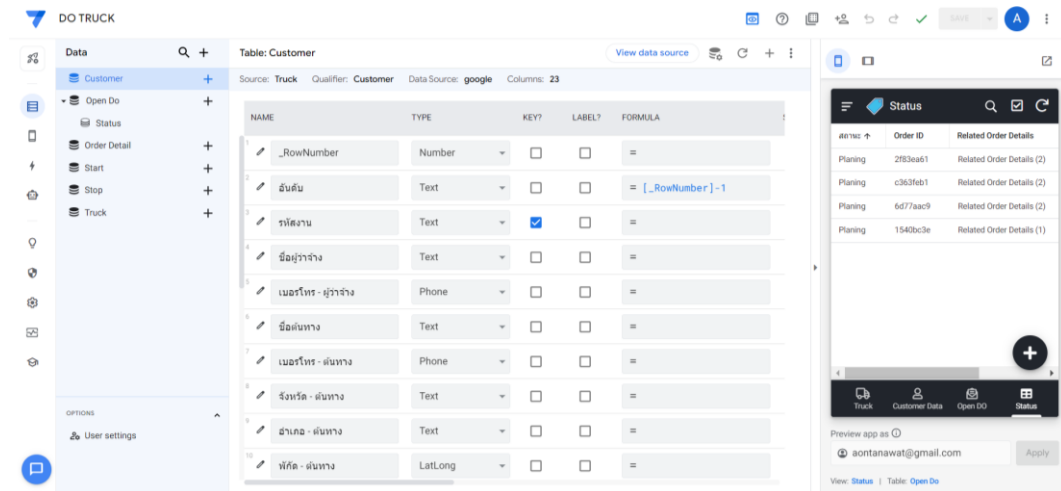


Figure 2: Forwarding Database into App Sheets

However, after linking the database, the user interface has been adjusted and designed to be more convenient and easy to understand with the transport planner's practice. Figure 3

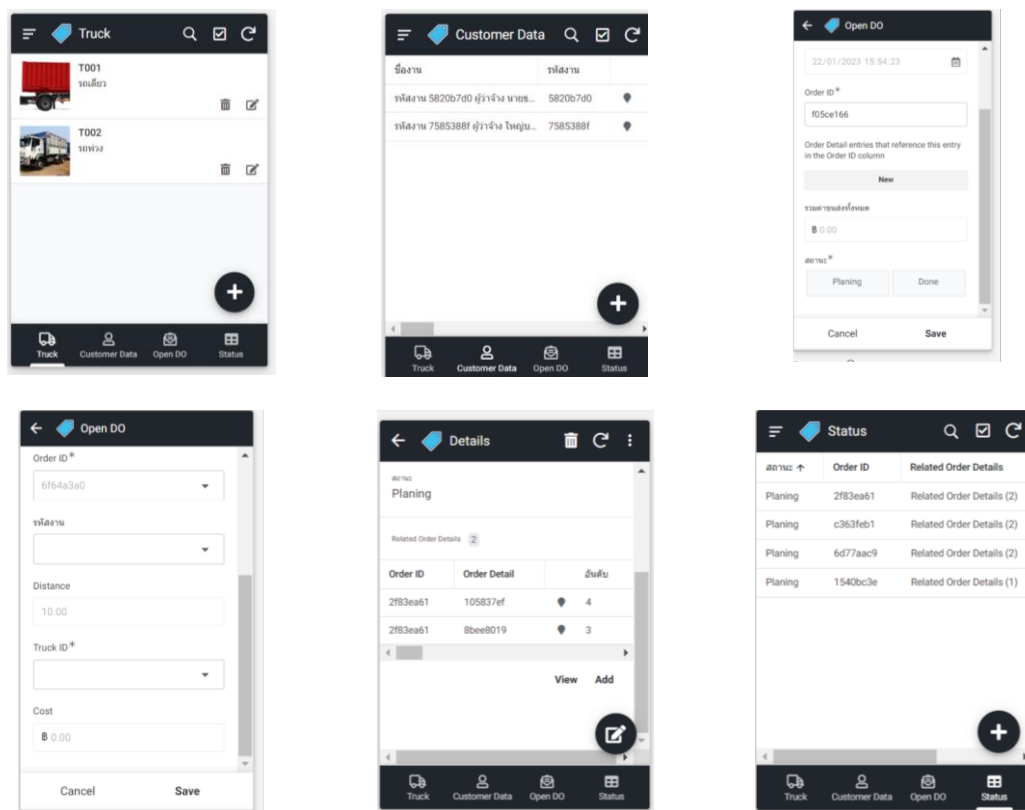


Figure 3: User Interface by App Sheets for Planning Transportation

## CONCLUSION AND FUTURE WORK

The operation of the transport planning application in conjunction with the rules for working with the employer resulted in the following performance: 1) Because the application has the ability to support flexibility according to the rules and regulations placed with the employer. In case the employer wants to change the date and time, the transportation must be done on time, and plans can be modified. In the event that the work time expires in the planning process, but the employer wants to change, the penalty in the event of an emergency plan change is only part of the work value. Resulting in the work of the employer and the transportation planning team of the company is more organized. 2) Training to bring knowledge from research to exchange ideas with transportation planners. It causes collaboration between academics and real practitioners before applying research that helps promote transportation planning to be appropriate and faster. 3) The application has the ability to support a variety of functions, such as choosing a truck used to transport. Transportation Data Logging Investigating the history of areas that have been transported both origin and destination Encourages work in backhaul planning, allowing the company to generate more income for round trips without empty vehicles. As a result, the tested transportation planning team can reduce the workload in transportation planning by an average of 1-2 hours per day, compared to 4-6 hours of walking work, reducing the workload by 25.00 % – 33.33%

In the next development, it will add on the part of the system where the employer can choose the service from the transport company, reserve the time, choose the transport vehicle and join the transport plan to receive a discount that can be reserved by yourself without having to go through the work of the staff

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