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Mobile application with business intelligence to optimize the control process of tourist agencies

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ABSTRACT

Currently, tourism companies do not have a strict control of clients, drivers, buses, guides and tickets; Drivers are known to drive at excessive speed and put their lives and the lives of their customers at risk, this occurs because drivers want to gain more passengers or race with a car from the same company. For this reason, the research work aims to optimize the travel control process for tourism companies by applying business intelligence. The kimball methodology was used, which allows making a dimensional model with dimensions and a central table of the process or event that occurs in real time, tourism companies would be benefiting since in decision-making in the field of travel control, they would have the most relevant data. In addition, users are also beneficiaries, clients who minimize risks when acquiring the tourism service, this would increase more profits for the tourism company and increase its clientele.

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1. INTRODUCTION

Nowadays, tourism is one of the fastest growing businesses all over the world and contributes a good boost to the economy [1]. In recent years information technology in tourism has been of much importance, because it has brought many advantages to all the companies in charge in tourism. Tourism agencies are focused on business through digital marketing. Since the internet is the pillar for digital business, especially for tourism agencies. Where they produce the highest income through social networks, making publications of the routes of visit with their respective discounts. Likewise, the importance of technologies for companies that are responsible for tourism are mainly internet connections, customer service, the different activities included in the tourism package, in order to meet the needs of the user. On the other hand, the Internet world allows to provide tourist offers with their respective departure date [2].

In recent years, tourists choose good quality and service from diversified tourist agencies, which are also in obligation to cause the other agencies with low level of service quality in all tourist areas. To improve the quality of services required, technology is essential, as it allows agencies, businesses and industries to raise the economy and also revalue the tourist areas. Nowadays, all travel lovers turn to the Internet, since it is the main source to choose desired places to visit. That is why they have started to plan a trip in a timely manner by using social networks with all the corresponding information [3].

Lately travelers have had to choose trips that have good service and versatile products which inevitably causes some of the competition from other travel agencies to provide low quality of service and without any control and security [4]. This is why tour companies do not have a strict control of customers,

drivers, buses, guides and tickets; drivers are known to drive at excessive speed and put their lives and those of their customers at risk, this happens because drivers want to gain more passengers or compete with a car of the same company. In Peru, tourism agencies have many resources, but there is a lack of good management to improve the economy. Therefore, it is necessary to promote a better distribution of income, mainly in the tourism agencies [5]. The administrative support related to business intelligence (BI) is essential to analyze and thus provide detailed information, in order to optimize and maximize the world of tourism. generating greater productivity and income that is required. It also helps to gain a better understanding of the processes that need to be implemented [6].

BI is very important, to be able to analyze the data and obtain important data to be able to store in the database, to be able to make good decision making in all companies [7]. In addition, the collected data is very important for tourism agencies. Since they will be able to integrate all the data and information obtained, for good business management and thus improve the quality of services to meet the needs of the user [8]. The main objective of the work is to implement an application with BI to optimize the control process of tourism agencies.

This paper is structured as shown in; section 2 explains the review of the research literature. Section 3 explains a brief description of the methodology, section 4 provides a detailed explanation of the case study. Also, section 5 places the results and discussions obtained through the simulation, and finally in Section 6 ira the conclusions.

2. LITERATURE REVIEW

At this point, a bibliographic review of the works of different authors related to the application of business intelligence in the field of tourism is made. In order to further innovate business intelligence in all areas of tourism and hospitality.

Delgado *et al*. [9] and Somya *et al*. [10], indicate that BI is the whole set of all the technological tools, to analyze and store important data, to all the companies especially to the tourist agencies for a good decision making. And thus raise the level of economic income. According to the author mentions that BI is a set of processes, knowledge, applications and technologies designed to effectively and efficiently support management activities in a company, including supporting analysis, planning and decision-making activities of the organization at all levels and in all business areas, ie sales, purchasing, marketing, financial management, control, ownership, human resource management, manufacturing and others.

Simoncicova and Tanuska [11] and Cabrera [12], define that the Kimball methodology is used for data warehousing (DW), since it focuses on collecting analyzed data for a company or organization. It provides help for good decision making. Kimball is recognized as the author of the creation of the DW dimensional model. He is also responsible for backing up the transactions of the analyzed data for good data management. It was also Kimball who determined that a DW was nothing more than: "the union of all the Datamarts of an entity". He therefore advocates a bottom-up approach to designing a data warehouse.

Tinoco [13] and Gil *et al*. [14], point out that the Peruvian state, promotes the development of tourism agencies, including all the packages to the need of the user. Since it includes natural resources, flora and fauna, folkloric dances, gastronomy, culture and pre-Inca stories. To meet the needs of tourists. Also, tourist agencies are very important to generate economic income, and also to revalue the customs and resources in all countries.

Herrera *et al*. [15], emphasize that tourism is becoming more and more potential, thus database approach to analyze, collect and visualize all data. Also, there is a need to develop various ways to improve the use and interpretation of comics and comics analytics as a set of methods and technologies. In addition, BD Analytics promises to enhance various digital technologies in the tourism sectors.

On the other hand, Mariani *et al*. [16], describe a way to integrate business intelligence, in order to analyze and manage the data obtained from tourists. The authors emphasize that the data obtained from the information are essential to guide a good management to all tourists, with validated information, for a good quality of service and visitor satisfaction.

Vajirakachorn and Chongwatpol [17], synthesize the study of tourists, include lodging and natural resources for a good tourist adventure. They include technological tools that help all tourist agencies, for good management and productivity, with a good quality of service, to meet the needs of tourists. They also offer telephone calls, travel advertising and others.

In conclusion, we reviewed all the works of the different authors, this will help to contribute more to the research work, in order to implement business intelligence in the tourism sector. Since it is fundamental for society to revalue tourism its fauna, flora and agriculture. and with the mobile application we seek to optimize the control process of tourist agencies.

3. METHOD

Kimball's methodology focuses exclusively on individual business processes as the basis for designing databases for analytical reports, as shown in Figure 1. This is part of its strength, but also a weakness, because it does not consider the relationship between these processes. This is one of its strengths, but also one of its weaknesses, because it does not take into account the interconnection of these processes. The interrelationship of processes and related information is important, for example, in healthcare fields, where cause and effect need to be investigated [18]. The main focus of the methodology is star database design, called fact table surrounded by unit dimension tables [19].

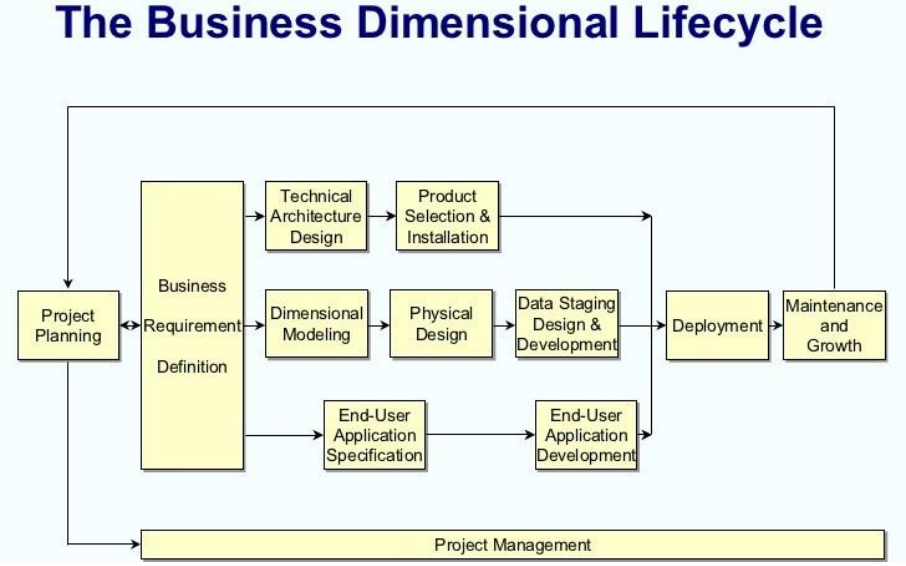

Figure 1. Kimball methodology

3.1. Project planning

The life cycle begins with planning the project. This focuses on the definition and scope of the DW, including the evaluation and justification of business processes. These are critical tasks, due to the high visibility and costs associated with most projects of this type [20]. Therefore, project planning focuses on the organization's resources and staff skill requirements, associated with the assignment, duration and monitoring of tasks. The integrated output of the project plan identifies all the tasks associated with the dimensional life cycle of the Business and the parties involved. This serves as the first step in managing a DW project [21].

3.2. Definition of business requirements

For DW to be successful, you must understand your business and end-user requirements. The techniques used to obtain the analytical requirements differ significantly from those traditionally used [22]. DW designers must understand the key factors that guide the business to determine the requirements effectively and therefore translate them into design proposals [23].

3.3. Dimensional modeling

Dimensional modeling is a way of bringing data closer to how it become useful information for companies. The ultimate goal is that they can intuitively and quickly find the information they need [24]. The dimensional model is conformed in fact table and the dimensions that surround in it, so that there is a good record of information in the database, and also improve different types of modeling data.

3.4. Design

In the design part, it is the phase in which the end user is represented all the data that are analyzed and accessible from the business user's computer [25]. A number of additional factors ensure the proper functioning of all these components, including training, technical support, communication and feedback strategies. Also, according to the definition of end-user applications, the development of end-user applications involves configuring metadata and generating certain reports.

4. CASE STUDY

4.1. Project planning

The project carried out is a mobile application, this application be of great help for tourist agencies since at the time of implementation. Customers be able to see the guide's data, they will also see the driver and bus data; additionally, the purchased ticket also be seen with the price, time, date andplace of visit. This includes everything from defining the goal, scope, tasks, and resources to setting the budget and schedule.

4.2. Definition of business requirements

Business requirements are first defined in the project and written in documents or in a project charter. They include all the elements and capacities for the product, in order to satisfy the needs of the users. All the requirements are according to the objective of each job:

- The application should show the data of the bus, driverand guide.
- It allows the customer to see the ticket with its price, timeand date.
- It allows you to see data about the tourist places that theclient will visit.

4.3. Dimensional model

With the previous dimensional diagram, the objectives set for this project were achieved, as can be seen in Figure 2. A star- type dimensional model is shown that consists of a single table of facts connected to the dimensions by a primary key for our data warehouse. Therefore, it allows a good performance of all the tests carried out.

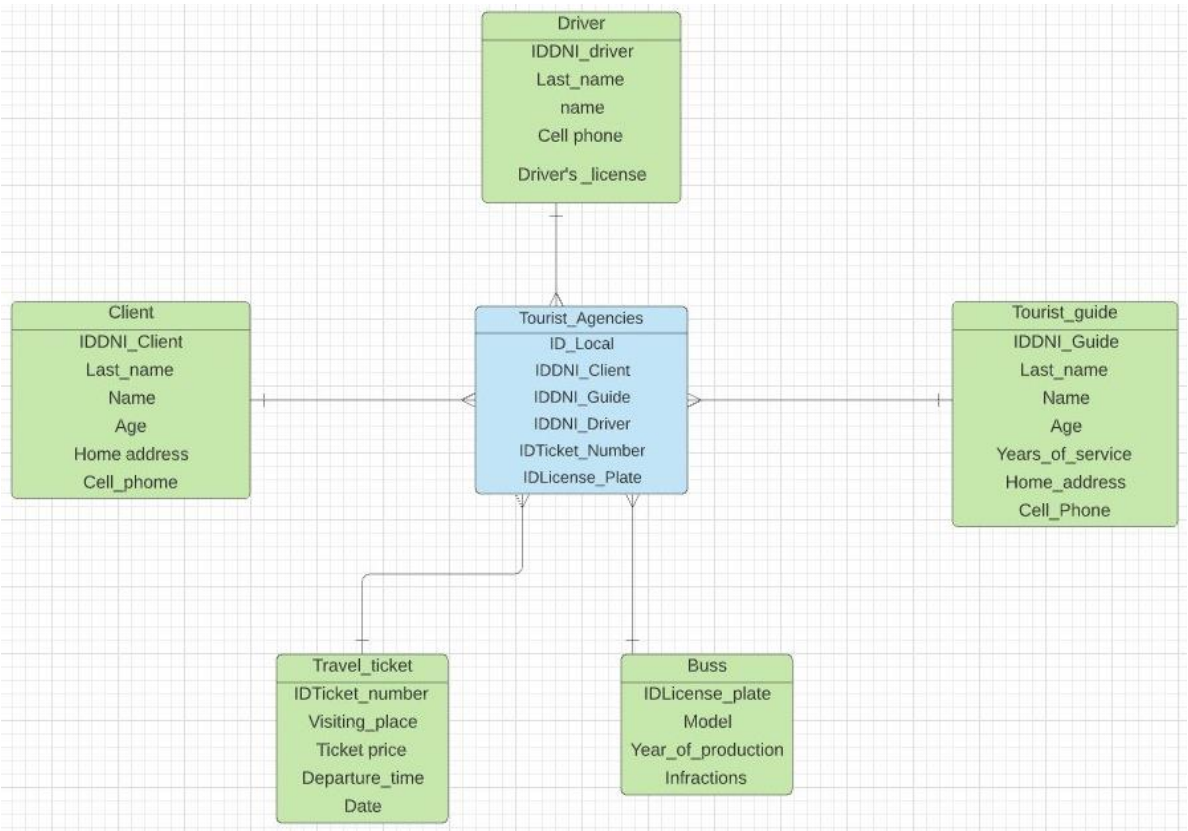

Figure 2. Driver data

- Table of facts: The central table of our dimensional diagram is the one that give us the necessary information for the application.
- Dimensions: Table 1 all the dimensions with their respective data were mentioned, this help to have an order and know What dimensions there be in the star model.

Table 1. Dimensions

Dimension	Description
dim.Client	In this dimension are all the data
dim.Buss	Dimension in which we find information about the buses
dim. Travel ticket	This dimension stores the information about the tickets that customers have purchased
dim.Tourist Guide	This dimension is the one that has all the information about the guide who plows the route
dim.Driver	In this dimension are all the data referring to the driver

4.4. Design

Firstly, Figure 3 shows the customer record shows all the updated customer data such as ID card, first name, last name, age, address and cell phone number. Where the company will have greater control over the passengers traveling. Figure 4 shows the prototype design of the tourist agency for travel ticket and tour guide, as they are very important for a tourist. In the application a prototype was designed for the trip tickets and for the tour guide of the trip. As shown in Figure 4(a) it shows the ticket data, all the updated ticket data, such as ticket number, tour location, price, departure time and date. And also Figure 4(b) shows all the guide data, the updated guide data, such as ID card, first name, last name, age, time of service, address and cell phone number. This helps the passenger to have a better control of the service he/she has purchased, such as the price of the ticket, the time he/she has chosen and the place he/she is going to visit. At the same time, they show the guide's information so that the customer feels more secure when traveling.

Figure 3. Client data

(a) (b)

Figure 4. Mobile application: (a) travel ticket and (b) tourist guide

Figure 5 shows the prototype design of the mobile application for the tourist agency for buses and drivers. For the mobile application, a prototype was designed for bus data and driver data. As visualized in Figure 5(a), it shows all the updated bus data, such as license plate, model, year of manufacture and violations. And it also shows all the bus driver's data, such as ID card, driver's name, license, address, age and cell phone number. Figure 5(b) shows the bus data, this helps the tour agency's customers to travel with more peace of mind and the driver's data is shown, this helps the passengers to travel with peace of mind and the company to provide better service.

(a) (b)

Figure 5. Mobile application: (a) buss data and (b) driver data

5. RESULT AND DISCUSSIONS

5.1. Case study

According to Figure 6 and Table 2, the results of the use of business intelligence tools at work are shown. Also, if this way would become simpler and more efficient. 41.2% of those surveyed answered that they agree and only 5.7% that they do not agree.

Table 2. He believes that, with the implementation of business intelligence tools, his work would become easier and more efficient?

	Frequency	Percentage	Cumulative percentage
In disagreement	1	5.7	5.7
Neither agree nor disagree	2	11.8	17.5
Agree	7	41.2	58.7
Totally agree	7	41.2	100
Total	17	100	

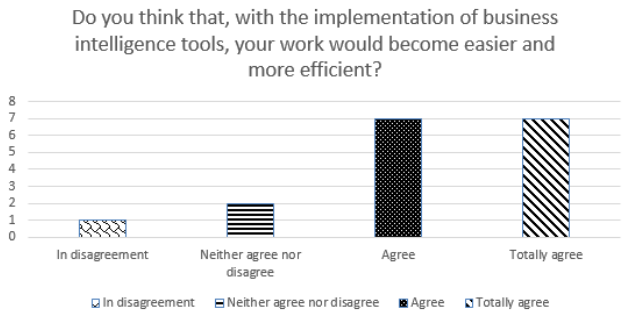

Figure 6. Implementation of business intelligence tools

According to Figure 7 and Table 3, the results of the applications that provide enough information are shown so that you can carry out your work without problems. In this way, information can be obtained in the most objective way possible. 47.1% of the people surveyed answered that they agree and only 11.8% answered that they totally agree and disagree.

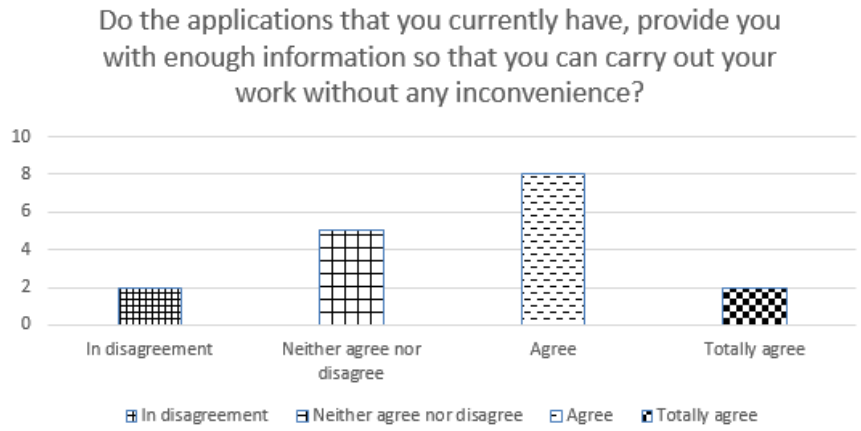

Figure 7. Histogram on the information of the work performed without any inconvenience

Table 3. The applications that you currently have, provide you with enough information so that you can carry out your work without any inconvenience?

	Frequency	Percentage	Cumulative percentage
In disagreement	2	11.8	11.8
Neither agree nor disagree	5	29.4	41.2
Agree	8	47.1	88.3
Totally agree	2	11.8	100
Total	17	100	

According to Figure 8 and Table 4, the results of the response time of your current applications are shown if it is fast enough to be able to do your job efficiently. This allows knowing with greater criteria about the efficiency and effectiveness of the applications. 47.1% of those surveyed answered that they agree and only 11.8% answered that they totally agree and neither agree nor disagree.

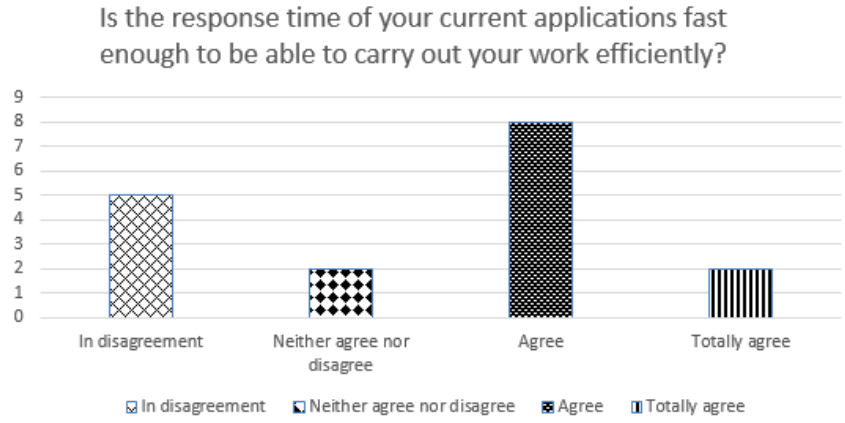

Figure 8. Histogram of fast application responses

Table 4. The response time of your current applications is fast enough to be able to carry out your work efficiently?

	Frequency	Percentage	Cumulative percentage
In disagreement	5	29.4	29.4
Neither agree nor disagree	2	11.8	41.2
Agree	8	47.1	88.3
Totally agree	2	11.8	100
Total	17	100	

According to Figure 9 and Table 5, the results of the information provided by your current applications satisfy the needs so that you can carry out your work. In this way, you can know your main needs at work. 64.7% of the people surveyed answered that they agree and only 35.3% answered that they totally agree.

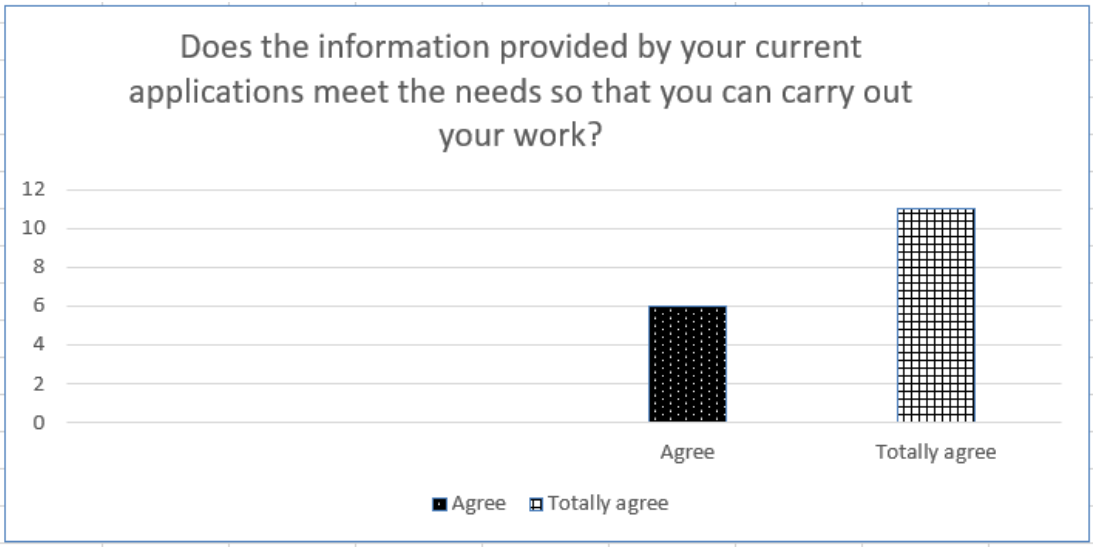

Figure 9. Histogram of satisfaction of needs to get the job done

Table 5. Does the information provided by your current applications meet the needs so that you can carry out your work?

	Frequency	Percentage	Cumulative percentage
Agree	6	64.7	64.7
Totally agree	11	35.3	100
Total	17	100	

And finally, Table 6 and Figure 10 show the results the use of business intelligence tools. In this way, find out if it is possible to improve the areas of a transport company. The 47.1% of the people surveyed answered that they agree and only 5.9% answered that they totally agree.

Table 6. Do you think that, using business intelligence tools, it is possible to improve the areas of a transportation company?

	Frequency	Percentage	Cumulative percentage
In disagreement	3	17.6	17.6
Neither agree nor disagree	5	29.4	47
Agree	8	47.1	94.1
Totally agree	1	5.9	100
Total	17	100	

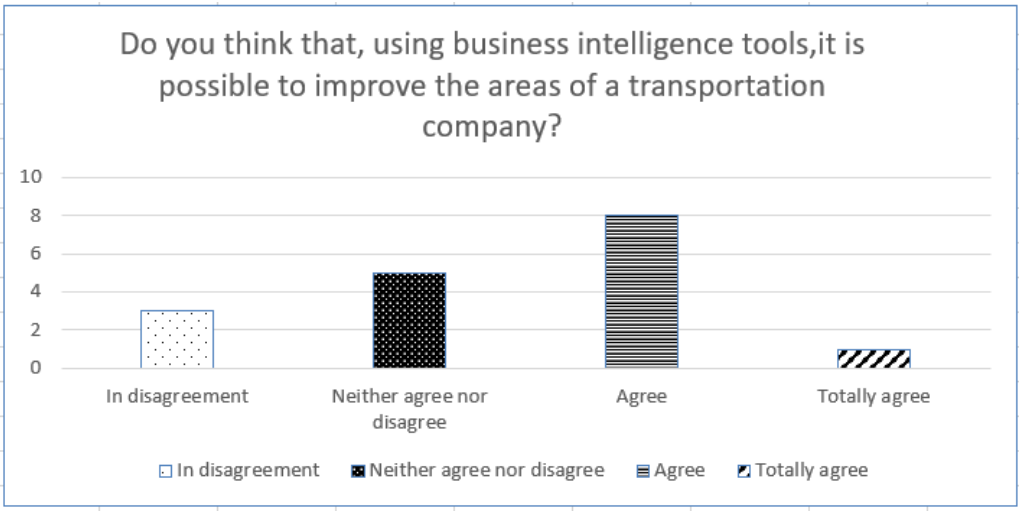

Figure 10. Histogram on application satisfaction

5.2. Methodology

As can be seen in Table 7, there is a comparison of the Kimball and Immon methodologies. These methodologies are very different since kimball is more used for graphic reports, table reports and the other is used for indicators. Therefore, the Kimball methodologies were used because they are used to analyze the data and to be able to implement and operate correctly. All the prototypes mentioned above and the surveys conducted, helps to meet the needs of each tourist, to implement the mobile application based on business intelligence in all tourism companies, as it helps agencies to have better control from the application of all its activities and also to customers who will have all the data of the service they will be provided, in any accident that occurs with a passenger or the bus will see the customer data so they can immediately communicate with a family member.

Table 7. Methodology comparison

Characteristics	Favors Kimball	Favors Inmon
Nature of requirements to support the decision of the organization	Tactical	Strategic
Integration data requirements	Individual business areas	Integration across the enterprise
Data structure	Business metrics, performance measures and scorecards	Non-metric data and for data that will be applied to meet multiple and varied information needs
Scalability	Need to adapt to highly volatile needs within a limited scope	Growing scope and changing requirements are critical
Data persistence	Source systems are relatively stable	High rate of change of source systems

6. CONCLUSIONS

In conclusion, the mobile application of business intelligence in tourism agencies was created for companies that provide tourist services as it will be able to perform a tighter control of customers, guides, driver and bus and also for customers to travel safer. It shows all the data of the client and the driver of how long he has been working in the company. in the research work the Kimball methodology was used, this methodology is widely used in business intelligence with the star database model, since all the data obtained will go through a process in order to extract the most relevant data for the company for good decision making and that customers who hire the tourist agency travel with confidence. It is suggested that this research work is recommended to be implemented for urban transportation companies since currently there is no company that has a detailed control of all customers and tourist trips. Also as a future work to be implemented for all tourism agencies in Peru, with all the business intelligence tools such as SQLServer Analysis Services, SQL Server Reporting Services to improve the presentation of their reports of tourism agencies or others where it is implemented.

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