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ORIGINAL RESEARCH ARTICLE

Futuristic business intelligence framework for start-ups

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ABSTRACT

Small businesses like start-ups and freelancing are on the rise these days. Economic changes implemented in India provided a watershed moment for India's diverse sectors, as well as for Asia's start-up ecosystem. However, these start-ups face a lack of financial preparation, and as a result, some of them fail. The current article covers the notion of assisting newcomers in the market with financial planning. This article intends to equip new start-ups with methods and tools such as investment plans, social marketing planning, finance management, work-life balance, savings plans, and future finance plans. Some extras include taxes storage facilities. Start-ups and freelancers use several platforms for different objectives, therefore they face many issues in communications, time planning. This article also seeks to remove the aforementioned concerns by offering a single platform for the organization's chat, calendar, to-do lists, announcements, alerts, and Payrolls, attendance, and so on. Furthermore, for business enhancement, the project strives for business analytics as the future scope and will give a single platform for client needs to decrease mistakes to a minimum. This article introduces the "Xenom" framework, which is used to realise the optimisation design of the business management system and information analysis platform. Furthermore, the collaboration of diverse platforms would eliminate time gaps, allowing businesses to follow their aims and forecast more efficiently.

Keywords: futuristic framework; business intelligence; start up; business analysis techniques

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1. Introduction

1.1. Start-ups

Nowadays, small start-ups and freelancing are rising rapidly. The economic reforms that have been carried out in India gave a turning point to the various industries of India as well as had a major impact on the start-up ecosystem. But these start-ups are facing a lack of financial planning and hence some of them result in failure. Therefore, the present study has proposed a framework called "Xenom" that would be providing this business the complete data-driven data analysis based on business and it will help the owner and decision makers to help in the decision-making process. Not only that, it will give the Threshold values for long and short risks[1]. Apart from this, the new start-ups and freelancers are also facing the problem of miscommunications, and time lags in the plans and conversations as the company uses different platforms for different purposes. So, our project is aiming to eliminate these lags by providing the organization chat, calendar, to-do lists, announcements, notifications, Payrolls, attendance, etc. features single platforms. **Figure 1** shows the business analysis techniques.

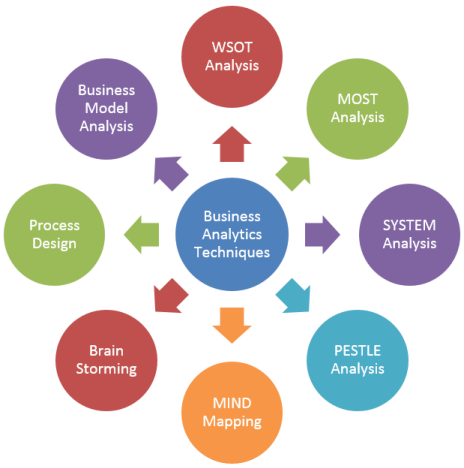

Figure 1. Business analysis techniques.

For enhancement of the business, the project aims for business analytics as the future scope and will provide a common platform of client requirements to reduce the errors to a minimum[2]. The proposed framework is carried out to realize the optimization design of the business management system and information analysis platform. And the collaboration of different platforms will remove time lags and entrepreneurs will be able to track their targets and project more effectively too.

Organizations are becoming increasingly conscious of the importance of their integral management processes. This is due to the intense competition in a global market where only the best leading companies in different industries can survive in the long term. Acknowledging the importance of business processes has constantly, though slowly, become a fact in the most developed economies since the mid-eighties, as demonstrated when Porter denied the concept of a value chain in 1980[3]. Moreover, the whole contemporary organizational structure emphasizes the role of business processes. Thus, process management is becoming an important part of operational business in organizations as well as in new projects to improve performance.

Organizations in the public and private sectors deal with several challenges to keep their sales growing. It's not an easy task to keep analyzing their data every day to uplift their stocks. Yang and Liu[4] say that Howard Dresner, came up in 1989 with the proposal of business intelligence as an umbrella term to describe "concepts and methods to improve business decision making by using fact-based support systems".

The first era of business intelligence started with the IT department as the controller of all enterprise data. They introduced a technique of combining data from multiple systems into a single database.

In today's era of rapidly growing technology, businesses are also growing with Business Intelligence (BI). Business intelligence combines business analytics, data mining, data visualization, data tools and infrastructure, and best practices to help organizations make more data-driven decisions[5]. By adopting business intelligence, an organization can use this platform to store, organize, and analyze data that allows organizations to access the insights they need to meet their business goals. Business intelligence in finance assists a company's investments and profitability across all dimensions of its financial organization. Such an analysis will help the organization determine further pricing strategies or optimize growth. With BI, we can work on internal as well as external data to make data-driven decisions.

This research study has proposed a framework called "Xenom" which is a business analysis model for small businesses and freelancers, consisting of an Activity Diagram, Data flow diagram, organization charts, SWOT analysis, Process flow diagram, etc. Keep track of your day-to-day activity with B-sight and provide a view-only option to your business investors to give them insights.

Research into business analysis has been extensive in recent times and, also, poorly organized as will be demonstrated below. Thus, there was a significant increase in scientific production on Business Process

Management (BPM)) in 2000, which became known as the third wave of BPM. This sufficiently justifies that the beginning of the chosen research period is precisely that year. On the other hand, the last major review of the literature in the field of business analysis was conducted in 2013[2]. Since that study and until 2020, there has been no specific bibliometric study of business analysis. Furthermore, no quantitative work has been identified to support the relevance of pure research in BPM. The very less attention was paid for establishment and structuring of data[6]. All this justifies the research explained in this document.

1.2. Related work

In 1865, Richard Millar Devens coined the term "business intelligence" in the context of a certain banker. Using business intelligence, the banker was rapidly maximizing profits by making decisions based on information collected in advance. According to history, early humans used stones and sticks to forecast the sales trends of new inventions. Then, later used various forms of materials to store the data like paper and books and analyze the data to make profitable decisions. In fact, BI is becoming easier to use as the technology progresses like using computers and software. It is moving to the cloud and becoming embedded in broader Customer Relationship Management (CRM) and Enterprise Resource Planning (ERP) software suites, and it currently encompasses Artificial Intelligence (AI) and machine learning. Despite pandemic-related economic situations, the total global business intelligence and analytics market reached $19.2 billion in 2020, according to International Data Corporation (IDC) market share figures. Although BI cannot tell users what to do or predict the future if they follow a specific path, it can help them make better decisions. BI is not only about generating reports but also provides a way for people to analyze the data and understand trends to make concrete business decisions[7].

Company assistants could refer to a variety of themes connected to the application of artificial intelligence (AI) and machine learning algorithms in company administration, such as virtual assistants, chatbots, and other intelligent software tools. Some significant issues and studies that could be included in such a survey are listed below[1–6]:

1) Virtual assistants: Virtual assistants are artificial intelligence-powered systems that can assist business owners and managers with duties such as scheduling, email management, and data analysis. Researchers discovered that virtual assistants can help small business owners reduce burden and enhance productivity in a study published in the Journal of Business Research.
2) Chatbots: Another form of AI-powered tool that can help firms with customer service and assistance is chatbots. Chatbots can enhance customer satisfaction and minimize customer turnover rates, according to a study published in the Journal of Business Research.
3) Natural language processing (NLP): Natural language processing (NLP) is a sort of AI technology that allows machines to interpret human language. NLP can enhance communication between managers and staff members as well as between companies and their clients when used in the context of business assistant tools. According to a study published in the Journal of Business Research, natural language processing (NLP) can assist in increasing the accuracy of customer sentiment analysis.
4) Personalization: It is a key feature of business assistant tools because it allows them to adapt to the needs and preferences of individual users. Personalized suggestions from AI-powered technologies can help enhance consumer engagement and loyalty, according to a study published in the Journal of Business Research.

1.3. Objectives of the proposed system

The goal is to design a business analysis system that can guide finance management and financial planning with the help of Business Intelligence (BI) for small businesses and freelancers. Specific objectives are below:

- One platform for business management. Companies use various tools for different services like chats,

notifications, and calendars that display upcoming meetings, schedules, and attendance. B-sight will allow employees to use all those services on one platform[1].

- Help to grow business. Many businesses fail due to a lack of business planning. The B-sight tool would be helping you analyze your business so that you get an idea of where to invest more and what is customers need.

2. Methods

2.1. Architectures of proposed framework

Figure 2 depicts architecture of the proposed framework which consists of below mentioned components.

A. Syncs all clients and payments in a single place

As a freelancer, it's essential to meticulously track all of income in one place. They need to keep records of how much you have coming in, when you expect to be paid, and how much you've made within a year[8]. This further is used for everything from managing a personal budget to filing taxes at the end of the year.

B. Creating budgets

All freelancers will have some expenses, even if overhead is low. Many freelancers can expect expenses for licensing fees, costs of essential tools like invoicing software and professional tools, etc. Based on their previous data on expenses and incomes, the system generates an ideal type of budget that would help them make ideal money decisions.

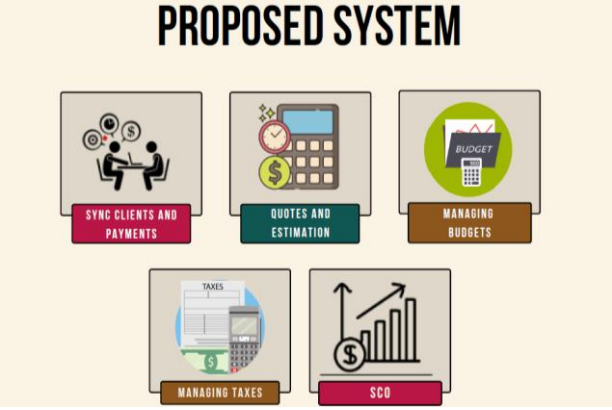

Figure 2. Proposed system of Xenom.

C. Creates quotes and estimation

Some freelancers will have projects that create estimates requiring upfront deposits from clients[9]. Quotes can be difficult to keep track of, as they're often customized for each project. Fortunately, there are tools that can make tracking estimates and quotes a little easier, pulling quotes from different types of form submissions and turning them into billable invoices.

D. Managing taxes

The platform would support several federal forms and state forms, allowing users to finish their tax returns accurately and correctly. It will also guide new freelancers never to miss a tax return.

E. Sales conversion optimization

A company does a lot of marketing to get sales, and various kinds of campaigns are initiated to market products. Campaigns such as email blasting and social media marketing are among the most popular ways of

marketing a product[10]. The aim of this project is to understand what the most effective ways are in terms of ROI (return on investment) and which campaign generates more leads and then suggest the ways of going about this marketing campaign in the most optimized manner based on a provided budget.

Figure 3 tells that the user will not only get an analysis of data or just help him out for the decision-making process, but also will get the help of Xenom for Managing the Budgets, Taxes, Supply Chain Optimization (SCO), Getting Estimation and Quotes. Thus, the proposed system would help out freelancers in multiple ways.

2.2. System workflow of Xenom

The system workflow of Xenom is depicted in **Figure 3**.

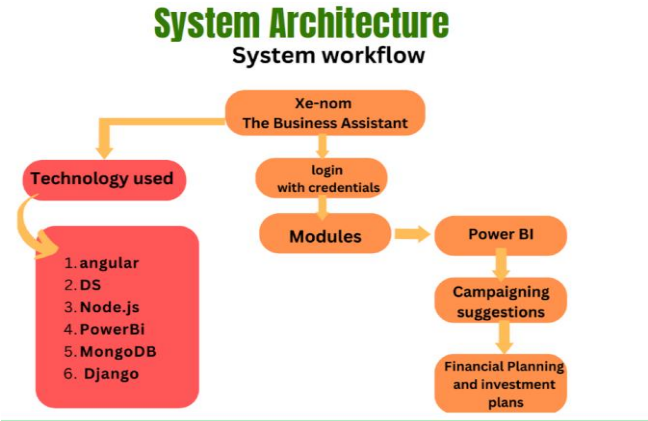

Figure 3. Implementation of Xenom.

The Xenom consists of several modules. Every module's short description is given as follows:

2.2.1. Module 1: Campaign analysis

Data visualization is the graphical representation of different pieces of information or data, using visual elements such as charts, graphs, or maps[11]. Data visualization tools provide the ability to see and understand data trends, outliers, and patterns in an easy, intuitive way.

- Accurate: The visualization should accurately represent the data and its trends.
- Clear: Your visualization should be easy to understand.
- Empowering: The reader should know what action to take after viewing your visualization.
- Succinct: Your message shouldn't take long to resonate.

The utility of data visualization can be divided into three main goals: to explore, to monitor, and to explain. While some visualizations can span more than one of these, most focus on a single goal[12].

The main goal of data visualization is to make it easier to identify patterns, trends and outliers in large data sets. The term is often used interchangeably with others, including information graphics, information visualization and statistical graphics.

Data-driven decision making using Machine Learning (ML) algorithm

Strategic relapse is one of the most well-known AI calculations, which goes under the Regulated Learning procedure[3]. It is utilized for anticipating the straight-out subordinate variable utilizing a given arrangement of free factors. Strategic relapse predicts the result of an unmitigated ward variable. Subsequently, the result should be a downright or discrete worth. It very well may be either Yes or No, 0 or 1, valid or Bogus, and so forth however rather than giving the specific worth as 0 and 1, it gives the probabilistic qualities which lie somewhere in the range of 0 and 1. Calculated Relapse is much like Direct Relapse with the exception of how they are utilized[7]. Straight Relapse is utilized for taking care of Relapse

issues, while calculated relapse is utilized for tackling the characterization issues. In calculated relapse, rather than fitting a relapse line, we fit an "S" melded strategic capability, which predicts two greatest qualities (0 or 1). The bend from the calculated capability demonstrates the probability of something, for example, regardless of whether the cells are destructive, a mouse is corpulent or not in view of its weight, and so on. Calculated Relapse is a huge AI calculation since it can give probabilities and group new information utilizing persistent and discrete datasets.

Hypothesis

Strategic relapse is a sort of relapse examination that models the likelihood of a paired result in view of at least one indicator factor. The strategic capability is utilized to demonstrate the connection between the indicator factors and the result variable. The calculated capability is an S-formed bend that reaches from 0 to 1, and it is characterized as follows:

$$p = e^{(\beta 0 + \beta 1x1 + \beta 2x2 + \ldots + \beta pxp)}/(1 + e^{(\beta 0 + \beta 1x1 + \beta 2x2 + \ldots + \beta pxp)}) \quad (1)$$

In Equation (1), p is the likelihood of the result variable, $x1$, $x2$, ..., xp are the indicator factors, $\beta 0$, $\beta 1$, $\beta 2$, ..., βp are the coefficients of the indicator factors, and e is the foundation of the normal logarithm.

The strategic relapse model gauges the upsides of the coefficients $\beta 0$, $\beta 1$, $\beta 2$, ..., βp utilizing the greatest probability assessment. The greatest probability assessment technique finds the upsides of the coefficients that amplify the probability of noticing the information given in the model.

Logistic regression in Xe-nom

A contractor does a lot of work in order to make sales. Campaigns like email blasts and social media communications are some of the most common ways used for product promotion. In order to determine what the best options are in terms of returns on investment and which campaigns generate higher leads, as well as how this marketing campaign should be optimised based on a budget allocated for it, statistical regression will be applied.

Machine learning classifiers such as Logistic Regression, SVM, RF and kNN are profoundly utilized for predicting various events and disorders[13–22]. Logistic function (otherwise called sigmoid functions): The calculated capability is the key capability utilized in strategic relapse to gauge the likelihood of a paired result. The calculated capability is an S-molded bend that maps any genuine esteemed contribution to likelihood esteem somewhere in the range of 0 and 1. The recipe for the strategic capability is

$$p = 1/(1 + \exp(-z)) \quad (2)$$

In Equation (2), p is the likelihood of the double result, z is the straight mix of the indicator factors and their coefficients.

Logit function is the converse of the calculated capability and is utilized to change the likelihood of the parallel result back to the direct blend of indicator factors and coefficients. The equation for the logit function is:

$$z = \ln(p/(1 - p)) \quad (3)$$

In Equation (3), p is the likelihood of the double result.

The odds ratio is a proportion of the strength of the relationship between the indicator variable and the parallel result. It is the proportion of the chances of the parallel result within the sight of the indicator variable to the chances of the twofold result without a trace of the indicator variable.

Aberrance is a proportion of the decency of spasm of the strategic relapse model. It is the distinction between the noticed log probability of the information and the greatest log probability of the fitted model.

These functions are utilized to gauge the likelihood of the parallel result and to decide the strength of the relationship between the indicator variable(s) and the double result.

Logistic regression is a well-known technique for foreseeing the productivity of a promoting effort. It includes building a model that utilizes at least one indicator factor to foresee the likelihood of a commercial being beneficial or not. The indicator factors can incorporate factors like the expense of the ad, the interest group, and the showcasing procedure.

To construct a logistic regression model, information on past promoting efforts can be utilized. The information ought to remember data for the indicator factors and the result variable (i.e., regardless of whether the mission was productive). The model can then be prepared on this information to distinguish the connections between the indicator factors and the result variable.

2.2.2. Module 2: Managerial basics

Keeping a note of business expenses and income is one of the most crucial parts of running a successful business[23]. We can list numerous direct and indirect reasons for tracking personal and business accounts and income.

The module is subdivided into different components:

Calendar

A marketing calendar, if used properly, can easily improve the efficiency of your time and work. Knowing when, how, where, and what you will be doing to improve your business is essential to improving your efficiency.

Some of the important factor:

- Keeps you organised and on track
- Excellent for brainstorming
- Helps to maintain consistency
- Helps keep your audience engaged
- Plan each post out for specific social networks
- Crucial for staying in the know
- Prepare for national observance days and holidays
- Improve your efficiency
- Publishing regularly and on-time
- Gives you a big picture view

Todo/status tracker

Importance of to-do:

- Improves your memory: A to-do list acts as an external memory aid. It's only possible to hold a few pieces of information at one time. Keep a to-do list and you'll be able to keep track of everything, rather than just a few of the tasks you need to do[9]. Your to-do list will also reinforce the information, which makes it less likely you're going to forget something.
- Increases productivity: A to-do list allows you to prioritize the tasks that are more important. This means you don't waste time on tasks that don't require your immediate attention. Your list will help you stay focused on the tasks that are the most important[8].
- Helps with motivation: To-do lists are a great motivational tool because you can use them to clarify your goals. You can divide your long-term goal into smaller, more achievable short-term goals and as you tick each one off your list, your confidence will increase.

Progress tracker

This element helps you to make a Gantt chart type of module where you track the progress of your multiple projects.

Finance analysis

Finance is the spinal cord of every business. If you are a startup business organization, it is essential for you to manage your finances and accounts. If your accounts are streamlined and managed efficiently, it leads to enhanced performance and cost reduction. Many startup organizations which do not keep a proper record of their accounts face challenges to solve their high expenditures[9].

The proposed framework was implemented through:

- Angular
- Machine learning
- Node JS
- Natural language processing
- Python (Django)

Business analysis approach

The business analysis approach follows the knowledge areas of the Business Analysis Body of Knowledge (BABOK). The approach defines the lifecycle, deliverables, templates, and tasks that should be included. Plan-driven approaches seek to define requirements as early as possible to reduce uncertainty, while change-driven approaches encourage requirements to be defined as close to implementation as possible[8]. These differences will lead to different deliverables and tasks being identified as well as different sequences and dependencies of tasks. The approach will also determine how the planning process is performed.

The Business Analyst (BA) will serve as the liaison among stakeholders to understand existing business processes, and to elicit, analyze, communicate and validate requirements. The BA will help to understand existing business processes where needed, business problems and opportunities and recommend solutions that enable the business to achieve its goals and objectives[8]. The BA will be responsible for utilizing the most appropriate means of gathering business requirements and assimilating those into system requirements.

From a step-by-step perspective, defining the Business Analysis Approach and Plan for a project can be broken down into three key steps.

- Define and agree the expected outcome
- Take stock of the project dimensions
- Create the Business Analysis Plan

Proposed planning process

The following key steps are involved in the proposed planning process of the proposed the framework.

Discover automation possibilities:

Automation is the delegation of the human control function to a machine. So, how can we let a chatbot takeover human features? Ultimately, if you have a group of workers entering facts or responding to repetitive questions there are possibilities for automation[6].

The first step consists of:

- Exploring the business fee of chatbots.
- Understanding and figuring out the feasibility of making use of ML algorithm.

Define use case:

A use case is a list of moves that define the interactions between a system and a function to acquire a purpose. Include the following to your documentation:

a. Decide on the exact enterprise software
    - Learn approximately the vendor panorama three. Determine dealer and finalize budget:

b. The agile method to seller choice uses a streamlined technique to pick the proper dealer and finalize the budget, inclusive of:

Leverage Other Module's sizable pre-vetted vendor relationships:

- Facilitate RFI and RFP if required
- Determine the finances
- Having to do list
- Having calendar
- Shortlist vendors and compare proposals

Target audience:

Our target audience is the freelancers and small start-ups. We have designed this application to help freelancers to keep track of their projects, to give them financial aid and what they have invested[24]. It will help in the decision-making process with the help of a machine learning algorithm and data will be visualized in diagrams for better understanding from insights.

3. Results and discussions

3.1. Results

This section presents the important results in the form of charts and graphs. Also, this section discusses key findings, advantages and future work. When the model has been prepared, it very well may be utilized to foresee the likelihood of a promotion being productive or not in view of the upsides of the indicator factors. For instance, assuming the expense of the promotion is high, the main interest group is thin, and the showcasing technique is not clear-cut, the model might anticipate that the commercial isn't probably going to be productive.

Figure 4 depicts the dashboard of Xenom with key components like sales statistics, activities, generate reports, sales, etc. **Figure 5** shows the profile of stakeholder like salesman.

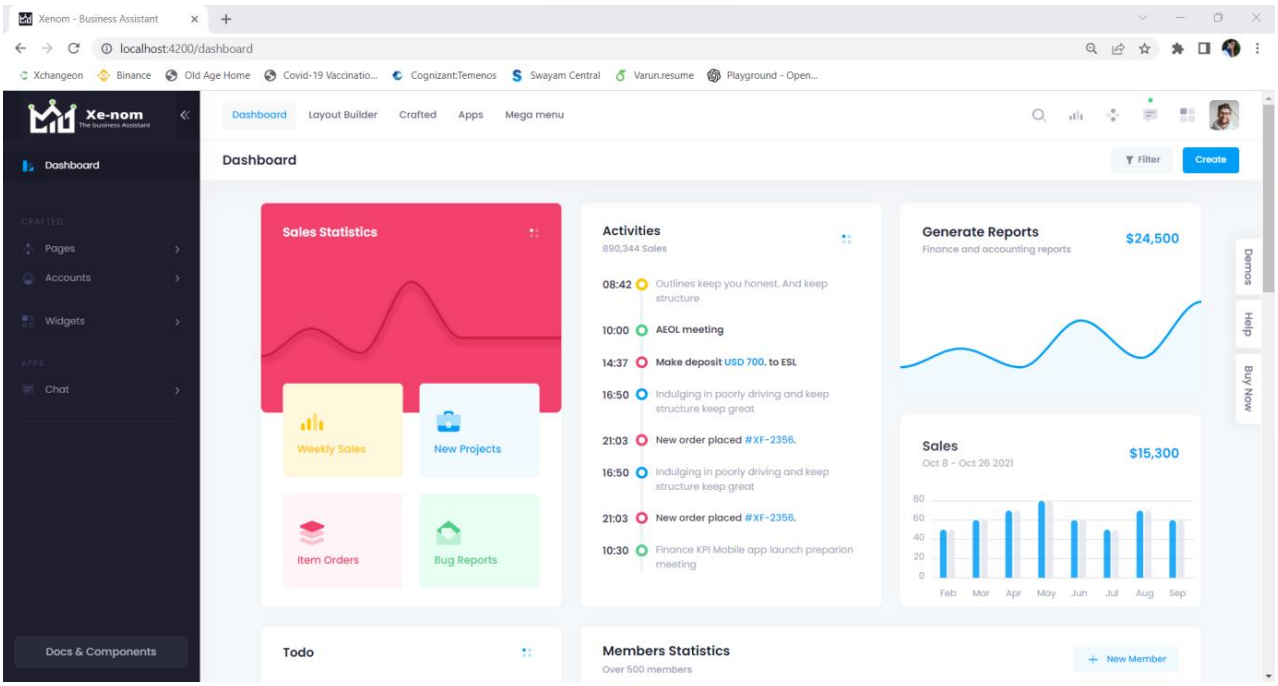

Figure 4. Dashboard.

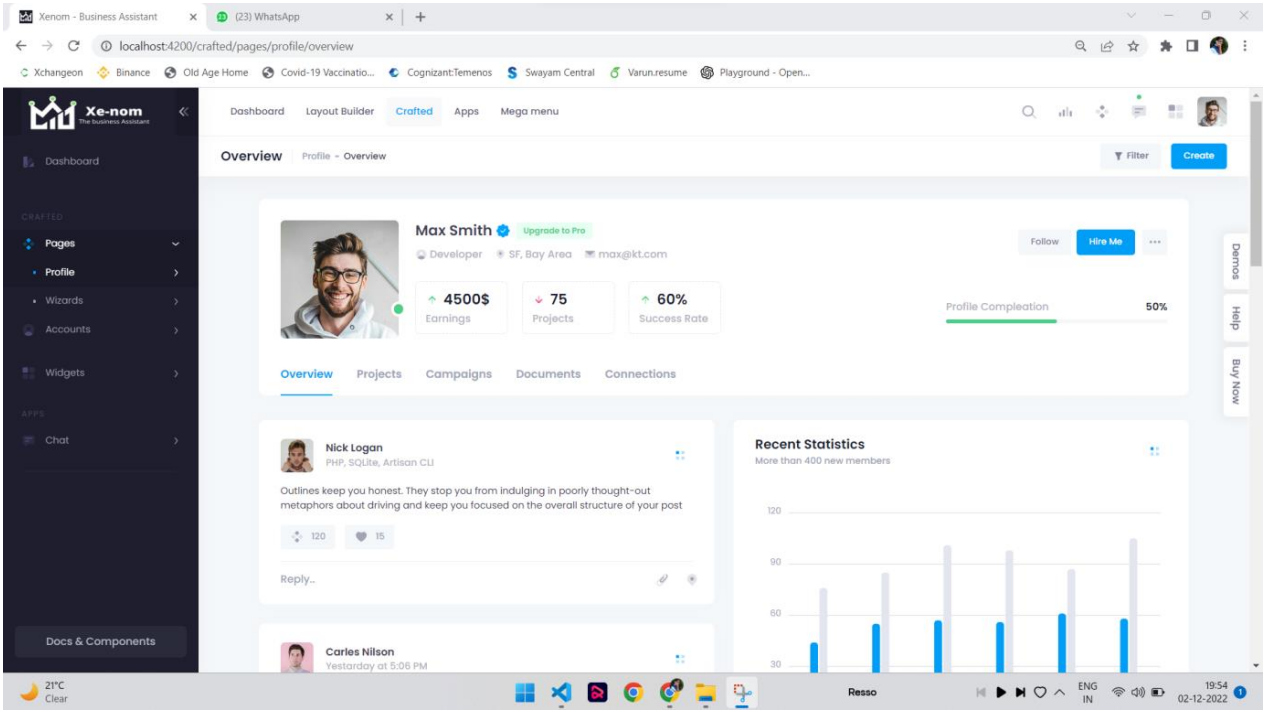

Figure 5. Profile.

Figure 6 displays the interface for chats among stakeholders. While **Figure 7** shows how Xemon can be utilized for displaying details about a project.

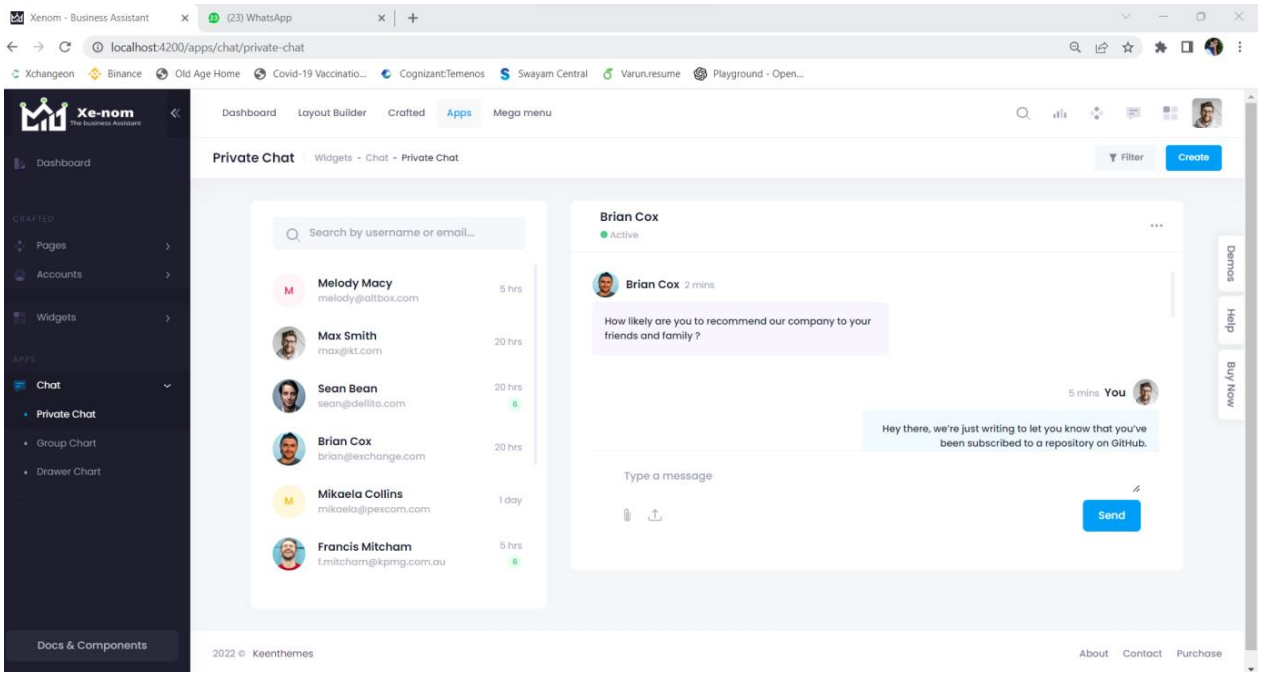

Figure 6. Chat.

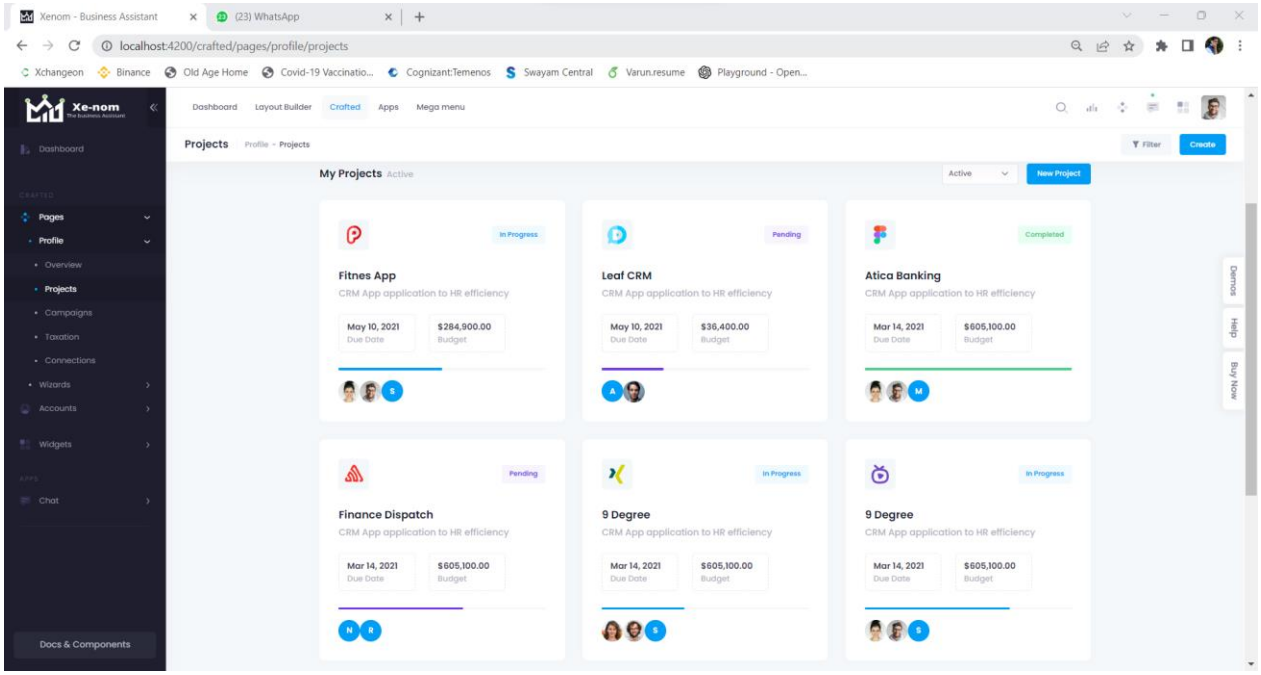

Figure 7. Project.

Figure 8 presents details about campaigns conducted by stakeholders. Whereas, Xenom can utilized for creating to-do list as shown in **Figure 9**.

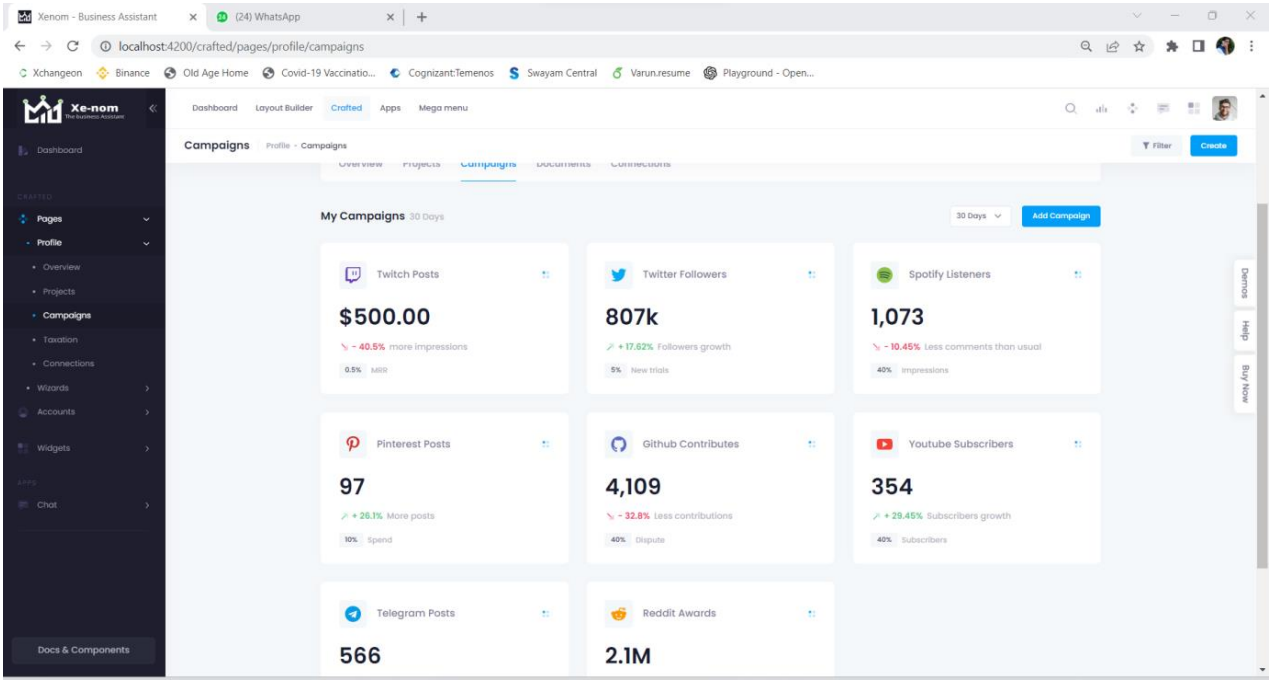

Figure 8. Campaigns.

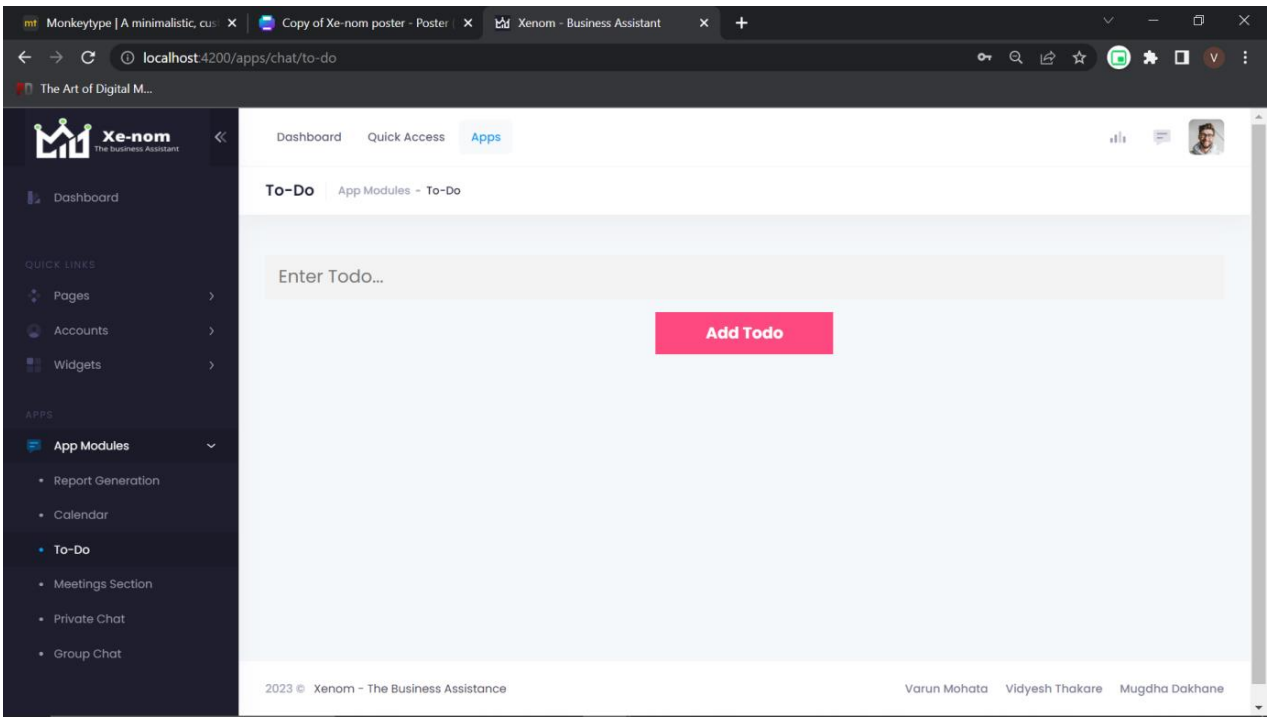

Figure 9. Todo application.

The facility of calendar is also one of key component in Xenom as displayed in **Figure 10**. Finally, **Figure 11** depicts that the task of report generation can also done using Xenom.

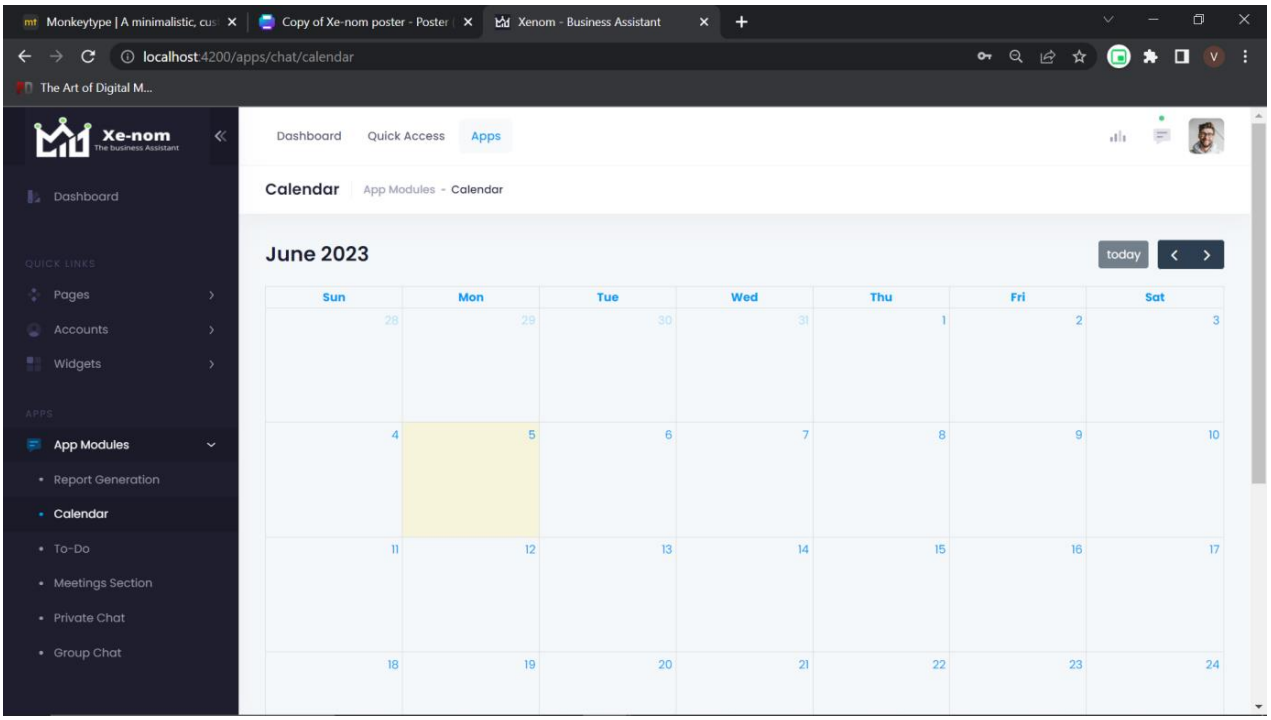

Figure 10. Calendar.

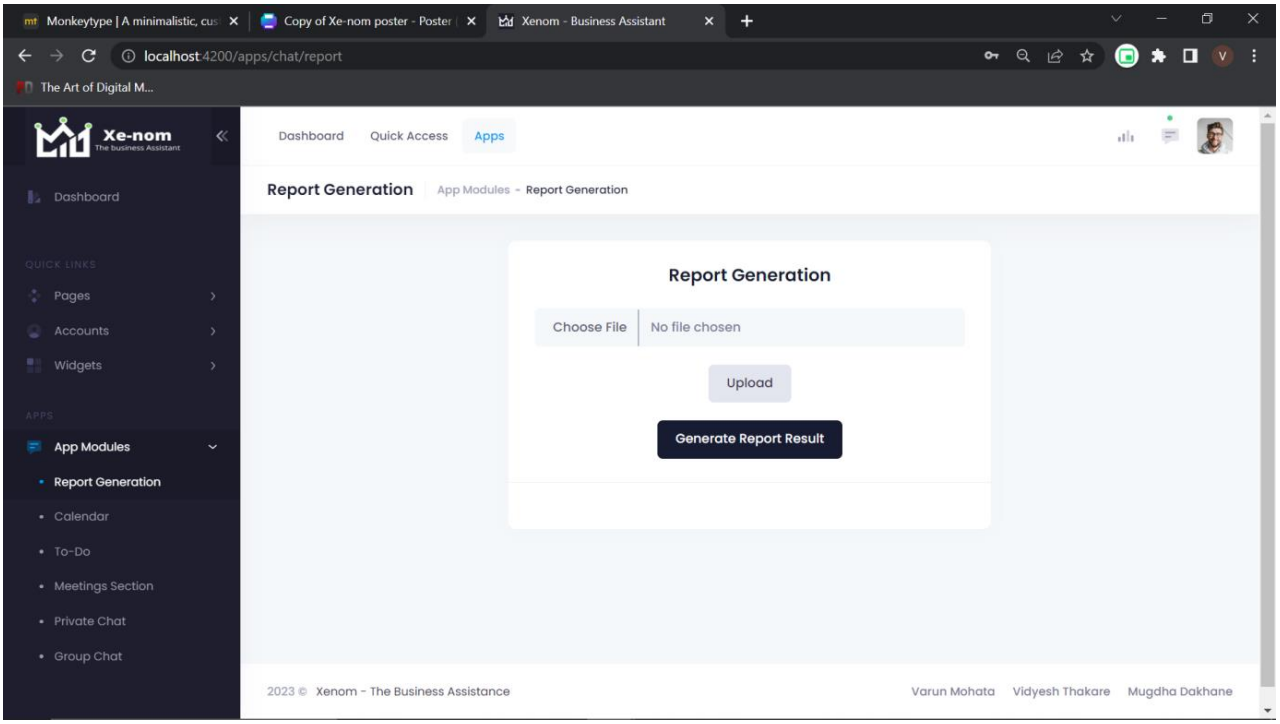

Figure 11. Report generation.

3.2. Highlights and further research

This section discusses key advantages that can be achieved through proposed architecture. Before going to see advantages, let's discuss what are the challenges faced business groups like start-ups. For instance, nowadays, we see small start-ups emerging, but they face many issues such as team management, time management, deadlines, client interactions, etc. That's because small businesses must concurrently check several platforms. For instance, if our team chats on one platform, meetings are held on another, customer needs are on another platform, and active and finished projects are on a different platform. An energetic inspiration to make a tool that manages almost everything regarding your business. Rather than using different platforms for various services, we will be able to use all those services using one platform, e.g., Xenom which will work as a business analysis model. In addition to this, it will provide all the services that are important to run a business. The benefits which are gained through the proposed frameworks are as follows. Firstly, any time accessibility. For example, interactions with customers through chatbots by replacing conventional communication tools like emails and phone calls. Secondly, increased handling capacity. For example, unlike humans who can only communicate with one human at a time, chatbots can simultaneously have conversations with thousands of people. No matter what time of the day it is or how many people are contacting you, every single one of them will be answered immediately. As the demand keeps rising, you will have more customers to take orders from but very few staff to attend to them all. Having a chatbot would eliminate such problems and cater to each and every person and ensure that no order is missed. Companies like Taco Bell and Domino are already using chatbots to arrange the delivery of parcels. Thirdly, provides flexible attribute. For example, Chatbots have the benefit that they can quite easily be used in any industry. Unlike other products where you have to do a lot of development and testing to change platforms, chatbots are relatively easy to switch. One has to just train the bot by giving the right conversation structure and flow to switch its current field or industry.

4. Conclusions

Although the idea of BI arose years and years prior, it is presently turning into a main pressing issue for organizations, no matter what their size, to consider whether they ought to put resources into this framework

to address client issues and needs. BI currently makes genuine business an incentive for information resources and gives critical upgrades in perceiving and taking advantage of business open doors. Numerous worldwide enterprises have embraced a BI framework, however, some of them have neglected to adjust to the framework. Functional and authoritative factors like procedure. Human resources, administration, culture, quality administration, and key direction of the firm essentially impact the execution and coordination of the BI framework. Understanding the capacities of both the innovation and the executive's viewpoints is basic to a company's progress in carrying out a BI framework.

Author contributions

Conceptualization, DAA and SAW; methodology, SAW; software, SAW; validation, DAA, SAW and PG; formal analysis, SAW; investigation, SAW; resources, SAW; data curation, SAW; writing—original draft preparation, SAW; writing—review and editing, SAW; visualization, SAW; supervision, PG; project administration, MAM; funding acquisition, PG and JPS. All authors have read and agreed to the published version of the manuscript.

Conflicts of interest

The authors declare no conflict of interest.

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