

Is ChatGPT better at business consulting than an experienced human analyst? An experimental comparison of solutions to a strategic business problem

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Abstract

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Given the level of continued technological progress, AI language models have been the subject of enormous media attention. The popularity of such models skyrocketed in November 2022 with the introduction of the ChatGPT application. The impact of AI language models on areas such as research, healthcare and business is constantly being evaluated. However, an issue in which there is a clear research gap is the use of ChatGPT for business decision-making purposes. The aim of this article is, therefore, to investigate whether ChatGPT can be leveraged to make strategic business decisions. The methodology compares three paths towards a case for a strategic business decision by means of a checklist-based score: one conducted by a human alone; the second taken purely by ChatGPT with as little human interaction as possible; and third, the centaur model, where a human actively interacts with ChatGPT and asks critical questions. The findings were twofold. Firstly, ChatGPT is still far from being considered a quality business consultant in itself. Secondly, however, AI turned out to be extremely helpful in terms of creating a decision-making path. Hence, humans may leverage the information provided by ChatGPT to gain helpful insights for better business decision making.

Key words

decision making, management, ChatGPT, AI, LLM, financial analysis.

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Introduction

The business decision-making process has been the subject of myriad discussions over a period of many years. Considerable research progress on this topic occurred in the second half of the 20th century due to advances in operations research (Simon, 1987; Tung and Miller, 1990; Eisenhardt and Zbaracki, 1992). It was then when major management strategies evolved and when the decision-making process was cascaded down to understand which factors affect it the most (e.g. Duncan, 1972; Tung, 1979; Jauch and Kraft, 1986). Yet even given those meaningful findings, there remains one area in which bias continues to effect the decisions made by even the most experienced and educated managers: uncertainty about the future (Gorry and Scott Morton, 1971; Walker et al., 2003). Although the future – by definition – remains uncertain even today, executives have substantially better tools and resources by means of which to foresee what is coming next and act accordingly (Pelissari et al., 2021).

One such resource is data itself, which is often nowadays referred to as Big Data due to its size, complexity and potential for growth. Adding tools that make it possible to process this data renders certain past decision-making problems obsolete. As an example, one may consider operative data, which can be measured with Internet of Things (IoT) solutions. In the past, productivity figures were measured manually by humans, but now those are transferred automatically in real time, for example, in agriculture (Astill et al., 2020). To take this one step further, one may imagine a multinational American restaurant chain wishing to acquire a brand of smaller restaurants in Europe. The inherent risks may include the potentially poor reputation of the smaller player. Today, to obtain a general idea of the risks involved, a simple check of reviews on Google Maps, which was not

previously possible, would suffice (Wang, Kim and Kim, 2021).

As revealed in this paper, executives have superior tools for managing their business than they had 30, 20 or even 10 years ago. These are not limited to the examples listed above, but may include more complex solutions such as business intelligence reporting (Niu et al., 2021; Bordeleau et al., 2020), globally connected enterprise resource planning systems (Lee, 2021), and many more (Varriale et al., 2021).

There is, however, another tool that may potentially assist managers in the decision-making process, but it is still a novelty for most practitioners and a largely unexplored area for researchers (Van Dis et al., 2023). This solution is known as ChatGPT and has been the most popular artificial intelligence language model (AI language models) to date. The aim of AI language models such as ChatGPT is to provide accurate and helpful responses to users' questions (Doshi, Bajaj and Krumholz, 2023; Korzynski et al., 2023a). Such questions may be related to education, research, general knowledge and even business consulting. This solution exhibits a great deal of potential in the context of strategic business decision making.

Hence, the above introduction leads to the following research question:

- **RQ1:** Can ChatGPT support managers in making strategic business decisions?

Of course, the formulated RQ1 is very generic, and at first glance the answer seems to be yes; however, from experience it is clear that unqualified or underperforming consultants may not only leave an existing problem unresolved, but also considerably worsen the outlook for a given company. A well-suited example could be an inexperienced consultant suggesting lay-offs for a strategically important product with

a negative margin. The EBIT would increase in the short term, but the product may turn out to have been crucial to cross-selling opportunities. As a result, income will increase in the short run, but in the long-term the company will go on to lose customers and perhaps even fail. Therefore, consultants and strategic managers are expected to have a holistic view of the entire business.

It is exactly such a case which will be the subject of consideration in this paper. If ChatGPT suggestions could lead to negative or neutral effects on the company, then the answer to RQ1 would be a clear “no”, or rather – considering the level of technological progress – “not yet”. If ChatGPT turns out to be helpful and/or asks further questions leading to a holistic approach, then we may answer in the affirmative. Regardless, the path towards an answer may have multiple solutions; therefore, the following research hypotheses were formulated:

- **H1:** An experienced human analyst is able to provide an optimal solution to the business problem presented, albeit over a long period of time.
- **H2:** AI by itself – ChatGPT – is not able to provide an optimal holistic solution to the business problem presented.
- **H3:** The centaur model – collaboration between ChatGPT and an experienced human – is the optimal means by which to solve the business problem presented.

The aim of this paper, therefore, is to compare the strategic business decision-making process of a human to those of an AI language model and the centaur model, which we define as collaboration between AI and humans.

The paper is structured as follows. Section one includes the literature overview of AI supporting the business decision-making process; section two describes the methodology; section three presents the results; and finally, section four concludes the paper.

1. Literature Review

The human fascination with AI has a long history in popular culture, ranging from visions of its positive effect on our world as in the Star Wars franchise, to dystopian scenarios as seen in the popular Matrix or Battle Star Galactica series. Most recently, engineers have made a great deal of progress on AI modelling, one result of which is the popular language platform ChatGPT. This language model has received a great deal of attention across multiple media for various reasons. On the one hand, users have been impressed by the AI’s ability to solve complex problems and provide information on coding, engineering, or even write essays on its own (Vanian, 2022). On the other hand, certain groups of people were negatively affected by the AI, where the language model behaved in a racist manner, told untruths, and even suggested people commit suicide (Davey, 2022; Wach et al., 2023).

Unfortunately, scientific research on AI is not as popular as media-driven discussions, but it may be surprising to note that one of the first major publications was published as early as in 1961. Minsky (1961) stated that although computers can only do what they are told to (programmed to do), they may be taught how to search through various databases and “learn by themselves”. Of course, this concept is highly simplified and does not accurately describe the complexity behind the production of the AIs that we are accustomed to today. It does, however, provide a significant insight into how AI works, as without human input, AI would not exist at all. Since then, technological progress has allowed us to create superior computers and machines that can easily outperform humans and have the potential for further growth, even in areas such as quantum mechanics (Saffman, 2016) or AI (Grace et al., 2018).

Hardware has been subject to enormous progress as well. For example, one may consider the famous statement by the co-founder of Intel, Gordon Moore, that the number of transistors in integrated circuits are likely to double every two years (later referred as Moore's Law). Proof of this theory may be found in the fact that the Intel 4004 from 1971 had 2300 transistors while the latest Apple M1 Ultra computer has 114 billion of them (Apple Press Release, 2022).

Notwithstanding this tremendous technological progress, the general concept of AI has not changed dramatically and can be described as a machine or software able to understand and learn new algorithms. Bini (2018) has summarised the evolution of AI aptly. The learning part is crucial here, because this is where substantial progress in software development has been made. To see an obvious difference, one may consider two different processes - one requiring few decisions, as in checkers, and another that requires a chain of decisions, as in chess. AI models were initially programmed to evaluate every single possible solution; hence, there was a different code for each move. Later, however, the concept of machine learning (ML) was introduced. This is where AI receives a sample data set and finds relevant patterns to create more of them; basically the machine learns from the "past" by itself and recodes itself, hence the term "machine learning". This method unfortunately has certain restrictions related to the amount, or rather the structure, of the data. With ML, software has to receive and structure the data in a specific manner in order to understand it, which requires a great deal of preparation and calculation. To overcome these limits, the concept of deep learning (DL) comes into play. With DL, machines use statistical models called Artificial Neural Networks (ANN) that process information in a similar way to the human brain

to develop a very deep understanding of such information.

This theoretical background brings us to the application of modern AI models which are part of everyday life. Nowadays AI is supportive in a variety of fields related to research (Scholarcy, Adept), images (Bria, Evoto), video (Vidyo.ai, Tavus), design (Galileo AI, PhotoRoom), spreadsheets (Sheet+, Ajelix) and even text production (Notion AI or ChatGPT). The latter, namely text or language models, are particularly relevant to the scope of this paper because the user may have an actual conversation with them.

Language models (LM) became popular at the beginning of the 21st century when a number of scientific papers were published, mostly related to translation. For example, Brants et al. (2007) described mathematical models that may be utilised to improve text translation. Those methods relied on the "training dataset"; the bigger it was, the higher the quality of the translation. The way language models work is not especially difficult to understand when using the concept of statistics. Fundamentally, they find the sequence of words with the highest probability of occurring.

A solid overview of the current language model architecture, including ChatGPT 3, was compiled by Brown et al. (2020). The authors dove deeply into technical specifications related to Language Models, testing a variety of questions in an attempt to evaluate the performance and limitations of multiple software models. The main point of interest of this research is the outlined problems that may be related to language models. ChatGPT 3 has been beset by various difficulties when dealing with topics such as religion, gender or race. To offer an example, misuse may occur as there are frequently used terms associated with a specific religion, race or gender. Hence, ChatGPT has developed some "favourite" words indicating stereotypes related

to religion (e.g. Christianity – Attend and Ignorant; Hinduism – Cast and Cows; Islam – Pillars and Terrorism, etc.), gender (e.g. male – large, mostly, lazy; female – optimistic, bubbly, naughty). Finally, it is becoming increasingly difficult to distinguish texts created by ChatGPT from those created by humans.

Based on the review above, AI language models such as ChatGPT can be considered a powerful tool, assisting humans in multiple ways (Korzyński et al., 2023b). But can it ultimately be used for strategic business decisions? Although papers like that of Duan et al. (2019) describe the use of AI for managerial decision making, literature on ChatGPT remains rare. As an example, as of April 2023 there were no results for documents indexed in Scopus after searching for “ChatGPT” and “decision” and “management”. The search was expanded to include “ChatGPT” and “management” only, at which point 10 documents were found, most of them related to healthcare and general ChatGPT challenges. The only article that may be seen as somehow related to the decision-making process was written by Wesendrup and Hellingrath (2023), who undertook a case study to see whether proximal policy optimisation (PPO) can be helpful for production planning and control purposes. It turned out that models utilising PPC are supportive of production-related decisions. This may be considered relevant in the context of this paper because ChatGPT uses the PPO method as reinforced learning.

As the next step in this review, a search on Google Scholar for the keywords “ChatGPT”, “decision”, “making”, and “management” was performed. Although more fruitful than Scopus, the results were still minimal. Again, many papers were related to healthcare. The results which were identified as being helpful for management science included papers by Wang et al. (2023) and Burger et al. (2023). The

former is rather a summary of a conference where the authors investigated ChatGPT’s knowledge of Industry 5.0. It turned out that ChatGPT was able to provide detailed information around the topic, but some of the concepts lacked creativity. On the other hand, the latter paper investigated whether ChatGPT can be used as a tool to support the research in the management sphere. Although not purely related to the issue tackled in this paper, the conclusion of the authors was in line with H3: Although ChatGPT will not replace humans, humans using ChatGPT can perform better with the help of AI.

As may clearly be seen, the limits and quality of the literature indicate a clear research gap. In the next section, the authors attempt to solve a holistic business problem with the help of ChatGPT.

2. Methodology

Using an experimental technique, this study compares the performance of humans, AI (ChatGPT), and the centaur decision-making model in a strategic business setting. A medium-sized food manufacturing company experiencing financial performance issues served as the basis for the design of the experiment (Yin, 2014). The controlled experimental design, reproducibility, and quantitative and qualitative analyses evaluate the scientific rigor of the study (Creswell, 2014). The research must display methodological awareness, which is accomplished by identifying the inherent limitations, upholding consistency, and addressing potential biases (Bryman, 2016). All research must take ethics into account. While avoiding the use of ChatGPT in the literature review, discussion, results, and conclusions, this experiment restricts such usage to the experimental goals, focusing on decision-making situations. By doing this, the AI tool is used sensibly, offering insightful information about its possible uses in managerial decision making. In this

study, the methodological triangulation is accomplished by combining quantitative and qualitative data and examining several decision-making situations involving humans, artificial intelligence, and centaur models.

The paper uses an experiment and a checklist-based score to compare three strategically important business decision making scenarios:

- 1. Human scenario (scenario 1): An analyst offers suggestions and proposes a solution to the business problem without the help of AI.
- 2. AI scenario (scenario 2): ChatGPT offers suggestions and proposes a solution to the business problem with the minimum possible amount of human assistance.
- 3. Centaur scenario (scenario 3): Humans and AI collaborate to make a decision, with the human having the relevant business acumen and asking critical questions.

In order to verify the stated hypotheses, a strategic business case was formulated which related to a medium-sized food

manufacturing company called Snacks Company faced with the challenge of decreasing EBIT. The three-year financial data (Figure 2) was prepared in such a way that one business unit (Nacho Chips) had a negative margin, while the second (Salsa Dip) was highly profitable and drove the company's EBIT.

To avoid a purely qualitative comparison of the three scenarios, a checklist-based scale with weighted grading was proposed as per Figure 1. The checklist is divided into two main areas, the first of which included nine crucial criteria by means of which to solve the formulated business case, and the second of which included three that were helpful in the overall business decision-making process (Elbanna, 2006). The scores were allocated based on their importance to solving this particular case (5 highly material, 1 not material). Additional criteria that were helpful received an average score of 3. For each scenario, we checked whether the specific criteria were present. Subsequently, the respective scores were applied, and the sum resulted in the total score.

Figure 1. Checklist with scores on a scale from 1 to 5

Area	Criteria	Wage
Decision making problem	Gather qualitative data (ask questions)	5
	Interpret the qualitative data	2
	Gather quantitative information (data)	5
	Interpret the quantitative data	3
	Discover product complementariness	5
	Find the root cause (margin)	5
	Propose a pricing strategy	5
	Propose other solutions (material)	5
	Propose other solutions (non-material)	1
Add. Criteria	Speed	3
	Independence	3
	Holistic view	3

Source: own elaboration

For an overview of the situation at Snacks Company, the following simplified Profit

and Loss Statement (P&L) was prepared as shown in Figure 1.

Figure 2. Simplified Profit and Loss Statement for the scenario

Simplified Profit and Loss Statement									
kUSD	Snacks Company Total			Nacho Chips			Salsa Dip		
	2020	2021	2022	2020	2021	2022	2020	2021	2022
Unit Price	n/a			5	5	5	2	2	2
Sales				100	110	120	100	110	120
Revenue	700	770	840	500	550	600	200	220	240
Unit variable cost	n/a			4	5	5.5	0.2	0.2	0.2
Total variable cost	420	572	684	400	550	660	20	22	24
Margin 1	280	198	156	100	0	-60	180	198	216
Fixed Cost	60	60	60	50	50	50	10	10	10
EBIT	220	138	96	50	-50	-110	170	188	206

Source: own elaboration

As shown, the issue of declining EBIT is related to increased variable costs for nacho chips from 2021 onwards, while the sales price and fixed costs remained constant. The most straightforward solution based on the numbers would be to exit the nacho chips business to improve the company's overall EBIT. But to test the AI, the scenario was based on a "holistic" assumption: the catch is that salsa dip is a complementary product to nacho chips and without the sale of nachos, no sales of salsa will be made. This correlation may be clearly visible for a human, but difficult for AI.

To avoid potential bias, in the case of scenarios 1 and 2, another assumption was added: The owner of the Snacks Company asking for assistance possesses neither broad business acumen nor AI acumen, and rather than volunteering information freely he provides it on request (if available).

The most popular freely available version of ChatGPT 3.5 at the current point in time was utilised to perform the comparison. All the content generated by the AI is related purely to the business decision-making process, and the two conversations were included in their entirety in the appendix. The AI was not involved in generating any of the textual content of this article itself. The results are described in detail in the subsequent section of the paper.

3. Results and Discussion

The discussion of the three scenarios from the methodology section will hereby proceed one by one. The steps involved in Scenario 1, the human business decision-making process, are shown in Figure 3 below.

Figure 3. Human business decision-making process

Source: own elaboration

First, the analyst asked the owner whether he has an idea of where the problem may

lie, to which the owner replied negatively (the assumption was that no assistance would be

forthcoming). Later, the available financials were provided; hence, step 1 may be categorised as information gathering. Immediately after looking at the financials, the analyst was able to see that the Nacho Chips business unit incurred losses due to variable costs having increased since 2021. The analyst also interpreted the data to investigate whether the products are sold jointly (complementariness). It did not take long for the human analyst to highlight the increasing variable costs and suggest that those may be related to the COVID-19 pandemic and supply chain problems. The analyst did not even consider shutting down the Nacho Chips business unit, but instead proposed a two-step solution:

- Step 1: Evaluating the root cause of the increase in variable costs. If these are seasonal due to the COVID-19 pandemic, then the EBIT problems should be resolved after such a shock. If not, Step 2 is not only optional, but also a requirement to maintain the business as a going concern.
- Step 2: Implementation of a sustainable pricing strategy. The human

analyst indicated that EBIT may not only be improved through cost optimisation, but through revenue effects. Those are clearly problematic because, even considering the increasing inflation, the price of nacho chips did not rise. Moreover, salsa dip may soon be faced with these same problems as well. The pricing strategy should consider the competition, market analysis, and more importantly the production costs.

- Optional suggestion: rolling budgeting/forecasting was proposed as a process by which to avoid such problems in the future.

Considering the interview with the analyst, the scale for Scenario 1 can be summarised as per Figure 4. As one may see, the analyst registered scores in all categories except for the interpretation of qualitative data. Also, although the answer came after approximately two hours and could be considered fast, it was necessary to plan a meeting with the analyst one week in advance.

Figure 4. Human checklist score

Area	Criteria	Wage	Checked? Human	Final Points Human
Decision making problem	Gather qualitative data (ask questions)	5	yes	5
	Interpret the qualitative data	2	no	0
	Gather quantitative information (data)	5	yes	5
	Interpret the quantitative data	3	yes	3
	Discover product complementariness	5	yes	5
	Find the root cause (margin)	5	yes	5
	Propose a pricing strategy	5	yes	5
	Propose other solutions (material)	5	yes	5
	Propose other solutions (non-material)	1	yes	1
Add. Criteria	Speed	3	no	0
	Independence	3	yes	3
	Holistic view	3	yes	3
# of affirmative responses and total score			10	40

Source: own elaboration

Looking at the abovementioned solution, H1 can be confirmed positively. The next step, then, was to repeat the process with

AI as the decision-making tool. The decision-making process for Scenario 2 can be summarised as in Figure 5 below.

Figure 5. ChatGPT business decision making process



Source: own elaboration

The amount of information and ideas received from the AI is impressive. However, obtaining the information involved responses that required solid business acumen. For example, immediately after providing the general Snack Company background, ChatGPT asked questions about revenue, market demand, competitors, environment/regulatory changes, the main cost drivers, and (similarly to the human analyst) the marketing and sales strategy. Since we assumed that the owner did not have a great deal of business acumen, advanced questions were answered “I don’t know”. Hence, we may consider the possibility of ChatGPT asking for qualitative data.

In general, after providing the information, the AI was able to offer five suggestions:

1. Cost structure analysis
2. Pricing strategy improvement
3. Sales channel increases
4. Marketing strategy improvement
5. Understanding the customers

Further, ChatGPT provided a detailed description of the suggestions above, which may be considered as interpretation of qualitative data on the created scale. Unfortunately, ChatGPT did not ask for any financial statements by itself; hence, no points were awarded for gathering financial data. However, in order to test the AI further, we insisted on providing additional information and fed the ChatGPT the financial data – a simple copy/paste manoeuvre from MS Excel. Surprisingly, the AI was able to read and interpret said data to draw

conclusions about decreasing margins and problems in the Nacho Chips business unit. Its conclusion was to optimise the cost, expand sales channels and consider additional sales in the profitable Salsa Dip business unit. For the next test, the owner asked the AI whether it might be worth closing the Nacho Chips business unit, to which the AI replied negatively. The entire conversation can be found in the appendix to this paper. Due to the high level of business knowledge required and the follow-up questions, the AI was able to provide clear suggestions, albeit not completely independently of human assistance. A person without solid business acumen and eagerness to learn the terminology would not benefit from a great deal of help on this topic. The solutions were also helpful, although very “generic”.

The summary of the scale can be found in Figure 6. It is important to mention that although the pricing strategy was indicated, no particular strategy was proposed by AI, in contrast to the human analysts. The same occurred in the context of information gathering. If the business owner did not provide additional information by himself, the AI did not ask for it. The speed of the AI response was surprising, and indeed an area in which AI performance can be considered significantly superior to that of the human. ChatGPT answered the questions within seconds. Overall, ChatGPT achieved a low score of 24 points in total. However, this is not sufficient to definitely reject H2. Further research is needed.

Figure 6. ChatGPT checklist score

Area	Criteria	Wage	Checked? Final Points	
			AI	AI
Decision making problem	Gather qualitative data (ask questions)	5	yes	5
	Interpret the qualitative data	2	yes	2
	Gather quantitative information (data)	5	no	0
	Interpret the quantitative data	3	yes	3
	Discover product complementarity	5	no	0
	Find the root cause (margin)	5	yes	5
	Propose a pricing strategy	5	no	0
	Propose other solutions (material)	5	yes	5
	Propose other solutions (non-material)	1	yes	1
Add. Criteria	Speed	3	yes	3
	Independence	3	no	0
	Holistic view	3	no	0
# of affirmative responses and total score			7	24

Source: own elaboration

Lastly, we investigated the centaur model (Scenario 3) and asked the analyst to work

together with AI. The process can be summarised as per Figure 7:

Figure 7. Centaur business decision-making process



Source: own elaboration

One may immediately note that the process is slightly different and longer than the one in Scenario 1, but there are multiple similarities. In this scenario, rather than having a conversation, the analyst utilised AI in a professional way, giving commands and assumptions. Hence, as part of step 1, the input and assumption section were required. After receiving the data together with the assumptions, the AI provided three potential business solutions:

1. Cost-benefit analysis
2. Pricing strategy
3. Product expansion

Surprisingly, the first two options are exactly in line with what the analyst initially

suggested during Scenario 1. After receiving the options, the human analyst investigated the steps for each of the proposals in more detail. The analyst confirmed that he was unaware of all the details and mentioned that those were highly informative, albeit not a factor in decision making for this particular case. AI was able to provide detailed strategies around those issues. The analyst would not consider product expansion in the end because of the risks inherent in the current environment, suggesting a holistic view. All in all, the collaboration was useful, fast and in line with the human decision-making process. The human analyst definitely drove the conversation and

the decision-making process, while the AI remained very supportive. The analyst also admitted that the problem of his limited knowledge of the literature on multiple topics was negated when working in cooperation with AI, hence increasing the speed of the process even further. The AI was also able to provide multiple interpretations

on every indicator or strategy after the human asked questions (qualitative/quantitative interpretation). Not only did the centaur model score the most points as per Figure 8, but H3 can be confirmed positively. The entire conversation can be found in Appendix 2.

Figure 8. Centaur checklist score

Area	Criteria	Wage	Checked? Centaur	Final Points Centaur
Decision making problem	Gather qualitative data (ask questions)	5	yes	5
	Interpret the qualitative data	2	yes	2
	Gather quantitative information (data)	5	yes	5
	Interpret the quantitative data	3	yes	3
	Discover product complementariness	5	yes	5
	Find the root cause (margin)	5	yes	5
	Propose a pricing strategy	5	yes	5
	Propose other solutions (material)	5	yes	5
	Propose other solutions (non-material)	1	yes	1
Add. Criteria	Speed	3	yes	3
	Independence	3	yes	3
	Holistic view	3	yes	3
# of affirmative responses and total score			12	45

Source: own elaboration

Conclusions

This article leverages an experimental technique to investigate three scenarios that offer solutions to a strategic business issue. A checklist with weighted scoring was developed to compare the performance of the three scenarios. The research problem was related to profits decreasing over a two-year period at a manufacturing company. All three scenarios were categorised depending on the involvement of the AI language model ChatGPT, as listed below:

- Human scenario (Scenario 1)
- AI scenario (Scenario 2)
- Centaur scenario (Scenario 3)

Scenario 1 involved purely human work and investigated the decision-making process of a human analyst. Scenario 2, by contrast, used a person referred to as a “business owner” who did not have a great deal of business acumen (apart from information on a simplified profit and loss statement) and interacted with the AI as he would converse with another human. Lastly, Scenario 3 involved a human analyst who had solid business acumen and was able to effectively leverage the language model (with commands rather than a conversation). The scores and final results of all three scenarios are shown in Figure 9 below:

Figure 9. Summary checklist score of all scenarios

Area	Criteria	Wage	Checked?			Final Points		
			Human	AI	Centaur	Human	AI	Centaur
Decision making problem	Gather qualitative data (ask questions)	5	yes	yes	yes	5	5	5
	Interpret the qualitative data	2	no	yes	yes	0	2	2
	Gather quantitative information (data)	5	yes	no	yes	5	0	5
	Interpret the quantitative data	3	yes	yes	yes	3	3	3
	Discover product complementarity	5	yes	no	yes	5	0	5
	Find the root cause (margin)	5	yes	yes	yes	5	5	5
	Propose a pricing strategy	5	yes	no	yes	5	0	5
	Propose other solutions (material)	5	yes	yes	yes	5	5	5
Add. Criteria	Propose other solutions (non-material)	1	yes	yes	yes	1	1	1
	Speed	3	no	yes	yes	0	3	3
	Independence	3	yes	no	yes	3	0	3
	Holistic view	3	yes	no	yes	3	0	3
# of affirmative responses and total score			10	7	12	40	24	45

Source: own elaboration

Ultimately, the worst scenario, although still impressive, was Scenario 2, purely based on AI. The AI programme was able to provide a number of insights and proposals, but human input would be required to ask additional questions and have at least an average understanding of business. The outcome of Scenario 3 could be described as similar to “Wikipedia” providing up-to-date information.

In general, the results of Scenario 1 and Scenario 3 were very similar. In fact, the AI programme offered the same first two proposals as the human (cost evaluation and pricing strategy). In addition, it was able to provide helpful information about business theories that the analyst was not aware of or had not considered.

This research can be considered valuable for a number of reasons. Managers can use AI to get additional insights on their business performance or the related theories. The AI user should bear in mind that general knowledge of a particular topic is helpful. Also, providing ChatGPT with clear commands, data and assumptions substantially helps with the business decision-making process.

The study was, however, beset by certain limitations. One included the paucity of available literature on the utilisation of AI language models for business decision making. Secondly, the methodology, which involved an experiment and the qualitative comparison of three scenarios and one analyst, could definitely be expanded. Lastly, the rapid technological progress with respect to AI language model training may make this research obsolete in a mere few years, if not months.

The limitations, however, can be considered the next step for further research. Scientists may develop specific methodologies to compare AI with managers and undertake further research when new versions of AI language models become available.

Disclosures on AI-Generated Content

The article was generated entirely by the authors without assistance from an AI-based system. The AI conversations in the Appendix were used purely for methodological purposes to compare the business decision-making process of a human with that of an AI language model.

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Appendix

Appendix 1: Conversation with AI, Scenario 2.



I need some advice on the performance of my business. Can you help out?



Of course, I'd be happy to help! Please provide me with some more details about your business and the specific areas you would like to improve upon. This will enable me to give you more targeted advice.



I do not have a lot of business acumen, so please feel free to ask questions. My business is called Snacks Company and is structured into two business units. Nacho Chips and Salsa Dip. We are running the production since couple of years but encountered EBIT decreases from 2021 onwards.



I understand. Here are some questions that will help me get a better understanding of your business:



1. What is the current size of your business in terms of revenue, number of employees, and market share?
2. What is the current market demand for nacho chips and salsa dip, and how does your business unit compare to your competitors in terms of product quality, price, and distribution?
3. Have there been any recent changes in your business environment, such as new regulations, changes in consumer preferences, or disruptions in the supply chain that may have contributed to the decrease in EBIT?
4. What are the main cost drivers for your business, and have there been any changes in these costs that have affected your profitability?
5. What marketing and sales strategies are you currently employing to promote your products, and how effective have they been in generating sales?

Once I have a better understanding of your business, I can provide more targeted advice on how to improve your performance.



I will answer what I know and have.

1. The total revenue ranges from 700k USD in 2020 to 840k USD in 2022.
2. Sales increases from 100k units to 120k units from 2020 to 2022.
3. I don't know.
4. Fixed costs are stable, but variable cost increased from 420k USD to 684k USD (2020 vs
5. I don't know.



Based on the information you provided, here are some initial suggestions to improve the performance of your business:

1. **Analyze your cost structure:** Your variable costs have significantly increased, which could be impacting your EBIT. It would be helpful to understand the reasons behind this increase and whether it can be reduced or optimized. Conducting a detailed analysis of your cost structure, including material costs, labor costs, and overheads, can help you identify areas where you can save costs without compromising on quality.
2. **Improve your pricing strategy:** If your competitors are offering similar products at a lower price, you may want to consider adjusting your pricing strategy. You could also explore offering promotions and discounts to attract more customers.
3. **Increase your sales channels:** Consider expanding your sales channels to reach a wider customer base. For example, you could explore selling your products online, through third-party retailers, or by partnering with other businesses that complement your products.
4. **Improve your marketing strategy:** It's important to have an effective marketing strategy to promote your products and increase brand awareness. This could include social media participating in trade shows or sponsoring events to increase visibility.
5. **Understand your customers:** It's important to understand your customers' preferences and needs to develop products that meet their expectations. Conducting market research, customer surveys, and focus groups can help you gather feedback and insights to improve your products and services.

I hope these suggestions are helpful. Remember that improving the performance of a business is an ongoing process that requires continuous effort and evaluation. Good luck with your business!



Thank you. I have a detailed cost analysis for two of my business units, would this help you?



Yes, a detailed cost analysis for your business units would be helpful in identifying areas where you can optimize your costs and improve your profitability. Please provide me with the cost analysis, and I will do my best to analyze the information and provide you with more targeted advice.



I have this table, is it helpful?

kUSD	Snacks Company Total			Nacho Chips			Salsa Dip		
	2020	2021	2022	2020	2021	2022	2020	2021	2022
Unit Price	n/a	5	5	2	2	2			
Sales	100	110	120	100	110	120			
Revenue	700	770	840	500	550	600	200	220	240
Unit variable cost	n/a	4	5	5.5	0.2	0.2	0.2		
Total variable cost	420	572	684	400	550	660	20	22	24
Margin 1	280	198	156	100	0	-60	180	198	216
Fixed Cost	60	60	60	50	50	50	10	10	10
EBIT	220	138	96	50	-50	-110	170	188	206



Thank you for providing this information. Based on the table, here are some observations and suggestions to improve the performance of your business:

1. Margins: The margin for the Nacho Chips business unit decreased significantly from 2020 to 2022, which is contributing to the overall decrease in EBIT. This could be due to the increase in variable costs, as the unit price remained constant. It would be helpful to understand the reasons behind the increase in variable costs and whether there are any opportunities to optimize these costs.
2. Fixed Costs: Your fixed costs remained stable over the years, which is a positive sign. However, it would be helpful to review your fixed costs to see if there are any opportunities to reduce them without compromising on quality or productivity.
3. EBIT: Your overall EBIT decreased from 2020 to 2022, which is a concerning trend. To improve your EBIT, you could consider increasing your revenue by expanding your sales channels, improving your pricing strategy, and enhancing your marketing efforts. Additionally, you could review your cost structure to optimize your variable and fixed costs.
4. Salsa Dip: The Salsa Dip business unit has a higher margin compared to the Nacho Chips business unit. It may be worthwhile to focus on expanding this business unit or introducing new products in this category to increase revenue and improve overall profitability.

In summary, to improve the performance of your business, it would be helpful to focus on optimizing your cost structure, expanding your sales channels, and enhancing your marketing efforts. Additionally, you may want to consider focusing on the Salsa Dip business unit or introducing new products in this category to increase revenue and profitability.



Would it be worth to shut down the nacho chips business unit to use the resources for the salsa dip business unit?



Based on the information provided, it is difficult to determine whether it would be worth shutting down the Nacho Chips business unit and redirecting resources towards the Salsa Dip business unit.



While the Nacho Chips business unit is currently not as profitable as the Salsa Dip business unit, it still generates a significant amount of revenue for your company. Additionally, shutting down the Nacho Chips business unit would likely result in the loss of customers who prefer this product, which could negatively impact your overall revenue.

Before making a decision to shut down the Nacho Chips business unit, it would be helpful to analyze the long-term potential of this product category and identify opportunities to optimize its cost structure and increase its profitability. You may also want to consider exploring new markets or distribution channels to expand your customer base and increase your revenue.

In summary, while it is important to focus on optimizing your resources and maximizing profitability, it may not be advisable to shut down a business unit without conducting a thorough analysis of its potential and exploring all possible opportunities for improvement.

Appendix 2: Conversation of an analyst with AI, Centaur Scenario (Scenario 3).



Act as a business consultant and help with a strategic problem



Of course, I'm here to help. What specific strategic problem are you facing in your business?



Assume the following. The company is in the FMCG manufacturing business. Turnover is around 800K USD per year. There are two business units, Nacho Chips and Salsa Dip. Products are sold complementary but have different profitability. Let me feed you with the financials in the next step.



Great, please provide me with the financials for both business units so I can better understand the situation and provide more targeted advice.



This is information for 3 years, from 2020 to 2022 for two business units. Can you read it?

kUSD	Nacho Chips			Salsa Dip		
	2020	2021	2022	2020	2021	2022
Unit Price	5	5	5	2	2	2
Sales	100	110	120	100	110	120
Revenue	500	550	600	200	220	240
Unit variable cost	4	5	5.5	0.2	0.2	0.2
Total variable cost	400	550	660	20	22	24
Margin	100	0	-60	180	198	216
Fixed Cost	50	50	50	10	10	10
EBIT	50	-50	-110	170	188	206



Thank you for providing the financial information. Based on the data, it seems that the Salsa Dip business unit is significantly more profitable than the Nacho Chips unit.

One immediate suggestion would be to conduct a cost-benefit analysis of the Nacho Chips unit to identify any inefficiencies or areas of improvement that could help to increase its profitability. This analysis could include a review of the unit's manufacturing process, supply chain, and distribution channels.

Another option would be to evaluate the pricing strategy for both units. While it may not be feasible to increase the price of the Nacho Chips too much, a slight increase in price combined with a reduction in the unit variable cost could help to improve its profitability. On the other hand, since the Salsa Dip is already highly profitable, a small decrease in the unit price combined with a slight increase in the unit variable cost may be an option to increase the volume sold while maintaining profitability.

Additionally, it might be worthwhile to consider expanding the product line for the Salsa Dip unit. Since it has a strong profitability record, this could be an opportunity to leverage the existing distribution channels and increase overall revenue.

Finally, exploring potential partnerships or collaborations with other businesses in the FMCG industry could be a way to create new revenue streams and increase overall profitability. This could include partnerships with complementary businesses such as soft drink or beer manufacturers, or exploring new markets through export partnerships.

Overall, a combination of these strategies could help to improve the profitability of the Nacho Chips unit and leverage the strong profitability of the Salsa Dip unit to create new revenue streams for the business.



Give me steps for a successful cost benefit analysis.



Sure, here are some steps to follow for conducting a successful cost-benefit analysis:



1. Identify the objective: Define the goal of the cost-benefit analysis, such as identifying inefficiencies, assessing the financial feasibility of a project, or determining the economic impact of a policy change.
2. Identify the alternatives: Determine the various alternatives that could address the objective. For example, if the objective is to identify inefficiencies, alternatives could include changes in the manufacturing process, supply chain optimization, or reduction in fixed costs.
3. Identify the costs: List all costs associated with each alternative, including direct costs such as labor, materials, and overhead, as well as indirect costs such as opportunity costs and potential legal or regulatory costs.
4. Identify the benefits: Determine all benefits associated with each alternative, such as increased revenue, reduced waste, or improved customer satisfaction.
5. Assign monetary value to costs and benefits: Quantify the monetary value of each cost and benefit to ensure that they can be compared directly. For example, costs can be measured in terms of dollars spent, while benefits can be measured in terms of additional revenue or improved efficiency.
6. Calculate the net present value: Discount the future costs and benefits to the present value to account for the time value of money. This will help to determine the net present value (NPV) of each alternative.
7. Compare alternatives: Compare the NPVs of each alternative to determine the most financially feasible option.
8. Sensitivity analysis: Perform a sensitivity analysis to determine how changes in assumptions or inputs could impact the results of the cost-benefit analysis.
9. Present the findings: Finally, present the results of the cost-benefit analysis, including the NPVs of each alternative and the sensitivity analysis, to key stakeholders and decision-makers to inform their decision-making process.

By following these steps, you can conduct a thorough and effective cost-benefit analysis that can help you make informed decisions about your business strategies.



Give me proposals for a pricing strategy for this business.



Sure, here are some pricing strategy proposals for your business based on the financial information you provided:

1. Bundle pricing: Consider bundling Nacho Chips and Salsa Dip together as a combo deal at a slightly discounted price. This can incentivize customers to purchase both products and potentially increase overall sales volume.
2. Premium pricing: Since Salsa Dip is already highly profitable, you could consider slightly increasing its unit price and positioning it as a premium product. This could increase its perceived value and justify the higher price point.
3. Cost-plus pricing: You could use a cost-plus pricing strategy, where you add a markup to the total cost of production for each product. This can ensure that you are covering your costs and generating a profit on each sale.
4. Promotional pricing: Consider running promotional pricing on Nacho Chips to increase sales volume. For example, you could offer a discount for a limited time or run a "buy one, get one free" promotion to incentivize customers to try the product.
5. Dynamic pricing: Consider implementing a dynamic pricing strategy where the price of each product changes based on supply and demand. This can be particularly useful for Nacho Chips, where demand may fluctuate based on factors such as seasonality or events.
6. Value-based pricing: Finally, you could consider a value-based pricing strategy, where you price your products based on the value they provide to customers rather than just the cost of production. For example, if Nacho Chips are particularly popular with customers, you could increase the price slightly based on their perceived value.

Overall, the pricing strategy you choose will depend on a number of factors such as your target market, competition, and production costs. It's important to carefully evaluate each option and test different pricing strategies to see what works best for your business.



What to consider when expanding the profitable salsa dip business unit? Give me clear steps.



Sure, here are some steps to consider when expanding the profitable salsa dip business unit:

1. Market research: Conduct market research to determine the potential demand for the salsa dip product in new markets. This could include surveys, focus groups, and competitive analysis to identify market trends and customer preferences.
2. Financial analysis: Analyze the financial feasibility of expanding the salsa dip business unit. This could include analyzing the costs of production, distribution, and marketing as well as potential revenue streams and profitability projections.
3. Supply chain management: Ensure that the supply chain can handle the increased demand for the salsa dip product. This may involve securing additional suppliers, increasing production capacity, or optimizing distribution channels.
4. Marketing strategy: Develop a marketing strategy to promote the salsa dip product in new markets. This could include advertising, social media campaigns, and collaborations with influencers or other businesses.

5. **Distribution strategy:** Develop a distribution strategy to ensure that the salsa dip product is available in new markets. This could include partnerships with retailers or distributors, online sales channels, or opening new sales channels such as foodservice or catering.
6. **Regulatory compliance:** Ensure that the salsa dip product complies with all relevant regulatory requirements in new markets. This may involve obtaining permits or certifications, adhering to labeling and packaging requirements, or complying with food safety regulations.
7. **Launch plan:** Develop a launch plan for the expansion of the salsa dip business unit. This should include timelines, budgets, and milestones to ensure a smooth and successful launch.
8. **Performance measurement:** Develop metrics to measure the success of the expansion, such as sales volume, revenue, and profitability. Monitor these metrics regularly and adjust the strategy as needed to optimize performance.

By following these steps, you can develop a clear and comprehensive plan for expanding the profitable salsa dip business unit into new markets.



We have limited amount of resources. Where to start with the business improvement process?



When resources are limited, it's important to focus on areas of the business that will have the greatest impact on improving performance. Here are some steps you can take to prioritize where to start with the business improvement process:

1. **Identify the most pressing issues:** Start by identifying the most pressing issues facing the business. This could include issues related to production, sales, marketing, finance, or customer service. Prioritize those issues that are having the biggest impact on performance or that are causing the most frustration for customers or employees.
2. **Evaluate the potential impact:** Once you have identified the most pressing issues, evaluate the potential impact of addressing each issue. This could include analyzing the potential revenue or cost savings associated with improving a particular process or addressing a specific issue.
3. **Assess resource requirements:** Assess the resource requirements for each improvement initiative. This includes not only financial resources but also personnel, time, and equipment. Prioritize initiatives that require fewer resources or that can be implemented quickly and with minimal disruption to ongoing operations.
4. **Develop a roadmap:** Develop a roadmap for implementing the improvement initiatives, prioritizing those with the greatest potential impact and requiring the fewest resources. This roadmap should include timelines, milestones, and metrics to measure progress and success.
5. **Monitor and adjust:** Monitor progress on the improvement initiatives regularly and adjust the roadmap as needed. This may involve reallocating resources, adjusting timelines, or changing the focus of improvement initiatives based on new information or changing circumstances.

By following these steps, you can prioritize where to start with the business improvement process and develop a roadmap for addressing the most pressing issues and improving overall performance, even with limited resources.