

STRATEGIC INJUSTICE IN GOALS SETTING AFTER USE OF AI

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Purpose: To indicate the effects of setting strategic sales targets and the effects of their development over time using simulations in the NetLogo system and to show how the effects of sales target decision-making using artificial intelligence may evolve, and to indicate the extent to which discriminating some targets against others may affect their formation in subsequent forecast periods.

Design/methodology/approach: The goal will be achieved on the basis of the results obtained from simulations using NetLogo in the “cake sharing” model. This model, after taking into account the necessary modifications to be made to it, seems reasonable. This is due to the assumption that it is not possible to continuously maximise all objectives simultaneously. The simulation involves the preparation of a model in the NetLogo environment and the development of appropriate analytical support in Python to investigate how the choice of different sales targets shapes business performance. The simulation assumes 500 iterations, during which four possible operating strategies will be explored: maximising sales volume, maximising the value of ROI (Return on Investment), minimising the volume of sales costs and maximising the value of social objectives (ESG). Four objectives will be set in the system. The first relates to improving a selected performance indicator in this case return on investment (ROI), the second to increasing the volume of revenue, the third to reducing sales costs and the fourth related to ensuring sales sustainability. Once the simplified input conditions for each of the objectives had been established, financial and nonfinancial reports of 2023 of a Warsaw Stock Exchange listed company was entered into the ChatGPT and the user asked to indicate the preferred objective in this situation. This was followed by a programme in Python entered into the NetLogo application allowing accelerated simulation of the development of measures over time. The use of ChatGPT with Netlogo has already been indicated in the literature as having good results (Martinez et al. 2024).

Findings: As a result, it was found that when using AI as a source for recommending strategic goals in the area of sales, there could be discrimination against the other goals. An intervention after one hundred iterations does not significantly change this situation, as AI does not suggest significant changes. Moreover, it may prove to be significantly late in this period. Particularly as the degradation of the value of the other targets appears significant. Hypothesis H1 is therefore confirmed. Regression analysis indicates that, although the other values are also increasing, they are increasing at a much lower rate than those associated with the overarching goal. Hypothesis H2 was similarly positively verified. The use of artificial intelligence, in this case the ChatGPT, can lead to decisions that discriminate between certain targets in the sales area. This was particularly evident, for example, with regard to the objective of increasing ROI

and, at the same time, the very low increases associated with the indicator related to social objectives.

Research limitations/implications: Limitations are related to the simplified model used that was based on four goals. It is also to be considered that 500 iterations were made in the stable environment what does not describe a real life company's surroundings.

Practical implications: It can therefore be concluded that, in the simulation environment used, a decision preferring one objective will have the effect of significantly detracting from the value of the other sales objectives over time, and that the use of generative artificial intelligence in the form of OpenAI ChatGPT can lead to decisions that discriminate against some objectives in the sales function area. Managers should be aware of it and to make decision should be familiar with algorithms and models that are used in decision making.

Social implications: It is to be aware that use of AI in strategic goal settings usually discriminate social values as the sales function is usually focused on sales results, ROI and cost more than social goals.

Originality/value: The use of simulation and AI in setting strategic goals in sales department and checking for strategic injustice in goals setting with use of AI.

Keywords: Goals discrimination, Artificial Intelligence, OpenAI.

Category of the paper: Research, Conceptual.

1. Introduction

The application of artificial intelligence in the areas of operation of both individual companies and the economy as a whole is making its mark very clearly. This is indicated by a number of studies raising the replacement of human labour by automated and algorithm- and AI-driven systems (Furman, 2016; Frey, Osborne, 2013, 2017), or the widespread use and impact of AI in the economy (Agrawal et al., 2019). The application of AI is also making its mark in the area of an organisation's sales function in the context of sales processes supported by artificial intelligence and advanced algorithms (Fisher et al., 2022), the creation of sales value (Paschen et al., 2021) or the use of a range of tools to support sales and customer communication (Hildebrand, Bergner, 2019). Artificial intelligence is also being used to forecast sales performance and support sales performance in this regard (Mehendale et al., 2019), or to predict demand (Bandara et al., 2019). This, while favouring revenue growth objectives (Trivedi, Patel, 2020), directs attention to the other objectives that the sales function could, and perhaps should, set and achieve. The research problem that arises, therefore, concerns the preference of the goal indicated by artificial intelligence among the possible choices.

The purpose of the study is to indicate the effects of setting sales targets and the effects of their development over time using simulations in the NetLogo system (Tisue, Wilensky, 2004).

Four objectives will be set in the system. The first relates to improving a selected performance indicator in this case return on investment (ROI), the second to increasing the volume of revenue, the third to reducing sales costs and the fourth related to ensuring sales

sustainability. Once the simplified input conditions for each of the objectives had been established, data was entered into the ChatGPT and the user asked to indicate the preferred objective in this situation. This was followed by a programme in Python entered into the NetLogo application allowing accelerated simulation of the development of measures over time. The use of ChatGPT with Netlogo has already been indicated in the literature as having good results (Martinez et al., 2024). Once the results were obtained, they were indicated again to ChatGPT with a request to verify them in the next round. The result obtained was again subjected to simulation using NetLogo.

2. Context and purpose of the research

Organisations are increasingly using artificial intelligence systems, algorithms or analytical tools in task performance, forecasting and decision-making. Whether assessing creditworthiness, selecting colleagues or determining directions. The algorithms used for this purpose, however, are not without bias and are also often not objective when making assessments. An “algorithmic injustice” is indicated, where even a system that is assumed to be objective may, after taking into account certain variables, have a significant tendency to discriminate against, for example, particular groups of people, issues or areas. Although such action may not be intended by the algorithm developers, it can happen under the influence of the data, especially those used when training the model. Model bias can therefore affect decisions made in various areas of an organisation's operations, including the management of the sales function. This is not only true for decision-making issues related to selling methods or determining target customer groups, but also for strategic issues such as shaping the sales target. This is especially true if the algorithm will dictate that it should aim to maximise the value of the target. This is also a concern of algorithmic fairness theory (AFT) where designing, evaluating, and regulating algorithms also AI should lead to equal treatment of groups or social sensitive issues (Zhou et al., 2021; Morse et al., 2021; Juin, 2023). Being aware that discrimination and bias may arise from data or model structure. AFT balancing accuracy and social values deals with trained models that may amplify inequalities while progressing. This paper also should lead to build more responsible AI systems.

The aim of the study is therefore to show how the effects of sales target decision-making using artificial intelligence may evolve, and to indicate the extent to which discriminating some targets against others may affect their formation in subsequent forecast periods.

Two research hypotheses were also posed:

H1: Preferring one target to another will have the effect of significantly detracting from other sales targets over time.

H2: The use of generative artificial intelligence in the form of OpenAI ChatGPT may lead to decisions that discriminate between some targets in the sales function area.

The verification of the hypotheses will be done on the basis of the results obtained from simulations using NetLogo in the “cake-sharing” model. This model, after taking into account the necessary modifications to be made to it, seems reasonable. This is due to the assumption that it is not possible to continuously maximise all objectives simultaneously. The Pareto equilibrium, for example, may apply here. Once this is achieved, it is not possible to increase the level of one objective without worsening the situation of the others. Maximising revenue growth may limit the maximisation of achievement levels of social, or even efficiency or cost-of-sales goals. So, if we perhaps simplistically assume that the total to be shared between the objectives is 100%, the research question is whether the algorithm will pursue a Pareto balance and seek to optimise the levels of the objectives in the long term, or whether it will prefer to maximise the one set to it by the AI.

3. Model of simulation

The simulation involves the preparation of a model in the NetLogo environment and the development of appropriate analytical support in Python to investigate how the choice of different sales targets shapes business performance. The simulation assumes 500 iterations, during which four possible operating strategies will be explored: maximising sales volume, maximising the value of ROI (Return on Investment), minimising the volume of sales costs and maximising the value of social objectives.

An agent simulation model will be created within NetLogo to reflect the dynamics of the sales process with changing market conditions, competition and available resources. Each agent representing a salesperson or sales department will make decisions based on the currently selected strategic objective. Python programming will be used both to prepare the input data (including processing of annual reports and non-financial data of the company) and to analyse the results of the simulation - including the construction of evaluation functions that will measure how well the set objectives are being met.

A key role in this process will be played by ChatGPT, which will automatically recommend a sales target for a given simulation cycle based on the analysis of financial and non-financial reports. The decision to select a target will be based on an analysis of prevailing trends, such as the priority of increasing revenue, improving financial efficiency (ROI), reducing sales costs or increasing social impact (ESG). In the context of the social objective, general indicators have

been selected to be introduced into the model, but which can influence the achievement of the others. These include donating a portion of turnover to social causes, removing provisions from contracts that are disadvantageous to customers but profitable for the organisation, and the organisation of free training by the company's sales staff for local communities. These objectives may limit the possibility of achieving the sought-after higher or lower values of the other objectives, respectively.

During the 500 iterations of the simulation, it will be observed how the preference for one objective affects other areas. For example, choosing to maximise sales may lead to higher costs and lower ROI, while an emphasis on maximising social value may reduce immediate sales volume but improve long-term customer loyalty rates. Python will be used to build result sets, visualise trends and benchmark analyses between alternative strategies, allowing the discrimination of other objectives to be accurately indicated when one objective is dominant.

The final result of the simulation will therefore be a full characterisation of the interrelationship between objectives in the sales process, enabling the most sustainable sales strategies to be recommended based on the specific market and organisational conditions of the company in question.

The cake-sharing model reflects a situation in which agents compete for predetermined and limited resources or outcomes. Decisions about their allocation consequently affect the targets achieved. In the simulation adopted in the study, the strategic objectives related to the sales function relate to an increase in sales volume, a reduction in sales costs, an increase in ROI and an increase in the social objectives index. These can be treated as a limited resource, or fragments of a whole (cake) to be shared with a resource constraint, and influenced by the chosen strategy of action. Certain assumptions are made here as to the validity of the choice of model.

The constraint associated with increasing sales volumes and reducing sales costs. It can be assumed that an increase in sales volume requires additional costs or investments. Similarly, an increase in sales volume may have a limiting effect on the increase in ROI. Also, social objectives can affect cost increases, ROI decreases and sales volume decreases. Although these objectives are not obviously disconnected, it can be assumed that the achievement of these objectives limits the achievement of the others. It was therefore assumed that in a cake-sharing model, agents would make decisions that account for what part of the cake (costs, sales, ROI, social benefits) would be achieved. This model seems to present well the conflict of interest between objectives and indicates the actual situations in which managers, executives and other sales staff seek a balance between sometimes conflicting demands such as increasing revenue and at the same time spending time on social responsibility tasks. The model thus presents a situation in which objectives compete with each other in a situation of choosing a strategic goal and direction under conditions of limited resources and conflicting interests between objectives.

4. Process of simulation of the strategic goal in the sales function

The simulation uses the Python language and the NetLogo application. It commences with starting the system and defining the environment in which it will operate (Figure 1). The next stage is the AI system's enlistment, or partial input of source data. This data includes the company's annual financial and non-financial activity report for 2023, available on the company's official website. In a further progression, ChatGPT analyses the reports in terms of market sales trends for the indicated industry. It does this according to its own algorithm after asking the prompt 'Base the selection of a target from the indicated ones on the data from the reports and the market analysis and forecasts for the industry in which the company operates'. The target is set as a percentage by ChatGPT and adopted for the simulation.

Once the objective has been set, the simulation is parameterised in the NetLogo environment in Python according to the AI's chosen objective. In the next step, it is tested in a single iteration of the simulation in which agents representing activities in the area of the sales function take actions according to the predetermined priority. In the next phase, there are 500 iterations during which key values are indicated for the adopted targets. These relate to sales volumes, sales costs, ROI values and the level of achievement of social objectives. As the desired direction for the sales costs value is downwards, while for the other measures it is upwards, it is assumed that these will be the percentages for the targets set. Everyone can therefore achieve at most 100% in one step as the value corresponding to the full realisation of the goal. This is also in line with the "divide the cake" model adopted. This is repeated a total of 500 times while the parameters remain unchanged. This is intended to enable the collection of a sufficiently large set of outcome data to be analysed and, consequently, to verify the hypotheses. The way in which the achievement of one dominant objective shapes the achievement of the other objectives will be assessed. This will make it possible to assess the discrimination of other objectives when the system is subordinated to the achievement of the overriding objective. The results are presented visually in the form of graphs.

The simulation model is shown in the diagram (Figure 1). It includes four stages, from initiation, through ChatGPT, entering codes into NetLogo and analysing the simulation results.

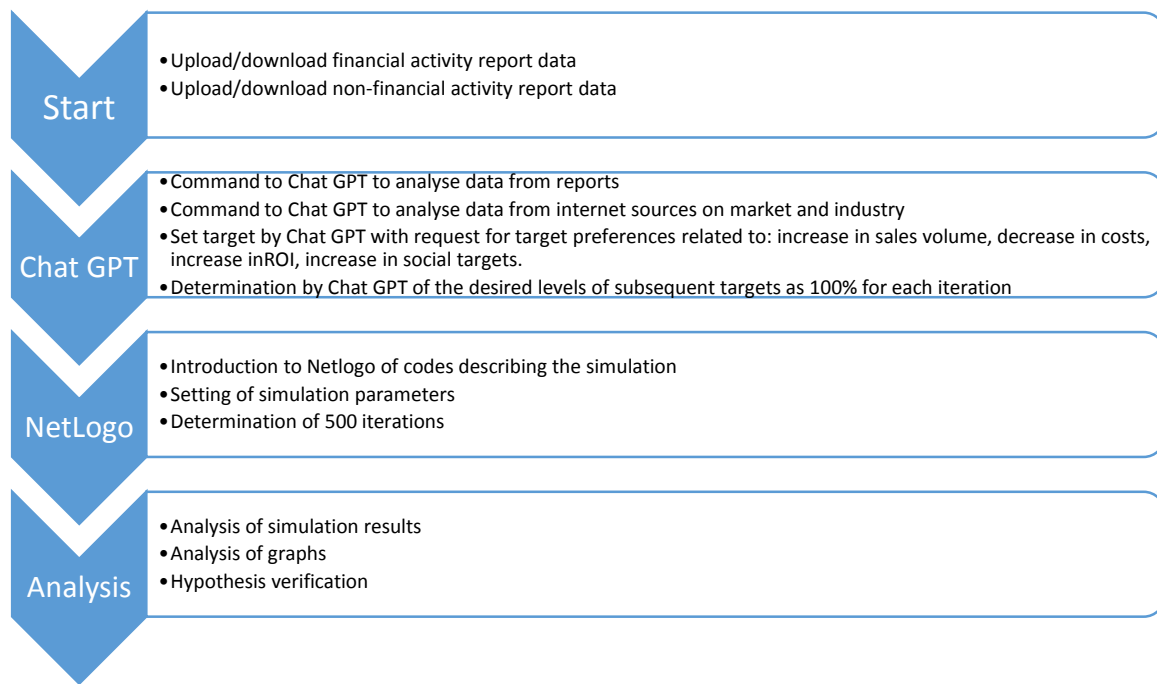


Figure 1. Diagram of the simulation model.

Source: author's own work.

5. Simulation

The simulations performed resulted in four situations. In each of them, the system's preference for individual targets is marked. In each situation, for individual target indications, the discrimination of the other targets is marked, but to varying degrees. Even stopping the simulation after 100 iterations and communicating the results obtained in it to ChatGPT does not change this situation. AI does not suggest significant changes here if the input conditions are still to be maintained.

The simulation for the sales growth target (Figure 2) clearly favours the objective set. This target is also followed by the ROI efficiency target and, to a lesser extent, the sales cost reduction target. However, the target related to social issues seems to be the most affected in this area. The intervention after 100 iterations in the ChatGPT does not change this situation and, under the same assumptions, suggests a continuation of the achievement of the previously set objective with a slight modification. However, regression analysis indicates that the development of the results of the other objectives in this simulation is strongly related to the development of the sales objective (Table 1).

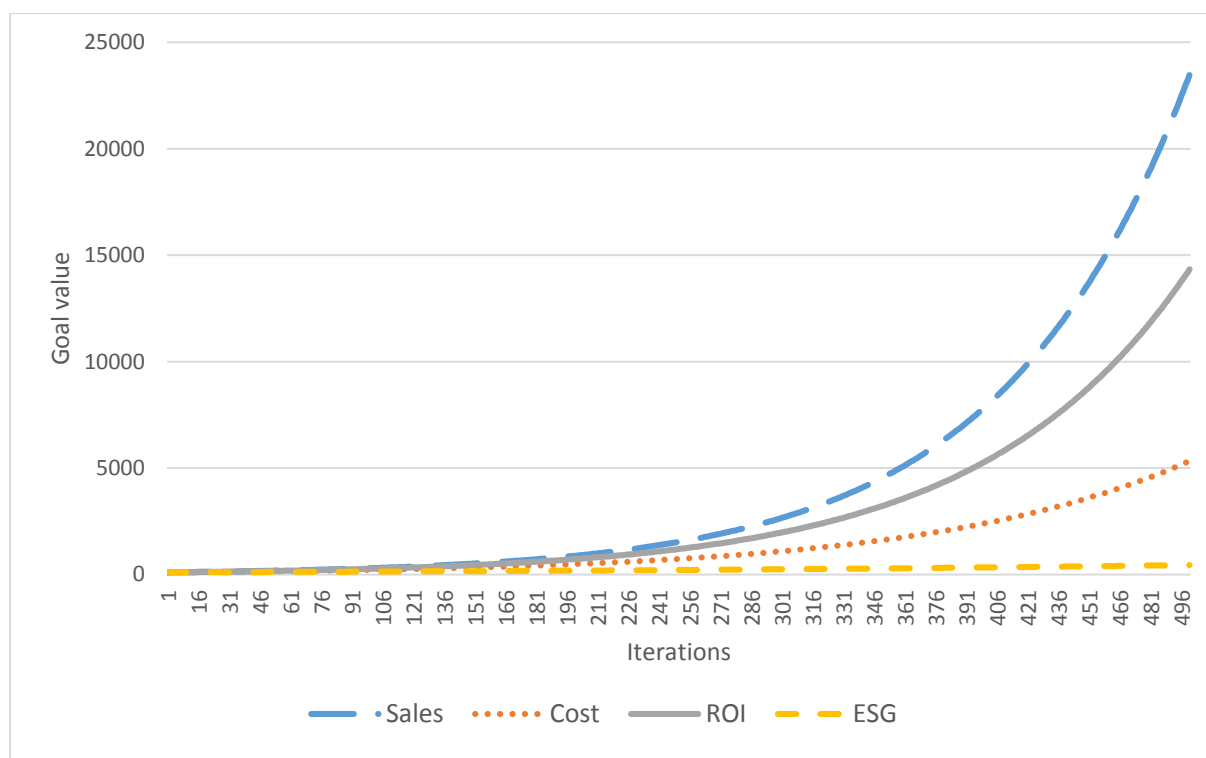


Figure 2. Simulation for the sales growth target.

Source: author's own work.

Table 1.

Linear regression for the independent variable sales growth

Variable	b0	b1 (sales)	SE (b1)	t	p	-/+95% confidence interval	Beta (standar.)	R ²
Cost	299.6	0.237	0.00138	171.7	<0.001	0.2343-0.2397	0.992	0.98
ROI	202.07	0.6218	0.00113	550.9	<0.001	0.6196-0.6241	0.999	0.998
ESG	163.06	0.0159	0.0003	53.39	<0.001	0.0153-0.0165	0.923	0.85

Source: author's own work.

A positive b1 value and relatively high t values indicate statistically significant results. The high R2 indicates a significant explanation of the variation in the individual variables by the sales variable.

Similarly, the goal of reducing sales costs is achieved above all (Figure 3). Here, the other objectives are also achieved to a much lesser extent, but sustainability-related (ESG) objectives are particularly discriminated against.

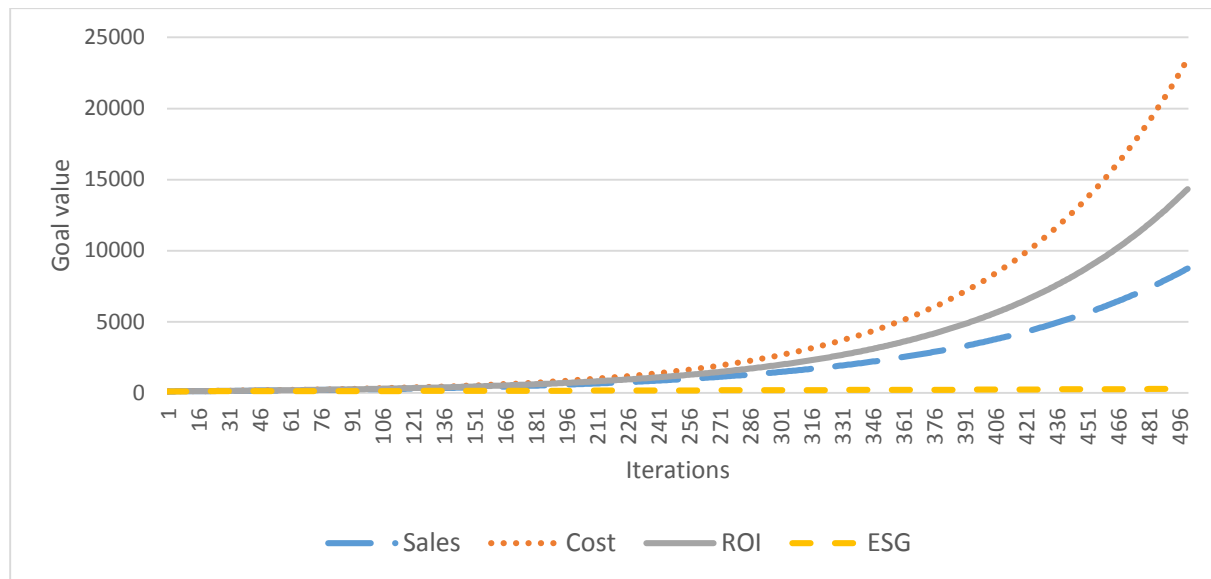


Figure 3. Simulation for the sales cost reduction objective.

Source: author's own work.

In the simple regression analysis for the simulation results (Table 2), positive b1 values and high t values indicate a significant statistical value of the results. In contrast, R2 indicates a significant explanation of the variation in results for ROI and sales cost results and an almost 20% gap in the explanation of the ESG objectives variable, indicating that it is explained by other variables.

Table 2.

Linear regression for the independent variable sales cost reduction

Variable	b0	b1 (cost)	SE (b1)	t	p	-/+95% confidence interval	Beta (standar.)	R ²
Sales	282.94	0.385	0.00144	266.5	<0.001	0.3822 – 0.3879	0.997	0.993
ROI	202.07	0.6218	0.00113	550.9	<0.001	0.6196 – 0.6241	0.999	0.998
ESG	138.31	0.0077	0.00017	45.6	<0.001	0.0074 – 0.0081	0.898	0.806

Source: author's own work.

In a situation in which priority is given to the objective related to increasing the value of ROI (Figure 4), the objective related to increasing the value of sales is achieved to a lesser extent, but the results for the objective related to reducing costs are particularly low, and to an even lesser extent for objectives related to the area of sustainability (ESG).

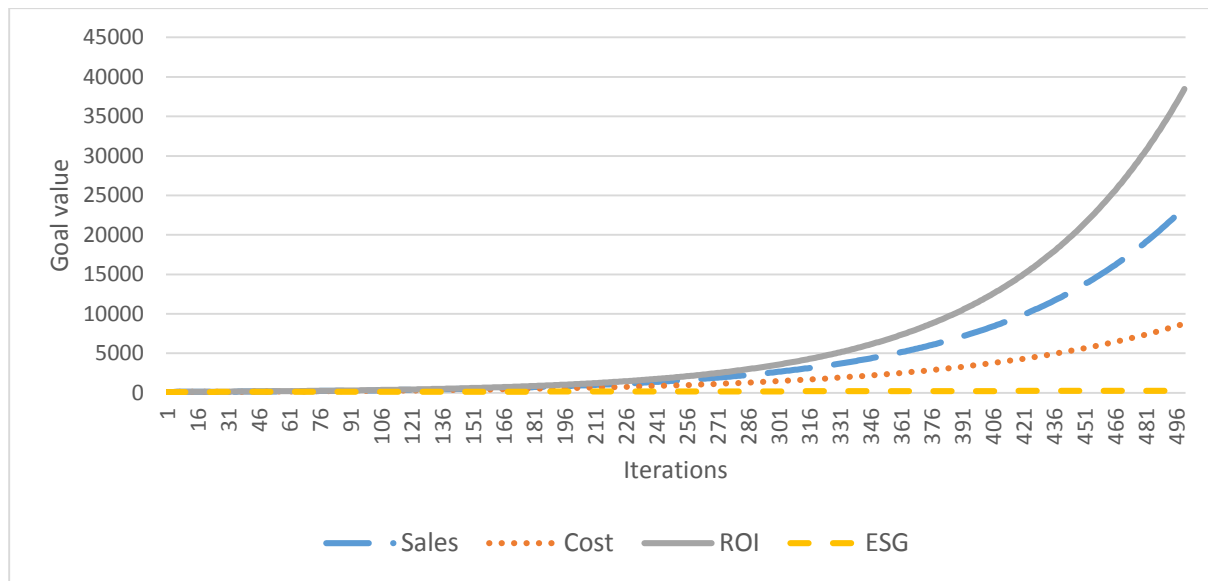


Figure 4. Simulation for the objective of raising ROI.

Source: author's own work.

For the grouping variable ROI (Table 3), b_1 is positive and t is high, but in the case of ESG relatively low in relation to the other two objectives. R^2 indicates that ROI explains costs and sales well and positively, but about 28% of ESG cases are not explained by ROI. In contrast, the narrow ranges indicate good estimation.

Table 3.

Linear regression for the independent variable increase of ROI

Variable	b0	b1 (ROI)	SE (b1)	t	p	-/+95% confidence interval	Beta (standar.)	R ²
Sales	268.742	0.6228	0.00106	586.33	< 0.001	0.6207 – 0.6249	0.9993	0.9986
Cost	391.331	0.2391	0.00131	182.86	< 0.001	0.2365 – 0.2416	0.9926	0.9853
ESG	140.925	0.0047	0.000113	41.82	< 0.001	0.0045 – 0.0050	0.8822	0.7783

Source: author's own work.

For the prioritisation of the social responsibility objective (Figure 5), all the other objectives are discriminated and their values in the subsequent iterations are very low compared to the priority objective. Here, as in the other cases analysed, the intervention in the ChatGPT regarding the indication after 100 iterations of the discrimination of the other three objectives does not significantly change the recommendation in this respect. However, if one wanted to look at the situation a little more positively, in the regression analysis, taking the achievement of ESG as the independent variable and the other goals as the dependent variables, it is indeed the case that a higher level of ESG is associated with a slightly higher increase in revenue than in costs. However, these are disproportionately low compared to the overarching objective (Table 4).

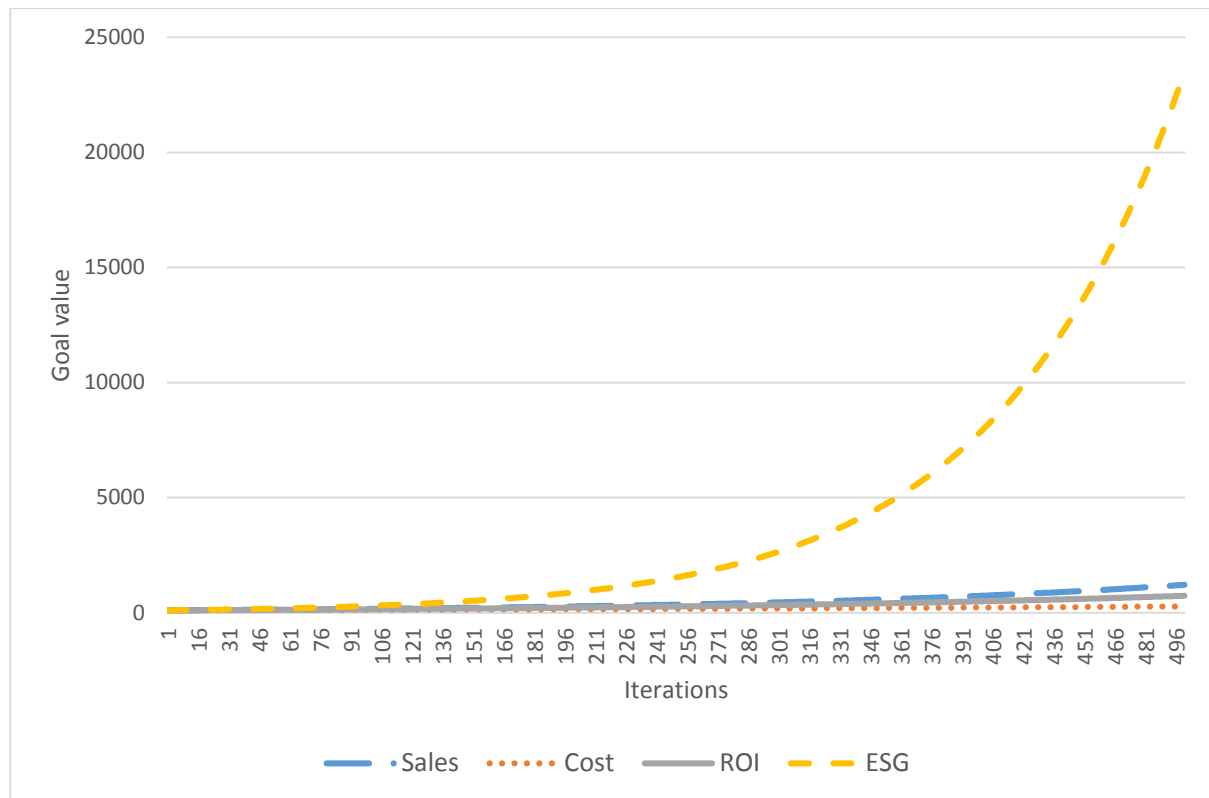


Figure 5. Simulation for the objective of increasing ESG engagement.

Source: author's own work.

Table 4.

Linear regression for the independent variable ESG

Variable	b0	b1 (ESG)	SE (b1)	t	p	-/+95% confidence interval	Beta (standar.)	R ²
Sales	224.44	0.0516	0.00067	76.9	<0.001	0.0503 – 0.0530	0.960	0.92
Cost	139.14	0.0078	0.00017	45.6	<0.001	0.0074 – 0.0081	0.898	0.81
ROI	192.03	0.0294	0.00046	63.4	<0.001	0.0285 – 0.0304	0.943	0.89

Source: author's own work.

For verification, a regression analysis was also performed for the explanatory variable ESG and considering the other variables as dependent. Positive b1 values and high t values were obtained. This indicates their significant statistical value. The relatively high coefficients of the standardised Beta value indicate a strong correlation of the ESG with the other objectives, while the high R2 indicates that 81-92% of the variation in the variables can be explained by the ESG variable.

6. Summary

The study used ChatGPT as an artificial intelligence, whose decision recommendation area can be considered partly verifiable and partly difficult or impossible to determine. The official financial and non-financial reports of a company listed on the Warsaw Stock Exchange should be considered verifiable, while the basing of the recommended target value on market and industry data resulting from ChatGPT's own algorithms and methodologies should be considered difficult to verify. Using the NetLogo software and a divide the cake model, it was determined how such AI-recommended targets might evolve in subsequent iterations. Four options were considered. In the first, the priority was to increase sales volume, in the second to reduce sales costs, in the third to increase ROI values and in the fourth to maximise social objectives. As a result, it was found that when using AI as a source for recommending strategic goals in the area of sales, there could be discrimination against the other goals. An intervention after one hundred iterations does not significantly change this situation, as AI does not suggest significant changes. Moreover, it may prove to be significantly late in this period. Particularly as the degradation of the value of the other targets appears significant. Hypothesis H1 is therefore confirmed. Regression analysis indicates that, although the other values are also increasing, they are increasing at a much lower rate than those associated with the overarching goal. Hypothesis H2 was similarly positively verified. The use of artificial intelligence, in this case the ChatGPT, can lead to decisions that discriminate between certain targets in the sales area. This was particularly evident, for example, with regard to the objective of increasing ROI and, at the same time, the very low increases associated with the indicator related to social objectives. It can therefore be concluded that, in the simulation environment used, a decision preferring one objective will have the effect of significantly detracting from the value of the other sales objectives over time, and that the use of generative artificial intelligence in the form of OpenAI ChatGPT can lead to decisions that discriminate against some objectives in the sales function area. Managers should be aware of it and to make decision should be familiar with algorithms and models that are used in decision making.

It is then important to develop a decision framework for balancing competing objectives in particular when supporting the decision making by AI. There is a need for deeper research in that field to develop the framework that considers algorithmic fairness theory findings. Such a framework could help managers to navigate trade - offs between economic and social goals, short and long term results and other concerns. By leveraging AI driven insights in a structured way it could guide on how to align AI supported decisions with strategic priorities and organizational values, having in mind responsible technology adoption.

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Appendix

Netlogo Code

```
globals [ chosen-goal ;; wybrany cel (np. maximize-sales, maximize-roi, minimize-costs, maximize-social)]
turtles-own [
  sales
  costs
  roi
  social-impact]
to setup
  clear-all
  setup-agents
  setup-environment
  set chosen-goal import-goal-from-chatgpt
  reset-ticks
end
to setup-agents
  create-turtles 50 [
    setxy random-xcor random-ycor
    set sales 0
    set costs 0
    set roi 0
    set social-impact 0
    set shape "person"
    set color blue
  ]
end
to setup-environment
  ;; Opcjonalnie można dodać klientów lub inne elementy środowiska
end
to-report import-goal-from-chatgpt
  let goals ["maximize-sales" "maximize-roi" "minimize-costs" "maximize-social"]
  report one-of goals
end
to go
  if ticks >= 500 [
    export-results
    stop
  ]
  ask turtles [
    perform-sales-activity
    update-indicators
  ]
  tick
end
to perform-sales-activity
  if chosen-goal = "maximize-sales" [
    set sales sales + random-float 10
    set costs costs + random-float 7
  ]
  if chosen-goal = "maximize-roi" [
    let effort random-float 5
    set sales sales + (effort * 2)
    set costs costs + effort
  ]
]
```

```
if chosen-goal = "minimize-costs" [  
  let saving random-float 2  
  set costs costs - saving  
  if costs < 0 [ set costs 0 ]  
  set sales sales + random-float 2  
]  
if chosen-goal = "maximize-social" [  
  set social-impact social-impact + random-float 5  
  set sales sales + random-float 3  
  set costs costs + random-float 2  
]  
end  
to update-indicators  
  if costs + 1 != 0 [  
    set roi (sales - costs) / (costs + 1)  
  ]  
end  
to export-results  
  ; Eksport danych do pliku CSV  
  let file-name (word "results-" chosen-goal ".csv")  
  file-open file-name  
  file-print "sales, costs, roi, social-impact"  
  
  ask turtles [  
    file-print (word sales ", " costs ", " roi ", " social-impact)  
  ]  
  file-close  
  show (word "Wyniki zapisano do pliku: " file-name)  
end
```