Electronic Companion – "Equivalent Inventory Metrics: A Behavioral Perspective" by Stangl and Thonemann

The following instructions are translated from German. We present the instructions for the inventory turn rate treatments. In the days of supply treatments, the instructions differ from those of the inventory turn rate treatment only in the metric used to measure inventory performance.

EC.1. Instructions Investment Experiment

Welcome and thank you for participating in this experiment. Please do not talk to each other from now on, turn off your mobile phones, and put away all your personal belongings.

We ask you to read all instructions carefully. If you have any questions, feel free to raise your hand. The experimenter will then come to you and answer your questions in private. Moreover, after reading the instructions you will have the chance to ask questions in case anything remained unclear. All decisions are made anonymously and will be treated confidentially.

You can earn money in this experiment. How much you will earn depends on your decisions. Your earnings in the course of this experiment are expressed in a virtual unit of currency – the experimental currency unit (ECU). At the end of the experiment, you will receive 1 euro per 3,000 ECUs earned during this experiment. In addition, you will receive a show-up fee of 2.50 euros.

Introduction

The inventory turn rate metric is a measure commonly used in warehousing. It is defined as the annual demand rate divided by the average inventory level. The inventory turn rate thus indicates how many times per year the average inventory level of a product is completely depleted and replenished.

Example: A company sells 10,000 units per year of a product. The average inventory level is 5,000 units. What is the inventory turn rate?

$$\text{Inventory turn rate} = \frac{\text{Annual demand rate}}{\text{Average inventory level}} = \frac{10,000 \text{ units/year}}{5,000 \text{ units}} = 2/\text{year}$$

At constant demand rate, an increase in the average inventory level causes a reduction in the inventory turn rate.

At constant demand rate, a reduction in the average inventory level causes an increase in the inventory turn rate.

Task description

You are in charge of a warehouse, and you will be evaluated on the basis of the average inventory level. Your warehouse contains two products featuring different inventory turn rates. From each product, 10,000 units are sold per year. The unit holding costs are the same for both products.

In each round, you can optimize the inventory management for one of the two products and thus reduce the average inventory level of this product. You will receive a bonus for each unit you reduce your average inventory level. There are no costs for the optimization itself.

You will know the current inventory turn rates of both products and how the inventory turn rates will change after the optimization. In each round, it is your task to select one of the two products for which you want to optimize inventory management.

Experimental protocol

The sequence of the experiment is as follows:

I. Decisions: You will decide in three independent rounds for which product you want to optimize the inventory management. You will receive a bonus for each unit you reduce your average inventory level.
II. Questions: You will answer three short questions.
III. Questionnaire: You will answer general questions regarding your attitudes and preferences.
IV. Questionnaire: Finally, you will answer general questions regarding the experiment and your person.

Payment

Your payment depends on the inventory reduction achieved over all three rounds. For each unit you reduce the average inventory level, you will receive 10 ECUs. At the end of the experiment, you will receive 1 euro per 3,000 ECUs that you have earned during the experiment. In addition, you will receive a show-up fee of 2.50 euros.

EC.2. Instructions Validation Experiment with Managers

Definition

$$\text{Inventory turn rate} = \frac{\text{Annual demand rate}}{\text{Average inventory level}}$$

Situation

You are in charge of a warehouse and you have discovered room for inventory optimization for products A, B, and C. Unfortunately, your budget restrictions allow just one optimization. You know the current inventory turns and how they will change after investing in inventory optimization.

You are evaluated by average inventory value. Which product would you invest in?

At your company, which of the following metrics is used to measure inventory performance?

- ☐ Inventory turn rate
- ☐ Days of supply
- ☐ Both
- ☐ Other (please specify):

EC.3. Instructions Effort Experiment

Welcome and thank you for participating in this experiment. Please turn off your mobile phone, and put away all your personal belongings. We ask you to read all instructions carefully. All decisions are made anonymously and will be treated confidentially.

You can earn money in this experiment. How much you will earn depends on your decisions and your exerted effort. Your earnings in the course of this experiment are expressed in a virtual unit of currency – the experimental currency unit (ECU). At the end of the experiment, you will receive 1 euro per 5,000 ECUs earned during this experiment.

Introduction

The inventory turn rate metric is a measure commonly used in warehousing. It is defined as the annual demand rate divided by the average inventory level. The inventory turn rate thus indicates how many times per year the average inventory level of a product is completely depleted and replenished.

Example: A company sells 10,000 units per year of a product. The average inventory level is 5,000 units. What is the inventory turn rate?

$$\text{Inventory turn rate} = \frac{\text{Annual demand rate}}{\text{Average inventory level}} = \frac{10,000 \text{ units/year}}{5,000 \text{ units}} = 2/\text{year}$$

At constant demand rate, an increase in the average inventory level causes a reduction in the inventory turn rate.
At constant demand rate, a reduction in the average inventory level causes an increase in the inventory turn rate.

Situation

You are in charge of a warehouse with a single product, and you will be evaluated on the basis of the average inventory level. Currently, your warehouse contains on average 5,000 units of this product. 10,000 units are sold per year. Therefore, the initial inventory turn rate of your warehouse is 2 per year.

Depending on your effort, you can now optimize your inventory management and increase your inventory turn rate. You will receive a bonus of 10 ECUs for each unit you reduce your average inventory level.

Task description

In this experiment your effort will be simulated by moving sliders. The sliders are initially positioned at "0" (see Figure 1 (a)). By using the mouse, you can position the slider at any integer value between "0" and "100". The more sliders you correctly position at the target position "50" (see Figure 1 (b)), the more you can reduce your average inventory level. You can adjust each slider an unlimited number of times. In each round, you have 120 seconds to do so.

(a) Initial position at "0" (b) Target position at "50"

Figure 1 Initial and target position of a slider

The average inventory level depends on the number of sliders positioned correctly as follows:

$$\text{Average inventory level} = \frac{5,000 \text{ units}}{1 + 0.1 \cdot \text{Number of sliders positioned correctly}}$$

The inventory turn rate is calculated accordingly:

$$\text{Inventory turn rate} = \frac{\text{Annual demand rate}}{\text{Average inventory level}} = \frac{10,000 \text{ units/year}}{\text{Average inventory level}}$$

Please note that the demand rate stays constant over all rounds.

Sequence of a round

In each round, the sequence is identical. Each round begins with an input screen with 48 sliders (see Figure 2). By positioning the sliders (moving them to the target position of "50"), you can reduce the average inventory level. For this task, you have 120 seconds per round. Within this time, you can freely decide how many sliders you want to position. In the upper part of the input window, you can track how the inventory turn rate changes, once you have positioned a slider correctly.

At the end of each round, on the result screen, you will be informed of the extent to which you were able to increase the inventory turn rate of your warehouse. Once you press "continue", the input screen (Figure 2) appears again and the next round starts.

Please note that you will start the next round with the inventory turn rate you have achieved in the previous round. This means that you can continuously reduce your average inventory level over all rounds.

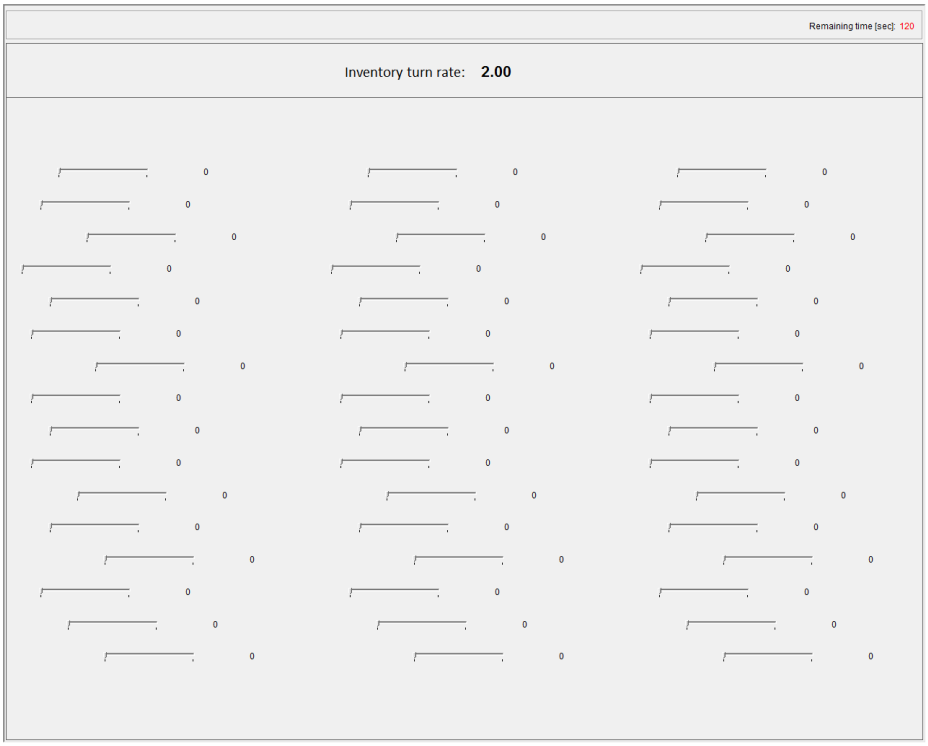

Figure 2 Input screen

It is up to you how many rounds you exert effort. If you do not want to exert any more effort, please press "terminate experiment" on the result screen. You will then immediately receive your payment for the inventory reduction you achieved until then and are free to leave.

Experimental protocol

The sequence of the experiment is as follows:

I. Comprehension questions: First, you will answer some comprehension questions. You must answer all questions correctly to reach the next stage of the experiment. You will receive a bonus if you can answer all questions correctly on the first or second attempt.

II. Effort task: You can exert effort and thus reduce the average inventory level. It is up to you how many rounds to exert effort.

III. Questionnaire: Finally, you will answer general questions regarding the experiment and your person.

Payment

Your payment depends on the achieved inventory reduction over all rounds. For each unit you reduce the average inventory level, you will receive 10 ECUs. At the end of the experiment, you will receive 1 euro per 5,000 ECUs that you have earned during the experiment.

EC.4. Instructions Inventory Decision Experiment

Welcome and thank you for participating in this experiment. Please do not talk to each other from now on, turn off your mobile phones, and put away all your personal belongings.

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You can earn money in this experiment. How much you will earn depends on your decisions. Your earnings in the course of this experiment are expressed in a virtual unit of currency – the experimental currency unit (ECU). At the end of the experiment, you will receive 1 euro per 5,000 ECUs earned during this experiment. In addition, you will receive a show-up fee of 4 euros.

Introduction

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At constant demand rate, an increase in the average inventory level causes a reduction in the inventory turn rate.
At constant demand rate, a reduction in the average inventory level causes an increase in the inventory turn rate.

Situation

You are in charge of a warehouse with three different products, and you will be evaluated on the basis of total annual cost. From each product, 10,000 units are sold per year.

You have to decide how much you want to invest per year in the order processing of each product. The more you invest in the order processing of a product, the higher the inventory turn rate and the lower the average inventory level, as well as the corresponding holding cost for this product.

For holding inventory, you incur costs of h ECUs per average unit on hand. The unit holding cost parameter h varies from product to product and will be displayed on the input screen.

You can adjust your decisions an unlimited number of times and display the corresponding turn rates before you submit your decisions.

Payment

The annual cost per product can be broken down as follows:

$$\text{Annual cost per product} = \text{Investment in order processing} + h \cdot \text{Average inventory level}$$

The total annual costs are made up of the sum of the annual costs per product. In addition, you will receive an endowment of 45,000 ECUs. Your profit will be calculated as follows:

$$\text{Profit} = 45{,}000 \text{ ECUs} - \text{Total annual cost}$$

At the end of the experiment, you will receive 1 euro per 5,000 ECUs that you have earned during the experiment. In addition, you will receive a show-up fee of 4 euros.

Experimental protocol

The sequence of the experiment is as follows:

I. Comprehension questions: You will answer some comprehension questions.
II. Decision: You will decide how much to invest in order processing per year.
III. Questions: You will answer eight short questions.
IV. Questionnaire: You will answer general questions regarding your attitudes and preferences.
V. Questionnaire: You will answer general questions regarding the experiment and your person.