Appendix B: Prototype gaming simulation

The goal of the prototype was similar as the present gaming simulation: explicating knowledge from behaviour and skills. The prototype of the gaming simulation was based upon different scenario’s (S), possible events (E), profiles of supply chain members (P) and the creation of the yield forecast (F). In the prototype gaming simulation session (s) the behaviour of each individual (i) participant could be described as . These different elements are individually discussed in the following eponymous sections.

**Scenario’s**

Five different scenario’s had been composed, in which data of exogenous variables was displayed. An overview is presented in Figure 1. These variables were expected to influence price and volume. Experts by experience in Advisory Board meetings appraised these scenario’s as unrealistic and unnecessarily offending. The combination of week numbers and temperatures did not match reality. Likewise the sun hours, the distribution between week market and day market, domestic supply and demand in the Netherlands, which numbers were evaluated to be too low. Both, the supermarket price and international market price, were assessed to be too high. Playing a simulation with these scenario’s triggered resistance from Advisory Board members, who judged it as impossible to work with.



Figure B.1: Overview of different scenario's

**Events**

The occurrence of an occasional and unexpected event created uncertainty regarding the data associated with this event (Wasserkrug, 2009). The occurrence of these events caused an unexpected change in the trade factors price and volume. In the prototype, only one of these events could happen randomly at an individual player. Six different events were included, causing a change in cost price, increase in international market supply, production-enhancing inventions, new product market combinations, pressure from pests or diseases, increase in international market demand (celebration of public holiday’s). These six different occasional events are shown in figure 2. According to experts by experience in Advisory Board meetings, the occurrence of events was accounted for in the volume that growers supplied to cooperatives. The volume to be supplied to cooperatives was Including these events would suggests participants’ understood that this influenced the yield and consequently supply. In the Advisory Board meeting it became clear that wholesalers and retailers had no notion of how these factors affect the yield and also supply. Events were therefore left out in the final gaming simulation.

Figure B.2: Display of different events included in the prototype

**Profiles of supply chain members**

For each supply chain member different profiles were compiled. Participants who fulfilled the role of growers could choose from different profiles. Each profile included the production area, yield per square meter, whether the crop makes use of lamps to add artificial light to the level of natural sunlight (assimilation lightning), when the crop will be ended, the percentage of secondary quality, cost price and the income per kilogram last year. The included information in each profile does influence the supply a grower communicates with a cooperative. However about 90% of all growers don’t trade directly with wholesalers, except when their nurseries are very large (> 50 hectares). Growers deliver their volume to cooperatives to trade. Grower profiles were therefore not included in the final gaming simulation.



Figure B.3: Grower profiles in the prototype gaming simulation

Participants from the Advisory Board who fulfilled the role of cooperative had the choice from four different profiles. Each profile came with the characteristics of the supply offered to trade, its quality, the number of growers and corresponding production area and the extent to which cooperatives could act independently from their growers. Cooperatives are owned by a collection of growers. In the Advisory Board meetings and from interviews it became clear that production area and number of affiliated growers, did not make a difference with regard to trade. In the end only the production volume that growers deliver to the cooperative, is what sellers use in trading with wholesalers. Like in the previous study Advisory Board members and interviewees stated that consensus on the quality of the goods between cooperative and wholesaler exists, before the actual negotiations take place (Van Haaften, Lefter, Lukosch, van Kooten, & Brazier, 2021). Quality aspects are therefore left out in the final gaming simulation design. The Advisory Board appraised a sellers freedom to act not to be relevant in trading. When it comes to trading someone has to get the highest price.

Figure B.4: Profiles of cooperatives

For wholesalers there were also four different profiles made. The capacity symbolized the volume to trade and its corresponding quality level is mentioned. Additionally the number of affiliated cooperatives wholesalers regularly trade with is mentioned and how strong the connection between wholesaler and cooperative is (low/regular/high). The available information was appraised by members of the Advisory Board as incomplete, while the strength of business ties and quality were regarded as irrelevant and both were left out in the final gaming simulation. Wholesalers match demand from retailers and supply from cooperatives. The difference between purchasing price and selling price, minus the fixed costs is the profit they make. In order to fulfil the demand of retailers, wholesalers make appointments on the volume to be delivered and the price they get. If wholesalers don’t deliver, retailers will impose a fine per kilogram that not has been delivered. In the final gaming simulation the fine, fixed costs and retail price were added.

Figure B.5: Profiles of wholesalers

The four profiles of retailers differed in the strength of their relationship with wholesalers on a scale of low-medium-high. A similar threefold scale was used to express how strict delivery specifics (quality, time per week) and a delivery obligation were retained (strict-middle-flexible). The majority of retail organizations have purchasing centralized, although some retail organizations have purchasing organized on a regional level. Last comes the business formula retail organizations apply: discount or full-service. Retailers tell wholesalers which volume they need and which price is paid for delivering this volume. When wholesalers agree to this, the price, volume and frequency is laid down in an agreement. Negotiation is largely absent between retailers and wholesalers. For this reason the profile of retailers has been left out in the final gaming simulation.

Figure B.6: Profiles of retailers

**Yield forecasts**

Growers estimated their yields and communicated their expected yields with cooperatives as the supply they expect to deliver. The difference between yield and supply varied between 10% and 50%. Growers and Cooperatives could change the difference by a percentage. In the final gaming simulation the Advisory Board advised strongly to drop this factor and choose for a fixed deviation of 10%.

**References**

Van Haaften, M., Lefter, I., Lukosch, H., van Kooten, O., & Brazier, F. (2021). Do Gaming Simulations Substantiate That We Know More Than We Can Tell? *Simulation & Gaming, 52*(4), 478-500.

Wasserkrug, S. (2009). Uncertainty in Events. In L. Liu & M. T. ÖZsu (Eds.), *Encyclopedia of Database Systems* (pp. 3221-3225). Boston, MA: Springer US.