

# Evaluating Shelf-ready Packaging Designs in a VR Environment

F.W.B. Hoolhorst<sup>1</sup>, T.J.L. van Rompay<sup>1</sup>, R. ten Klooster<sup>1</sup> and M. Roukema<sup>2</sup>

<sup>1</sup>University of Twente, The Netherlands

<sup>2</sup>SmurfitKappa Development Centre, The Netherlands

---

## Abstract

*This paper focuses on the development of a method and accompanying VR environment which support designers in evaluating a series of shelf-ready packaging designs (SRP) on their on-shelf performance. The method and VR environment support in providing insight into which SRP is expected to become most successful in a specific retail environment, e.g. a supermarket. Furthermore it provides useful feedback for further development of the most promising SRP to designers.*

Design method, Design tool, VR environment, Product design, Product marketing

---

## 1. Introduction

In the recent past most products were delivered to retail in secondary packaging which often existed out of anonymous looking corrugated cardboard boxes (see figure 1). Retailers had to unpack such these boxes in order to place the product-to-sell on the shelf in a representable way. Nowadays an increasing amount of retailers demand manufacturers to deliver their products in shelf-ready packaging (SRP) (see figure 2) in order to reduce shop exploitation costs. SRP, which is synonymous with retail-ready packaging, is a relative new type of secondary packaging. According to ECR UK (2005), SRP refers to the preparation of a product so that it is delivered to a retailer in a ready-to-sell merchandised unit. Products which come in SRP can be easily placed on the shelf without the need for unpacking or repacking. An increasing amount of product manufacturers see SRP as a silent salesman of their products in a retail environment. They increasingly recognise that SRP has significant impact on their product's on-shelf performance. This means that an SRP-product combination needs to (1) communicate the brand and product identity (brand fit), (2) contribute to a product's stand out on the shelf (on-shelf conspicuousness) and (3) seduce the customer to buy the product (liking) (Koopmans 2001).

A world leading developer and manufacturer of SRP notices that, although the impact of an SRP on a product's on-shelf performance is significant, its development is often still an afterthought. Many product manufacturers just realize that the SRP still needs to be developed once their developed product is ready for its production start-up.

Consequently SRP design processes are therefore short and mainly based on data base design. This means that they often exist out of the customization and detailing of existing standardized SRP design formats. Nevertheless SRP design processes exist out of many iterative loops which contain divergent and convergent phases in which design alternatives are generated and evaluated. In here many design aspects must be considered, e.g. logistical and mechanical parameters. However, taking on-shelf performance into account as a design aspect is still a challenge since SRP is relatively new packaging format.

Therefore the enounced world leading developer and manufacturer of SRP invests in research that provides insight in dealing with on-shelf performance in their design process; amongst others in research that focuses on the evaluation of SRP regarding this aspect. Many on-shelf performance related packaging evaluation methods have been developed within the last decades (Rosch, Mervis et al. 1976; Will, Eadie et al. 1996; Jugger 1999; DeWalt and DeWalt 2002; Sleswijk-Visser, Stappers et al. 2005; Blackwell, Miniard et al. 2006; Aaker, Kumar et al. 2007; Schoormans, Eenhuizen-van den Berge et al. 2010; Van der Laan 2013). Unfortunately most of them are difficult to apply in design practice for various reasons. Two reasons are important to be mentioned explicitly. Firstly, most verification methods are time consuming since (1) an extensive preparation is required in order to apply the verification method in SRP development practice and (2) the amount of subjects that are needed in order to gain reliable results is large. Secondly, most verification methods seem particularly well suited for end-of-pipe evaluation of the final SRP. In this phase it is hardly

possible to make changes to the SRP. Unfortunately, the available time for evaluation of a series of SRP regarding their on-shelf performance is limited within design practice. Designers demand better insight into which of their SRP designs is expected to be most promising regarding its on-shelf performance. They furthermore demand useful feedback in order to optimise the most promising SRP towards a successful design.

Therefore research project had been initiated that focuses on the development of a method and accompanying VR environment which support the evaluation of SRP regarding their on-shelf performance. Evaluating SRP on their on-shelf performance is a challenge for two reasons. Firstly, it is only possible to evaluate SRP in a retail context since an SRP-product combination's on-shelf conspicuousness is a part of the on-shelf performance aspect. For practical and organisational reasons it is hardly possible to evaluate a range of SRP in a controlled test setup in a real retail environment. However, such an evaluation is possible when making use of a VR retail environment. Secondly, available time for the evaluation of SRP is often limited due to the product's planned production start-up. Therefore it should be able to evaluate a series of SRP within one day (including processing ranking data towards presentable results).

## 2. Methodological framework

The method and accompanying VR software tool support in evaluating SRP on their on-shelf performance. Ranking SRP is used as a starting point for the method. According to Perry (2006), ranking provides an intuitive, visual and less time consuming way for participants to compare items relatively to each other. The method exists out of the following phases: (1) Prepare test, (2) Rank SRP designs, (3) Discuss rankings and (4) Documentation (see figure 3). The method supports in the preparation and execution of a session in which a series of SRP is evaluated. It furthermore supports in processing and documenting results that comprehends from the evaluation session. A design brief is used as input for the method. Applying the method provides (1) insight into which SRP is expected to be most promising for further development, (2) insight into why this SRP is expected to be most as well as (3) feedback for further development of this SRP. The evaluation of a series of SRP is done by an expert panel that exists out of three to five persons who are capable to evaluate SRP designs on their on-shelf performance. The expert panel is supported by a moderator who prepares and leads the evaluation session as well as processes and documents the results that comprehend from the evaluation session.

### 2.1 Prepare test

It is only possible to execute and evaluate a series of SRP on their on-shelf performance once the evaluation session has been prepared with care. Therefore the first phase of the method focuses on the preparation of the evaluation session. The evaluation session is prepared by the moderator who will lead the session. The following input is required for the preparation of the evaluation session:

- A design brief which formulates the product for which an SRP will be designed, the product's brand as well as the main characteristics of the retail environment in which the product will be sold;

- A set of images of all SRP (e.g. CAD models) that were generated within the development of the specific SRP.

Based on this input, the moderator selects/prepares the following items which will be used as input for the actual evaluation session:

- Expert panel: a group of 3 to 5 persons who are capable to evaluate SRP designs on their on-shelf performance (step 1.1);
- Brand and target group items: Items that communicate the product's brand and target group in an implicit way, e.g. mood boards or TV commercials. The brand and target group items are used as input for rankings on brand fit and liking (step 1.2);
- SRP: A selection of the SRP which are worth full to evaluate. The selection is made out of the set of images of all SRP designs (step 1.3);
- Retail context: A relevant shelf configuration in which the SRP needs to perform (step 1.4).

Furthermore he creates a new design project and/or evaluation session in the VR ranking tool.



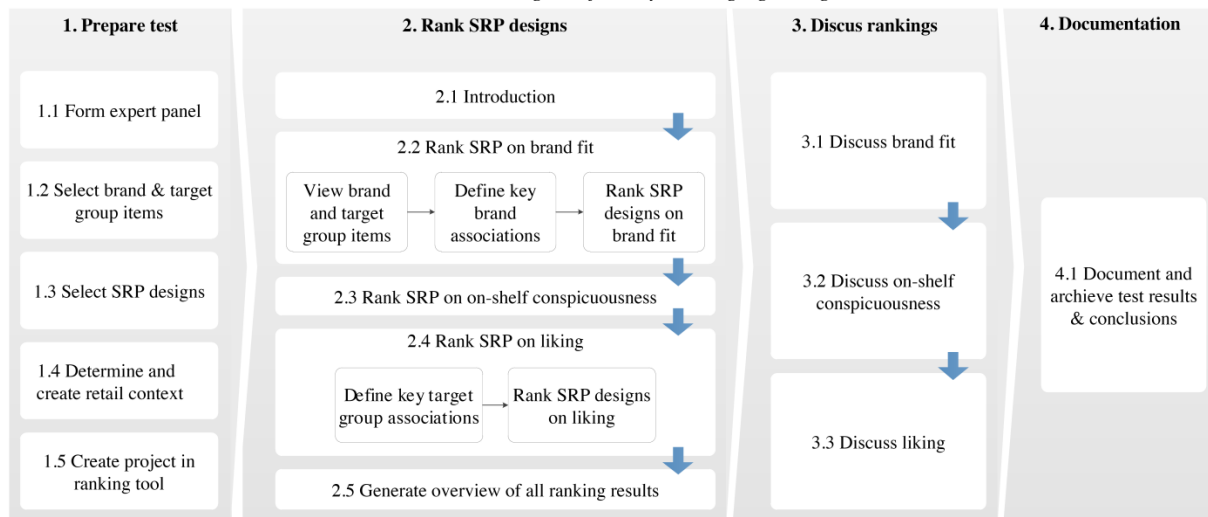
**Figure 1:** A supermarket employee who is unpacking a secondary package in order to put the products-to-sell on the shelf in a representable way.



**Figure 2:** Example of shelf-ready packaging: Corrugated cardboard boxes containing the products-to-sell are placed on the shelf without unpacking.

### 2.2 Rank SRP designs

The actual evaluation session exists out of two phases. The 'Rank SRP designs' is the first of these phases. This phase focuses on the actual ranking of SRP based on the input that was created during the 'Prepare test' phase. The phase starts with an introduction in which the expert panel is



**Figure 3:** Methodological framework: An overview of steps that need to be taken in order to evaluate a series of SRP design proposals regarding their on-shelf performance

prepared on the evaluation session (step 2.1). In here the moderator explains (1) the evaluation session's goal, (2) the tasks that will be executed during session as well as (3) the expected output of the session to the expert panel.

Afterwards, the expert panel is asked to rank the selected SRP design proposals regarding the following on-shelf performance related aspects after the introduction: (1) brand fit, (2) on-shelf conspicuousness and (3) liking.

The expert panel is first asked to rank the selected SRP on brand fit (step 2.2). In order to do so, the expert panel first studies a set of brand and target group items in order to get familiar with the brand. Afterwards the expert panel formulates 3 to 5 key brand associations in order to create a common understanding of the brand. The brand associations are based on the brand and target group items that were studied. A common understanding of the brand ensures that the discussion regarding the SRP' brand fit is more effective and efficient. Finally the expert panel ranks the SRP on brand fit based on the formulated key brand associations.

Participants are asked to rank the SRP on-shelf conspicuousness within the second ranking task (step 2.3). The expert panel gets an overview of the selected SRP in order to do so. Each SRP is placed in a relevant full size VR retail context.

Finally the expert panel is asked to rank the SRP on liking (step 2.4). In here, liking refers to the extent the SRP-product combinations is expected to attract the target group that will probably buy the product. The expert panel formulates 3 to 5 key target group associations in order to create a common understanding of the target group. Formulation of these key associations is based on the brand and target group items which were studied earlier (step 2.2). The expert panel ranks the SRP on liking based on the formulated key brand associations.

Finally, a visual representation of all ranking results (brand fit + on-shelf conspicuousness + liking) is made (step 2.5). This overview, in the form of a stacked bar chart (see figure 6), is input for the discussion in the 'discuss ranking' phase.

### 2.3 Discuss rankings

Within this phase, the expert panel discusses the ranking results in order to underpin them. The discussion furthermore focuses on formulating feedback that enables designers to improve the most promising SRP. Input for the discussion is the visual representation of ranking results that was generated in step 2.5. Discussion is done for each ranking individually (step 3.1, step 3.2 and step 3.3) by means of a set of pre-formulated questions (see table 1). These questions are based on 8 criteria for an active salesman-design for packaging of Koopmans. Output is substantiation of ranking results as well as design suggestions for further improvement of most promising SRP design.

### 2.4 Documentation

The moderator makes a report and/ or presentation of the evaluation session during the 'documentation' phase. This report and/ or presentation describes the evaluation session's test setup, its results as well as the conclusions that can be drawn from the evaluation session. The moderator makes a report and/ or presentation in order to make the results of the evaluation session available for the future (step 4.1). Furthermore the report and/ or presentation can be send to involved parties who have interest in the results of the evaluation session.

## 3. Setup of the VR environment

The method that supports in evaluating a series of SRP design proposals regarding their on-shelf performance is supported by a VR environment (see figure 4 and figure 5). This VR environment represents images of the SRP (in their retail context), supports the actual ranking of SRP and supports in representing the ranking results in a conveniently, visual way. The VR environment exists out of a parabolic projection screen and a surface table equipped with specific ranking software. The parabolic projection screen is used for displaying images of SRP in their future retail environment; the surface table and ranking software enable the expert panel to actually rank the SRP on several on-shelf performance related parameters and represent the ranking results.

### 3.1 Images of SRP

SRP that were projected on the parabolic screen were first modelled in ESKO ArtiosCAD and Adobe Illustrator. Then the modelled SRP were placed and rendered in an existing VR retail environment with ESKO Store visualizer. Finally static images were generated of the SRP in their retail environment.

#### Step 3.1 – Discuss brand fit

- To what extent does the SRP-primary packaging combination communicate the brand?
- To what extent does the SRP-primary packaging combination tell you what kind of product this is?
- Which product benefits does the SRP-primary packaging highlight?
- To what extent do you feel that the brand and product positioning strategy are credible?

#### Step 3.2 – Discuss on-shelf conspicuousness

- To what extent does the SRP-primary packaging combination stand out on the shelf?
- Does the SRP-primary packaging combination clearly communicate relevant information (e.g. product type or product benefit)?

#### Step 3.3 – Discuss liking

- To what extent does the SRP-primary packaging combination appeal to target group users?
- To what extent does the SRP-primary packaging combination signal that this is an attractive product?

**Table 1:** Overview of the pre-formulated questions which are used as input for the discussion of the ranking results during steps 3.1 step 3.2 and to step 3.3

### 3.2 The parabolic projection screen

The images of the SRP were projected by means of two beamers (Christie DS+60) on a white parabolic projection screen. Each beamer had a resolution of 2378 x 1050 dpi and projects one side of the parabolic projection screen. The parabolic projection screen has a width of 8000 mm and a height of 3000 mm. There has been chosen to apply a projection screen with these dimension for two main reasons. Firstly, an expert panel must be able to compare the SRP during the evaluation session regarding their on-shelf performance. In here, providing the expert panel an overview of all SRP design proposals facilitates the comparison. Therefore the parabolic projection screen must be able to display an overview of 5 to 7 images of SRP at once. This is also the maximum amount of SRP that someone can oversee during a comparison (Dirken, 1994). Secondly, each SRP needs to be displayed on full size in its future retail environment, because small design details as well as the retail environment influence an SRP's on-shelf performance (Koopmans, 2001).

The beamers' colour scheme were not calibrated. Nevertheless, their colour quality was sufficient for the evaluation of the method and VR environment. Colour authenticity was less important, because evaluation of the method and VR environment was done by means of several cases in which products of fictive brands were evaluated. However, colour authenticity gets important in case the method and accompanying VR environment are applied in design practice. Finally, colours influence an SRP's on-shelf performance.

### 3.3 The surface table and ranking software

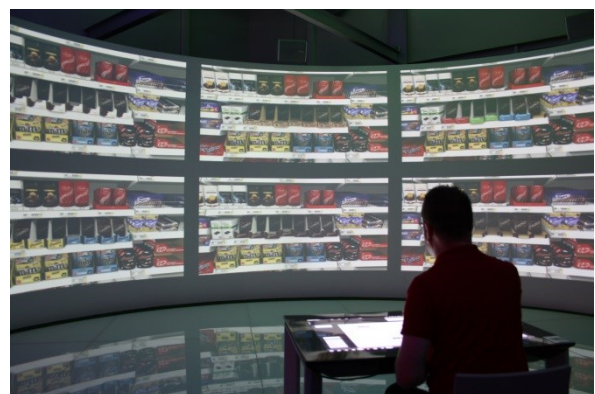
The surface table (Samsung SUR40) and the installed ranking software are used to actually rank SRP as well as to represent an overview of the ranking results. The surface table is equipped with a 40 inch touchscreen which is positioned in the horizontal direction. The resolution of this touchscreen is 1920 x 1080 dpi. The size and horizontal position of the surface table's touch screen makes it easy possible to watch and discuss the SRP that are projected on the parabolic projection screen as well as the actual content that is displayed on the touchscreen. Its touch functionality provides the expert panel an intuitive way to actually rank the SRP. The expert panel actual ranks SRP by swiping images of these SRP to their intended positions at the displayed ranking axis.

An overview of all ranking results is generated once all rankings are made by the expert panel. The ranking software itself cannot process the ranking data to towards a useful overview of the ranking results at the moment. Nevertheless, it is possible to export the ranking data to MS Excel by means of Heidi SQL. MS Excel then automatically generates an overview of the ranking results in the form of a stacked bar chart (see figure 6). The stacked bar chart can be used as input for the discussion in the 'Discuss rankings' phase.

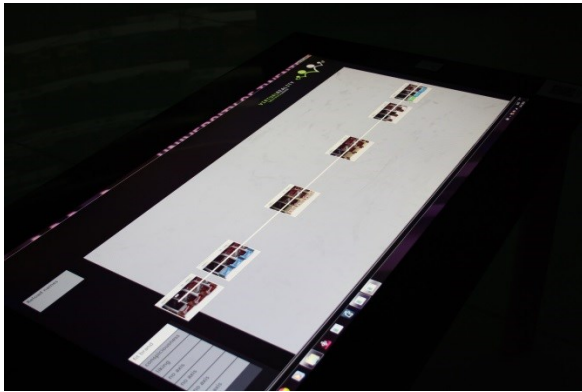
## 4. Discussion

The method as well as the VR environment are still in the development phase. Further development and validation of both is still needed.

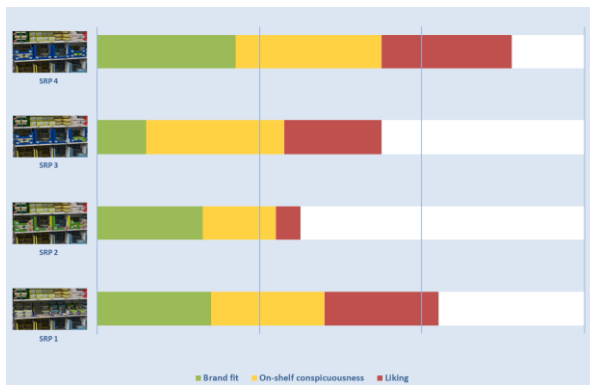
Until now, both were only applied to fictive SRP design cases in an academic laboratory setup. However, at this moment there is not a sufficient insight into the method and VR environment's actual applicability in daily SRP design practice. Therefore further validation of both in daily SRP design practice is needed in order to gain this as well as to fine-tune the method and VR environment.



**Figure 4:** The setup of the VR environment exists out of a parabolic projection screen and a surface table equipped with ranking software.



**Figure 5:** The ranking software is running on the surface table. An expert panel swipes images of SRP design proposals to their intended positions at the ranking axis by means of this software.



**Figure 6:** A stacked bar chart which is automatically generated by MS Excel shows an overview of the ranking results.

The current VR environment is still a prototype that needs further development in order to be applicable in SRP design practice. This particularly counts for the ranking software that runs on the surface table. Further development of the ranking software should particularly focus on the representation of ranking results. At this moment, ranking data which were generated by means of the ranking software must be exported to MS Excel by means of Heidi SQL. Only then it is possible to generate a representative visual overview of the ranking results. This is time consuming and disturbs the flow of a ranking session. Additional functionality that automatically generates representative and visual overview of ranking results should therefore be incorporated in the ranking software.

Furthermore additional functionality could be added to the ranking software. In here one could think of functionality that provides the opportunity to display overviews of ranking results of at least two evaluation sessions at once. This enables an expert panel to easily compare the results of several similar evaluation sessions in which the same series of SRP was evaluated regarding their on-shelf performance.

The ranking software could also comprehend opportunities to track an expert panel's ranking behaviour. Early tests in the academic laboratory setup showed that, within a series of SRP, some SRP designs were easier to

evaluate than others. SRP designs that were easier to judge were immediately swiped to their intended position at the ranking axis and were rarely repositioned afterwards. An expert panel often postponed to rank SRP designs that were harder to judge. These SRP designs were also relocated more often since the expert panel was in doubt about the right position of these designs on the ranking axis.

## 5. References

- Aaker, D. A., V. Kumar, et al. (2007). *Marketing Research*. John Wiley & Sons.
- Blackwell, R. D., P. W. Miniard, et al. (2006). *Consumer behaviour*. South-Western College Pub.
- DeWalt, K. M. and B. R. DeWalt (2002). *Participant observation: a guide for fieldworkers*. Walnut Creek, Altamira Press.
- Dirken J.M. et al. (1994), "Inleiding tot de produkt-en systeemergonomie (2nd release)", Delft University of Technology, Department of Industrial Design Engineering, in Buurman den R., Boersema, Th., Christiaans, H.H.C.M., Dirken, J.M., Goossens, R.H.M., Hoefnagels, W.A.M., Kanis, H., Moes, C.C.M., Moelenbroek, J.F.M., Snijders, C.J., Vermeeren, A.P.O.S. (2001), *Ontwerpmethodologie* (7th release), Delft University of Technology, Department of Industrial Design Engineering
- ECR UK (2005). *Retail Ready Packaging*, Letchmore Heath: ECR UK/IGD.
- Jugger, S. (1999). The power of packaging. *Admap Magazine*.
- Koopmans, F. (2001). *De kracht van verpakking*. Nederland, Kluwer.
- Perry, R. (2006). "The relative value of american law reviews: A critical appraisal of ranking methods." *Virginia Journal of Law and Technology* 11(1): 1-40.
- Rosch, E., C. B. Mervis, et al. (1976). "Basic objects in natural categories." *Cognitive Psychologist* 8(3): 382-439.
- Schoormans, J., M. Eenhuizen-van den Berge, et al. (2010). "Designing packages that communicate product attributes and brand values: an exploratory method." *The Design Journal* 12: 31-47.
- Sleeswijk-Visser, F., P. J. Stappers, et al. (2005). "Contextmapping: experiences from practice." *CoDesign: International Journal of CoCreation in Design and the Arts* 1: 119-149.
- Van der Laan, N. (2013). Implicit markers of food choice. *Geneeskunde*. Utrecht, University of Utrecht. **Ph.D.**
- Will, V., D. Eadie, et al. (1996). "Projective and enabling techniques explored." *Marketing Intelligence & Planning* 14(6): 38-43.