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Mobile Decision Support vs. Interpersonal Sales Communication: Predictors of Buying Intentions for Price Bundles

Wolfgang Maass & Tobias Kowatsch
Hochschule Furtwangen University (HFU) - Germany
{wolfgang.maass, tobias.kowatsch}@hs-furtwangen.de

Abstract
Mobile recommendation agents (MRA) are a new class of decision support systems that provide consumers with product information during purchase situations in stores. They allow merging of local information with global information provided by online content sources. Currently design criteria for MRA are missing. Studies on purchase decision support systems indicate the importance of price, single product quality, and attitude on buying intentions. It is assumed that purchase decision tasks on price bundles increase utility effects of MRA. We present an empirical study that investigates the impact of cues on price, bundle quality, and discount provided by MRA on consumer's buying intentions in comparison with interpersonal sales communication between consumer and sales personnel. Our results show that MRA can be used to inform consumers about bundle qualities under best-value strategy conditions, which will be used for future MRA designs.

Keywords: Mobile decision support systems, product bundling, retailing

1 Introduction
With increasing adoption of mobile services (Kleijnen, de Ruyter, & Wetzels, 2007), consumers are also inclined to use mobile recommendation agents (MRA) for in-store purchase decisions (Maass & Janzen, 2007; van der Heijden, 2006). MRA provide consumers with decision support "on the go" when they are actually in a retail store (van der Heijden, 2006). Thereby local information is directly integrated with global information and used for adaptive recommendations (Maass & Janzen, 2007; Wasinger & Wahlster, 2006). The MRA concept is based on the concept of a recommendation agent (RA) that has been intensively investigated in online domains (Häubl & Murray, 2006; Swaminathan, 2003; Xiao & Benbasat, 2007). These studies indicate that shoppers use online recommendation agents for reduction of their search complexity and cognitive load (Häubl & Trifts, 2000; Todd & Benbasat, 1999) which results in improvement of objective decision qualities (Häubl & Trifts, 2000; Pereira, 2001). In some cases it also leads to higher trust in purchase

decisions and reduction of search spaces (Häubl & Murray, 2006). First results indicate that MRA have similar impact on purchase decisions (Maass & Janzen, 2007; van der Heijden, 2006).
Because MRA can be used anytime and anywhere they provide shoppers with greater flexibility than desktop-based online RA. MRA can be used as sales assistants and as support for sales assistants. They constitute a new class of decision support systems (DSS) for shopping domains, for buying domains in general but also for any other situation along the product life cycle (Maass & Janzen, 2007).
The impact of RA on buying decisions has been mainly investigated for single product purchases (Bo & Benbasat, 2007; Häubl & Murray, 2006; Häubl & Trifts, 2000; Wang & Benbasat, 2007) but with focus on differentiation strategies, such as product or price bundling (Adams & Yellen, 1976; Stremersch & Tellis, 2002), as common in the retailing sector. It has been also found that more complex buying tasks result in more extensive cognitive efforts which, in turn, increase the inclination for using RA (Todd & Benbasat, 1999; van der Heijden, 2006).
In this article, we discuss the use of MRA for price bundles as an example of a complex buying task. We present the results of an empirical study in which we discuss whether information on bundle quality, price and discount mediated by MRA affect shopper's buying attitudes and intentions on *price bundles*, i.e. bundles of products with discount but without functional integration (Stremersch & Tellis, 2002). Therefore, we adapt Hansen's research model with the focus on a bundling task (Hansen, 2005). On a more practical basis, our intention for this study is a more profound and goal-directed development of future shopping-oriented MRA. MRA process and aggregate retrieved information according to available knowledge about consumers, products and other contextual information. This unlocks a completely new field for innovative business models that leverages dynamics as known so far only by online businesses.
In the following section our research approach is embedded into various theoretical backgrounds from which hypotheses and our research model are derived. In Section 3, we introduce the applied empirical method followed by a discussion of results. The general discussion is presented in Section 4. This article is concluded by a summary, a discussion of limitations and an outlook on further research (Section 5).

2 Theoretical Background

The theoretical background of our research stems from consumer behavior and decision support systems. Results from both fields are discussed before we introduce results of our study.

2.1 Purchase decision making

Buying decision making in general and consumer purchase decision making in particular are vibrant research topics for retailing in bricks-and-mortar stores and online shops. The dominant research paradigm of purchase decision making research is based on the information processing paradigm (Blackwell, Miniard, & Engel, 2001) supported by functionalistic stance within the realm of cognitive science (Fodor, 1983).
Seminal theories are the general Constructive Consumer Choice Processes (CCCP) (Bettman, Luce, & Payne, 1998), Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975) and Theory of Planned Behavior (TPB) (Ajzen, 1991).

Theoretical Background

CCCP is a direct adoption of the information processing viewpoint. TRA and TPB bridge the gap between real-life purchase behavior and behavior that is investigated in laboratory settings by focusing on buying intentions. Retailing research has extended the information processing stance by including consumer's affections (Holbrook & Hirschman, 1982) which is in particular important for emotional products, such as fashion, emblazonments, and cars. Beside constructs that purely stem from an information processing stance, it is argued that consumers also form beliefs about products that are integrated by an overall attitude towards a product (Blackwell et al., 2001; Hansen, 2005).

Within purchase situations consumers try to avoid risk-taking and apply risk reduction strategies. Resort to recommendations is one possible quality assurance and risk reduction strategy (Dawar & Parker, 1994). Hence, recommendations are also means for reduction of cognitive load (Bettman et al., 1998). The alternative for a consumer is extensive information search and information processing for self-dependent generation of convictions on a particular product or product class.

From an information processing viewpoint, products provide a set of different cues which are used by consumers to form quality expectations (Steenkamp, 1990). Prevalent cues that have been studied are brand names, brand advertising, product features or appearance, price and product/retail reputation (Dawar & Parker, 1994). Cues from different types are not independent but interfere with one another, such as price and quality (Hansen, 2005). It is argued that consumers determine the quality of products by application of various heuristics on cue information (Dawar & Parker, 1994).

Hansen proposes a conceptual framework that integrates important constructs found by information processing theories and emotions within the field of consumer decision making (Hansen, 2005). In our study, we have selected with office furniture a domain in which we assume that emotions are less important than functional and task-oriented aspects. Therefore, we focus on those causal relationships from Hansen's framework that consist between price, quality, attitude and buying intention.

Following CCCP, making a purchase decision on product bundles reduces the effort compared to purchasing each product individually but it is more complex than buying one single product alone. Hence, buying a product bundle increases the cognitive load of a consumer compared to one-product choice scenarios. Product bundles are target of bundling strategies, such as price bundling and product bundling (Adams & Yellen, 1976; Gaeth, Levin, Chakraborty, & Levin, 1991; Schmalensee, 1984; Stremersch & Tellis, 2002). Following Stremersch and Tellis, price bundling is "the sale of two or more separate products in a package at a discount, without any integration of the products" while product bundling is defined as "the integration and sale of two or more separate products or services at any price" (Stremersch & Tellis, 2002). Examples for price bundling are six-packs of beer while PC configurations require functional integration of product items which is an example for product bundling.

Price information is one signal for product quality, such as physical appearance, retailer reputation and brand names (Dawar & Parker, 1994). Product quality, in turn, influences consumer's attitude towards a product and her buying intention (Hansen, 2005). Here, we focus on the impact of price information on perceived overall quality of a price bundle. In situations where price is better known than product quality, three key choice strategies are distiniguished: best-value, price-seeking, and price aversion (Tellis & Gaeth, 1990). By adopting a best-value

strategy, a consumer chooses a product with the least overall cost in terms of price and expected quality while the other two strategies uses price information as substitute for quality information. If enough information about a product is available, a consumer will tend to choose a best-value strategy (Tellis & Gaeth, 1990).
Before we introduce our research model on the use of mobile recommendation agents for product bundle purchases, we discuss the research context of recommendation agents in more detail.

2.2 Recommendation agents

In in-store shopping situations, product recommendations are given by sales personnel. For traditional interpersonal sales communication between consumers and sales personnel, product information and style of communication are distinguished (Sheth, 1976; Soldow & Thomas, 1984). Technical recommendation agents (RA) are aggregators of product information services which can be subsumed by the class of decision support systems (Grenci & Todd, 2002). In this sense, RA conceive simple interpersonal sales communication between consumers and sales personnel personnel (Leigh, 1987). From an IS perspective, RA are designed to support goals of consumers, producers, retailers, advertisers and other stakeholder in shopping environments. The focal group of current IS research on RA are consumers that individually use supporting information services provided by RA (Xiao & Benbasat, 2007). Within online shopping domains, RA have been extensively investigated (Häubl & Murray, 2006; Swaminathan, 2003; Xiao & Benbasat, 2007). As Bo and Benbasat pointed out, RA elicit the interests and preferences of individual users for products and make recommendations accordingly (Xiao & Benbasat, 2007).
In contrast to online RA, MRA are in a very early stage of the innovation life cycle which explains that little IS research has been conducted on MRA (Maass & Janzen, 2007; van der Heijden, 2006). MRA are defined as decision support systems for in-store purchase situations that present product information on the product-in-focus according to consumer preferences, current activities and plans (Maass & Janzen, 2007).

2.3 Methodology

In our research, we apply a design science methodology (Hevner, March, Park, & Ram, 2004). At first, we have built several MRA prototypes so that we were able to understand the characteristics of MRA (artefact development) and to discuss those with different groups, such as retailers, producers from various industries and various consumer groups which indicated the problem relevance of MRA (elicitation of business needs) (Kowatsch, Maass, Filler, & Janzen, 2008; Maass & Kowatsch, 2008). Requirements elicited from these discussions have been integrated into MRA designs (refine). In the next phase, we have reviewed the literature on consumer behaviour models that are applicable for MRA (refine by knowledge application) (Maass & Kowatsch, 2008). Based on innovation adoption theories (Davis, 1989; Moore & Benbasat, 1991), we present results of a study which is part of intensive justification, evaluation and refinement work on MRA designs.

2.4 Hypotheses: Determinants of Buying Intention

In purchase situations, consumers tend to have incomplete information about product qualities (Nelson, 1970). Consumers' strategies for solving this information asymmetry are influenced by information on quality, importance of quality, and price-quality correlations (Milgrom & Roberts, 1986; Tellis & Gaeth, 1990; Wolinsky, 1983). Similar effects are also found for multi-product bundles (Gaeth et al., 1991). These correlations describe generic mental processes of human purchase decisions that are assumed to be independent of mediating *information channels*, such as interpersonal sales communication between consumers and sales personnel, or technology mediated online or mobile recommendations. Hence, information on price bundles provided on the one hand by simple sales dialogues (SSD) between consumers and sales personnel or on the other hand by MRA should be used by consumers similarly. Therefore, we hypothesize the following relationship:

H1 The perceived price of a price bundle obtained by MRA or SSD is positively related to the quality of that bundle.

Mixed results can be found for the causal relationships between price and perceived utility and buying intentions, respectively. Hansen (2005) found no correlation for tangible goods whereas Haaker et al. (2006) found price as being the strongest predictor for perceived utility of service bundles. Consistent with Hansen (2005), we also address tangible products but with focus on price bundles and formulate the second hypothesis as follows:

H2 The perceived price of a price bundle obtained by MRA or SSD is negatively related to the behavioural intention to buy that bundle.

Marketing research reports the importance of price and discount on the evaluation of a bundle by a consumer (Han, Gupta, & Lehmann, 2001; Hanson & Martin, 1990; Stremersch & Tellis, 2002). Discounts increase individual surplus which is defined as the difference between reservation price and product price (Hanson & Martin, 1990). The valuation of a discount depends on a consumer's reference price, i.e. prices lower than a reference price are perceived as gains and vice versa (Han et al., 2001). With a price of a bundle near common reference prices we assume that discounts have direct impact on consumer's purchase decisions, especially in those purchase situations in which MRA or SSD provide information on the bundle's discount:

H3 The perceived discount of a price bundle obtained by MRA or SSD is positively related to the behavioural intention to buy that bundle.

Information on the quality of a product has been found as an important predictor of a customer's attitude towards a product (Hansen, 2005). MRA and SSD provide consumers with product information, which in turn influences how users perceive the attractiveness of a particular product or bundle. Hence, we formulate the following relationship:

H4 The perceived quality of a price bundle obtained by MRA or SSD is positively related to the attitude towards that bundle.

Consumer's buying intention is influenced by a triadic relationship with price and quality which is generally decomposed into the three dyadic relationships H1, H2 and the following relationship (Hansen, 2005; Zeithaml, 1988):

H5 The perceived quality of a price bundle obtained by MRA or SSD is positively related to the behavioural intention to buy that bundle.

And finally, a positive attitude towards a product can lead to higher buying intentions (Hansen, 2005; O'Brien, 1971). Within the context of price bundles, we formulate therefore our last hypothesis as follows:

H6 The attitude towards a price bundle is positively related to the behavioural intention to buy that bundle.

According to the aforementioned hypotheses, the research model is summarised by the structural diagram as shown in Figure 1.

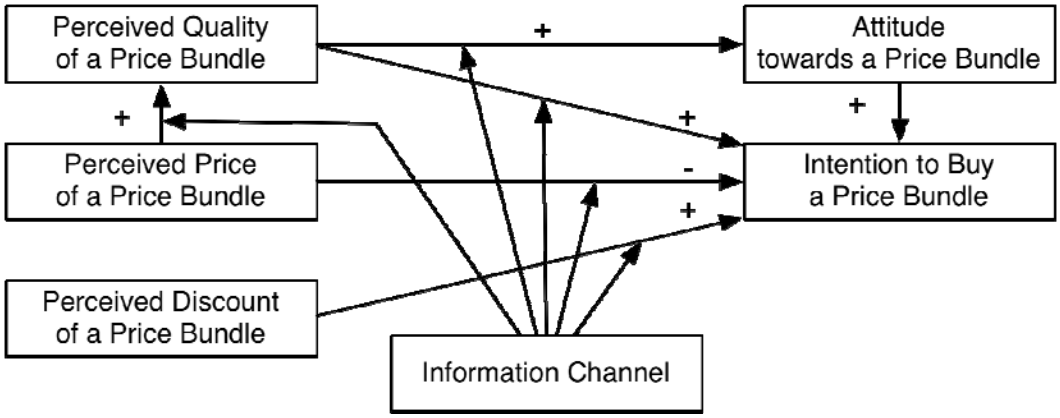


Figure 1: Hypothesized correlations between the behavioural intention to buy a price bundle and its predictors in in-store purchase situations if the information channels are MRA or SSD

3 Method

3.1 Subjects

Sixty-two undergraduate students from Furtwangen University participated in a lab experiment that was conducted to evaluate and test the hypotheses. Forty-five subjects were male and 14 female (3 had given no answer). Their age ranged from 20 to 24 (N = 48) and 25 to 29 (N = 10) with 4 subjects giving no answer. All of the subjects study digital media and computer science.

3.2 Context and Procedure

The subjects were randomly assigned to one of two experimental settings, both simulating an in-store purchase situation. In Experiment I, subjects were shown all relevant information of price bundles on a MRA that was simulated on a website (see Figure 2). Subjects were informed that this information is provided by a mobile device. Information about products, prices and discounts are given immediately.

In Experiment II, a SSD was presented to subjects that contained the same information on each price bundle as in the MRA setting (see Figure 2). This setting is an approximation of SSD with human sales personnel (Leigh, 1987). At the beginning, a product was presented (type, price, product description) followed by a recommendation of an additional product. Finally, the consumer is informed

about a discount if both products are bought together (price bundling). All information is displayed on a printout.
By a pre-test, it was verified that both settings and the items in subsequent questionnaires were correctly understood.



Figure 2: In-store purchase situation on a MRA; treatment: high bundle quality, high price, and low discount.

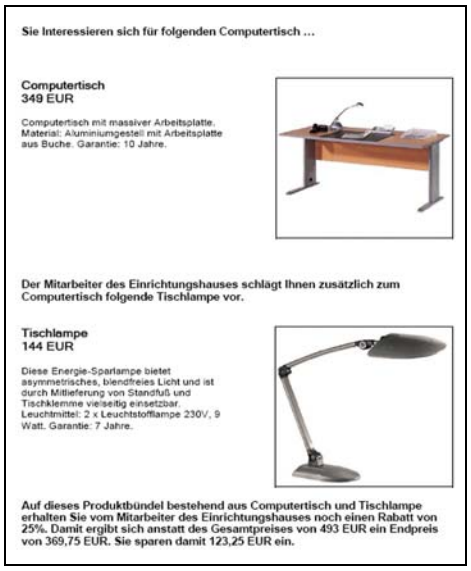


Figure 3: SSD on a printout that simulates an in-store purchase situation; treatment: high bundle quality, high price, and high discount.

In both experimental settings, the subjects were asked to evaluate price bundles based on the attributes quality, price, discount, attitude, and buying intention. A 2 (high/low bundle quality) x 2 (high/low price) x 2 (high/low discount) between-subjects experimental design was carried out to test and validate the hypotheses. The results of each treatment were averaged as it consisted of two bundles, which was necessary to reduce the bias of the evaluation of one single bundle. Each subject was asked to evaluate two treatments. In total, 59 treatments were used for analysis from the first experiment (MRA), whereas we considered 64 treatments from the second one (SSD).
At the end of both experiments, subjects were asked to rate the total length and the comprehensibility of the evaluation procedure. Findings on seven point Likert scales (from extremely disagree to extremely agree) yielded high ratings for comprehensibility (MRA: 5.03, SSD: 5.09) and average ratings for the total length (MRA: 4.03, SSD: 3.35).

3.3 Variable Measures

Items for the constructs bundle quality, price, attitude and buying intention were adapted from Hansen (2005). Two items for the construct discount were newly created. With the exception of the single-scale item buying intention, for each construct two items were used, each based on a seven-point semantic scale and a seven-point Likert scale. The intention to buy a product bundle was measured on a seven-point Likert scale. All items can be found in the appendix.
The total number of statements within each construct and Cronbach's Alpha reliability coefficients for both experiments are shown in Table 1. All Alpha

values range from .87 to .94, which is generally perceived as acceptable for this kind of research.

Table 1: Total number of items and Cronbach's Alpha reliability coefficients for the constructs bundle quality, price, discount, and attitude

Construct	Items	Exp. I (MRA)	Exp. II (SSD)
Bundle quality	2	.89	.89
Price	2	.89	.87
Discount	2	.87	.88
Attitude	2	.87	.94

In addition to Cronbach's Alpha reliability coefficients and consistent with the work of (Davis, 1989) and (Moore & Benbasat, 1991), factorial validity was assessed for both experiments. Thus, a confirmatory factor analysis was employed with principal components extraction and varimax rotation. Results of the confirmatory factor analysis for the first experiment showed that the four factors represented a total variance of 91.7%, where Factor 1 (Quality) explains 20.1%, Factor 2 (Price) 22.3%, Factor 3 (Discount) 22.5% and Factor 4 (Attitude) 26.8%, respectively. According to the items of the second experiment, a total variance of 90.4% can be explained by four factors, where Factor 1 (Quality) explains 21.9%, Factor 2 (Price) 22.8%, Factor 3 (Discount) 22.5% and Factor 4 (Attitude) 23.2%, respectively. As the figures in Table 2 illustrate, the four-factor solution is acceptable for both experiments. In such, the factor analysis yielded scales that were distinct and unidimensional except for quality and attitude as they load on the same factors to some degree, e.g. the item *Quality 2* loads on Factor 4 in Experiment I (.567) and II (.470). But these findings are consistent with the research model as the attitude towards a price bundle is influenced by its quality.

Table 2: Rotated factor matrix of bundle quality, price, discount and attitude for both experiments**;** Factor (F)1: Quality, F2: Price, F3: Discount, F4: Attitude

	Exp. I (MRA)				Exp. II (SSD)			
Item	**F1**	**F2**	**F3**	**F4**	**F1**	**F2**	**F3**	**F4**
Quality 1	.916	.118	-.018	.325	.924	.020	.085	.258
Quality 2	.756	.097	-.077	.567	.822	.057	.032	.470
Price 1	.033	.946	.011	.022	-.070	.940	-.164	.010
Price 2	.121	.928	-.054	-.073	.128	.938	-.110	-.056
Discount 1	-.048	.016	.943	-.074	.119	-.094	.927	.072
Discount 2	-.013	-.057	.946	.017	-.012	-.184	.925	.099
Attitude 1	.326	-.062	-.046	.907	.302	.039	.200	.868
Attitude 2	.264	-.027	-.009	.941	.310	-.101	.009	.890

Variance analysis of the manipulations of the constructs quality, price and discount resulted in significant differences for high and low values as the figures in

Table **3** illustrate. The high and low manipulations were perceived to be just above and below the average value (4) of the semantic scales. Critical mean values can be observed for quality (4.09/high) and discount (3.98/low) in the second experiment as they are close to the average value of 4. Nevertheless, it can be assumed that the manipulations of quality, price and discount were within the participant's acceptable ranges.

Table 3: Mean values of high/low manipulations for quality, price and discount, F-value and p-value

	Exp. I (MRA)				Exp. II (SSD)			
Construct	**High**	**Low**	**F-value**	**p-value**	**High**	**Low**	**F-value**	**p-value**
Bundle Quality	4.09	3.32	12.4	< .001	4.67	3.56	23.4	< .001
Price	4.50	3.62	12.2	< .001	4.33	3.52	9.9	< .01
Discount	4.59	3.98	6.7	< .05	4.72	3.48	34.2	< .001

3.4 Results

For both experiments, at the .001 level the constructs quality and attitude had a significant correlation with the intention to buy a product bundle, as indicated by the figures in Table 4. The correlations between bundle quality and attitude were also significant at the same level. All the other correlations did not correlate significantly as stated in our hypotheses. Hence, H1, H2 and H3 are not supported for both experimental settings, whereas the correlations proposed in H4, H5 and H6 are supported by the figures.

Table 4: Correlation coefficients of the research model; Notes: * Significant at the 5 per cent level. *** Significant at the .001 per cent level.

Relations	Exp. I (MRA)	Exp. II (SSD)	Test results
Price → Quality (H1)	.17	.05	Rejected
Price → Buying Intention (H2)	-.12	-.03	Rejected
Discount → Buying Intention (H3)	-.20	.20	Rejected
Quality → Attitude (H4)	.71***	.66***	Accepted
Quality → Buying Intention (H5)	.43***	.37***	Accepted
Attitude → Buying Intention (H6)	.80***	.76***	Accepted

4 Discussion

Our study on using MRA as support for in-store purchase decisions indicates (1) that product information obtained by MRA is comparable with simple interpersonal sales communication between consumers and sales personnel and (2) that results from research on online RA are a valid basis for further investigations on MRA. This holds in particular for the importance of perceived quality cues for price bundles that is used by consumers for forming a buying intention which replicates Hansen's results (Hansen, 2005). Hence, perceived quality is a flexible concept that can be applied on singular products but also on price bundles. Indirect effects of perceived qualities on buying intentions have been found via consumer's attitudes towards price bundles. Therefore, in compliance with Hansen's results, a strong triadic relationship for price bundles exists between quality, attitude and buying intention.

It was found that price has no significant impact on the perceived quality of a price bundle and therefore lacks an indirect effect on buying intentions which contrasts Hansen's finding (Hansen, 2005). A possible explanation is that the information given for each product has been richer than those offered in (Hansen, 2005). Thus, consumers were able to form strong opinions on the quality of a price bundle and were not using price as an indirect indicator of perceived qualities but apply a best-value strategy (Tellis & Gaeth, 1990). This view is supported by the missing relationship between price and buying intention which would support price-seeking strategy (Tellis & Gaeth, 1990).

No positive relationship was found for the impact of discount on buying intentions. This result is also inline with the missing relationship between price and buying intention because discount is defined relative to a given price (Adams & Yellen, 1976). Hence, it can be argued that in this setting discount is only perceived as a price construct and does not carry additional information.

5 Conclusion

5.1 Summary

In summary, the results are two-folded. On one hand, a triadic relationship between quality, attitude and buying intention can be asserted for the use of MRA and simple interpersonal sales communication between consumers and sales personnel in purchase situations for price bundles. This is consistent with previous research for single products (van der Heijden, 2006). On the other hand, no effects of price and discount on buying intentions are traceable which is also consistent with previous results under the assumption of the application of best-value strategies (Tellis & Gaeth, 1990).

The novelty of this study stems from two elements. First, we have used a MRA setting for our experiments and compared this with an approximation of interpersonal sales communication between consumers and sales personnel. Our results show that MRA can be used to inform consumers about qualities of price bundles under best-value strategy conditions. Second, we have replicated results of purchase decisions on single products for price bundles (Hansen, 2005). In combination with other research on the adoption of MRA-mediated product information, it can be concluded that MRA are an efficient and effective means for supporting purchase decisions on product bundles in stores under best-value conditions.

5.2 Limitations

MRA are an innovative class of decision support systems for which few research results exist (Maass & Janzen, 2007; van der Heijden, 2006). Therefore, this study with its approximations of interpersonal sales communication and MRA-based communication gives early design guidelines for the class of MRA and shall be perceived as a direction how MRA can support in-store purchase decisions. This study focuses only on price bundles and makes no proposition on product bundles (Stremersch & Tellis, 2002). Trust building as one of the most important constructs in sales processes (Hawes, Mast, & Swan, 1989) has been neglected as well as affective influences (Hansen, 2005). The underlying model has neglected several potentials for auto-correlations, such as between discount and price which is important for price-seeking and price-aversion settings but not for best-value conditions as discussed here.

5.3 Future Work

This initial study on MRA-based purchase support systems opens up a broad field for future research. In this study, we have approximated interpersonal sales communication with sales personnel and sales communication via MRA by desktop PC applications with the goal to derive design requirements for future MRA implementations. Hence, an important next step is to evaluate the same

setting with human sales personnel and technically realised MRA systems, cf. (Maass & Janzen, 2007; Wasinger & Wahlster, 2006).
On conceptual level, an interesting topic is the investigation whether MRA influence buying intentions under conditions where price-seeking and price-aversion strategies are applied (Tellis & Gaeth, 1990). It can be assumed that price and discount have significant impact on buying intentions and the perception of bundle qualities (Shibin, Parker, & Nakamoto, 2007).

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Appendix

Items of the constructs quality (Q), price (P), discount (D), attitude (A) and intention to buy (IB).

Q1	Compared to the average quality of such a bundle the quality of this bundle is ... (much worse / much better).
Q2	In my opinion the quality of this bundle is … (very low / very high).
P1	Compared to the average market price of such a bundle the price of this bundle is in my opinion… (much lower / much higher).
P2	In my opinion the price of this bundle is ... (very low / very high).
D1	Compared to the average discount you get for this type of bundle the discount of this bundle is in my opinion ... (much lower / much higher).
D2	In my opinion the discount for this bundle is ... (very low / very high).
A1	Compared to furniture bundles in general, I find this bundle to be ... (much less attractive / much more attractive).
A2	I find this bundle … (much less attractive / much more attractive).
IB	How likely is it that you would buy this bundle (totally unlikely / most likely)