

EVALUATING THE EFFECTS OF FORMAL AND INFORMAL SURVEILLANCE: A RETAILER'S VIEW

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ABSTRACT

This study analyzes how retailers view the links between security problems, investments in formal and informal surveillance, the feeling of security related to customers and employees, and the competitiveness of the store. The study utilizes elements of the theory of Crime Prevention Through Environmental Design (CPTED) in its theoretical approach. Thus, surveillance investments are divided into formal and informal surveillance investments. The theoretical model is tested using structural equation modeling (SEM) with a data collected among grocery store retailers. The study provides several interesting findings. First, security problems have a positive impact on investments in formal surveillance but no impact on investments in informal surveillance. Second, retailers perceive that formal surveillance investments have a negative impact on the feeling of security related to customers and employees whereas informal surveillance investments have a positive impact. Third, retail entrepreneurs perceive that the feeling of security related to customers and employees has a positive impact on competitiveness of the store.

INTRODUCTION AND PURPOSE

Retail crime affects millions of retailers, retail employees and customers and results in billions of dollars in losses for companies around the globe (Bamfield, 2004; Hayes & Downs, 2011; Hayes et al., 2011). Retail crime includes not only theft but also vandalism and disturbance (e.g. Kajalo & Lindblom, 2010). These acts do not only cause inventory shrinkage, but also introduce violence to the workplace putting employees and customers at risk of injury (Hayes et al., 2011).

Thus providing a safe and secure environment for customers and employees has become a major factor in store management and design for any retail store type (Coleman, 2006). Moreover, retailers have shifted from 'crime reaction' to 'crime prevention' efforts (Bamfield & Hollinger, 1996; Hayes, 2003; Hayes et al., 2011). Thus, retailers use a number of methods to reduce shrinkage caused by theft and shoplifting (Hayes & Blackwood, 2006; Gill et al., 1999; Hayes & Downs, 2011; Hayes et al. 2011; Kajalo & Lindblom, 2011; Lindblom & Kajalo 2011).

Although the huge amounts are spent on crime prevention methods worldwide, there is limited evidence on the actual effectiveness of these investments (see e.g. Beck & Willis, 1999; Farrington et al. 1993; Felson 1996; Hayes, 1999; Hayes & Blackwood, 2006). In particular, it has been argued that the effectiveness of surveillance methods is likely disappeared in the long

run (Beck & Willis, 1999). In addition, there is major concern that crime prevention investments may make honest consumers feel less secure (Guffey et al., 1979; Cox et al., 1993; Overstreet & Clodfelter, 1995). For example, a survey by Lin et al. (1994) found that formal surveillance devices were perceived to increase the environmental hostility within the store (see also Burns et al., 2010). All in all, further research is needed to understand the effectiveness of surveillance in the store environment as retailers are looking for the cost-benefit of surveillance investments (Welsh & Farrington, 2007; Hayes et al., 2011).

The present paper aims at understanding how security problems affect surveillance investments at the store level and what is the link between these investments and retailer's assessment of consumers' and employees' feeling of security and competitiveness of the retail store. To do this, this study utilizes the theory of Crime Prevention through Environmental Design (CPTED).

THEORETICAL BACKGROUND

Criminologist C. Ray Jeffery formulated the theory of Crime Prevention through Environmental Design (CPTED) in 1971. Although Jeffery coined the phrase "Crime Prevention through Environmental Design," much of the conceptual development in this area has been based upon Oscar Newman's "defensible space" theory (1973). As Moffat (1983) argues, defensible space is at the root of the CPTED concept. Reynald and Elffers (2009) state that all contemporary approaches to and discussions of the crime-design relationship use Newman's defensible space theory as a critical point of reference (see e.g. Clarke, 1992; Beavon et al., 1994; Taylor & Harrell 1996; Felson, 1998; Jeffrey, 1999). According to Reynald and Elffers (2009), Newman's defensible space concept refers to the systematic way in which the physical design of urban residential environments can be manipulated to create spaces that are less vulnerable to crime by providing residents with more opportunities to control and defend their space. Cozens (2002) states that since the work of Jeffery (1969) and Newman (1973), CPTED has evolved into a robust sub-division within criminology. Cozens (2002) continues by arguing that in recent years CPTED has emerged as a socio-physical perspective within both criminology and urban planning and these ideas have refined "defensible space" into a more community-based and holistic approach.

Crowe (2000, 1) defines CPTED as "the proper design and effective use of the built environment which can lead to a reduction in the fear of crime and the incidence of crime, and to an improvement in the quality of life." Cozens (2002) argues that CPTED involves the design and management of the physical environment to reduce the opportunities for crime and is based upon the assumption that the offender enters into a rational decision-making process before undertaking a criminal act. In addition, Cozens (2002) argues that CPTED is not deterministic in its stance and clearly recognizes the importance of e.g. socio-economic and cultural issues that may influence criminal motivation.

In reviewing the research results on CPTED, Cozens et al. (2005; see also Cozens et al., 2001) concluded that CPTED practices can reduce crime and the fear of crime and also increase property values and investment in an area. Cozens (2006, editorial) states "[...] Increasingly, theory, research and practice in the fields of environmental criminology and CPTED all strongly suggest that there is now sufficient evidence to argue that a consideration of the opportunities for crime that urban design can foster should be as integral to the planning and design process as issues such as public health, fire regulations, sustainability and disability access."

CPTED is a multi-disciplinary approach to crime prevention. Its strategies include access control, surveillance, territorial reinforcement and maintenance of the facility. Moffat (1983) divides CPTED into seven areas: territoriality, natural surveillance, formal surveillance, access control,

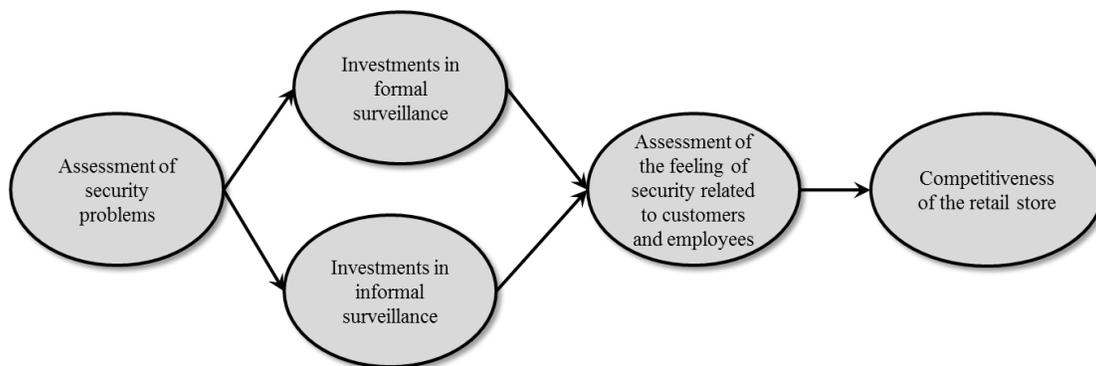
image/maintenance, activity programme support, target hardening and defensible space. Cozens et al. (2005; see also Cozens, 2002; Cozens et al., 2001) concluded that key CPTED practices are territoriality, surveillance (informal and formal), access control, image/maintenance, activity program support and target hardening. Cozens et al. (2005) argue that each CPTED method has individually contributed to reducing crime. However, Reynald and Elffers (2009) argue that there are also conflicting empirical results and broad conclusions about the viability and effectiveness of these methods.

The present study focuses on surveillance. In accordance with CPTED research, surveillance is classified as informal or formal. Formal surveillance is intended to produce a deterrent threat to potential offenders through the deployment of personnel whose primary responsible is security (e.g. police, security patrols) or through introduction of some form of technology, such as closed-circuit television (CCTV) (Welsh & Farrington, 2004; Cozens et al., 2005; Reynald & Elffers, 2009). Informal surveillance shares the same aim as formal surveillance, but it involves efforts that capitalize upon the ‘natural’ surveillance provided by people going about their everyday business (Welsh & Farrington, 2004). In practice, informal surveillance is promoted by physical features and activities a way that maximizes visibility and fosters positive social interaction (Farrington et al., 1993; Hays, 1999; Cozens et al., 2005; Reynald & Elffers, 2009).

There is a relatively an extensive literature on the use of various formal crime prevention strategies. For example, numerous CPTED-based empirical studies conducted in railway stations, parking lots, buses, banks, and other public places indicate a link between formal surveillance and incidence of crime (see e.g. Hannan, 1982; Poyner, 1991; Laycock & Austin, 1992; Tilley, 1993; Pretious et al., 1995; Barclay et al., 1996). Whereas formal surveillance has been a matter of interest in business life and academic research for decades, informal surveillance has received less attention. However, it can be assumed that indicate that informal surveillance can be used as situational crime prevention mechanism and it may have even a high capacity to prevent crime.

The present study analyses retail entrepreneurs’ assessment of the links between security problems, two types of surveillance investments, feelings of security related to customers and employees, and competitiveness of the retail store. The conceptual model of the study is presented in Figure 1.

Figure 1. Conceptual Model



METHODOLOGY

The sample consists of Finnish grocery store K-retailers. K-retailers are semi-independent retail entrepreneurs who own and manage their retail businesses, and who invest considerable personal and financial resources in these enterprises. K-retail entrepreneurs are contractually linked to K-alliance, one of the largest retail organizations in Finland. K-retailers have a variety of store formats, ranging from small convenience stores to supermarkets and large hypermarkets. K-retailers are entitled to use the K-logo and other chain-marketing symbols, but managerial policies and processes at the store level—such as marketing and security issues—are the responsibility of individual K-retailers. Furthermore, K-retailers are responsible for surveillance investments (e.g. in CCTV systems) in their stores, and they assume the financial risk in managing their operations.

The population for the study consisted of 946 grocery store K-retailers. The data collection was carried out through an Internet survey in February and March of 2009. E-mail was sent from the K-retailers Association describing the purpose of the study and requesting the retailer's participation. A total of 161 grocery store retailers filled in the questionnaire, yielding a response rate of 17%. Non-response bias was tested and no statistically significant differences were found for the study variables between the early and late respondents (Armstrong & Overton, 1977). Overall, we find the response rate and sample satisfactory for the purposes of this study.

The development of the six-page questionnaire was directed by previous research and by several lengthy discussions with retailers and experts from retailing organizations. A pre-test was carried out by asking several managers and professionals to complete the questionnaire to assess whether they understood the questions. These procedures aimed to ensure that there are no unclear items in the questionnaire and to guarantee the content validity of our study.

Five-point Likert-type scales were used to measure all constructs (1=strongly agree–5=strongly disagree) which are presented in Table 1. The reliability of the constructs was assessed using Cronbach's alpha values. Alpha values in Table 1 indicate that the items were sufficiently related to justify their combination as constructs, even though one construct was slightly (.59) below the recommended level of .60 (Nunnally and Bernstein, 1994). Problems of missing data are often magnified in structural equation modeling, and missing-data computation is very important (Ullman and Bentler, 2004). Thus, the multiple imputation option included in LISREL 8.80 was employed with Expected Maximization (EM) algorithm imputation of missing values. This procedure is explained in Schafer (1997).

Table 1. Survey Items Used to Measure Latent Variables and Cronbach's Alphas

Latent variable	Survey items
Assessment of security problems $\alpha=.80$	Disturbance is currently a significant problem Vandalism is currently a significant problem Shoplifting is currently a significant problem
Investments in formal surveillance $\alpha=.59$	Our store has invested in security guards Our store has invested in CCTV surveillance systems Our store has invested in various alarm systems Our store has been active in co-operation with the formal authorities (e.g. police)
Investments in informal surveillance $\alpha=.86$	Our store has invested in premises that are comfortable Our store has invested in premises that are well cleaned Our store has invested in premises that are well-lighted
Assessment of the feeling of security related to customers and employees $\alpha=.71$	The consumers visiting the store feel secure The persons working in the store feel secure The consumers visiting the store feel that shopping in the store is pleasant
Competitiveness of the retail store $\alpha=.88$	The sales of the store have grown faster than those of the closest competitors The profitability of store is better than that of closest competitors The store is financially successful

The response options ranged in all questions from 1, (strongly agree) to 5, (strongly disagree). α : Cronbach's alpha.

Scale construction and validation were completed using confirmatory factor analysis and the two-step procedure recommended by Anderson and Gerbing (1988). First measurement model assessment was conducted and then the structural model assessment.

In order to measure the model fit of the measurement model and structural model we used the chi-square statistic, the root mean square error of approximation (RMSEA), the standardized root mean square residual (SRMR), the goodness of fit index (GFI), the non-normed fit index (NNFI), and the comparative fit index (CFI). With the root mean square error of approximation (RMSEA) values less than .05 are indicative of good fit, and between .05 and under .08 of reasonable fit (Browne and Cudeck, 1993; MacCallum et al., 1996). Likewise, small values of the standardized root mean square residual (SRMR) indicate good model fit, and values less than .10 are generally considered favorable (Kline 2005).

Goodness of fit index (GFI), non-normed fit index (NNFI), and the comparative fit index (CFI) values close to 1 indicate a good fit (Steenkamp & van Trijp, 1991). The model fits of the measurement model ($\chi^2 = 162.51$, $df = 94$, $p < .00$, $RMSEA=.067$, $SRMR=.065$, $GFI = .887$, $NNFI = .922$, $CFI = .939$) was reasonable as all fit measures are within generally recommended thresholds. Table 2 presents means, standard deviations, and correlations for the constructs.

Table 2. Means, Standard Deviations and Correlations

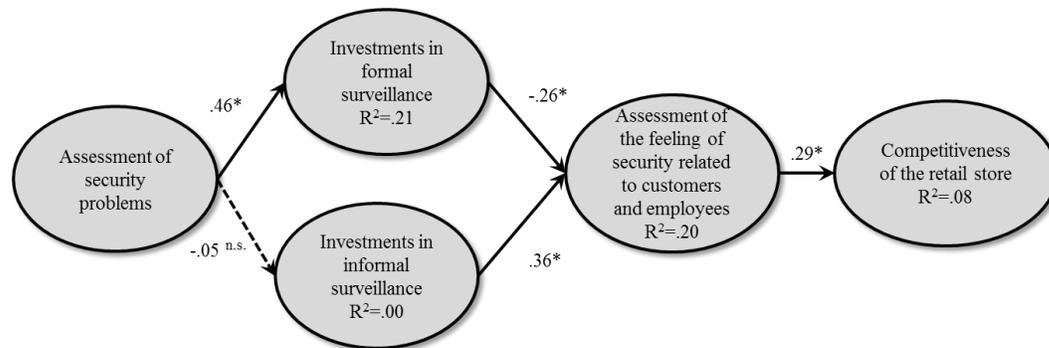
Constructs	Mean	S.D.	1.	2.	3.	4.
1. Assessment of security problems	2.45	0.89				
2. Investments in formal surveillance	1.88	0.67	.28**			
3. Investments in informal surveillance	1.61	0.52	-.04	.36**		
4. Assessment of the feeling of security related to customers and employees	2.03	0.66	-.35	-.02	.28**	
5. Competitiveness of the retail store	2.60	1.04	-.09	-.07	.13	.30**

** Correlation is significant at the .01 level (2-tailed).

ANALYSIS AND RESULTS

The conceptual model was tested using structural equation modeling (SEM) via LISREL 8.80 (Jöreskog and Sörbom, 2001). The modeling was undertaken by deploying covariance matrix and the maximum likelihood estimation procedure. Figure 2 presents the structural model and fit indexes which indicate that the model fit is reasonable.

Figure 2. Structural Model: Standardized Path Estimates



*= t-test significant at $p < .05$. $\chi^2 = 196.59$, $df = 99$, $p < .00$, $RMSEA=.078$, $RMR=.099$, $GFI = .867$, $NNFI = .900$, $CFI = .918$.

The model provides several interesting findings. First, assessment of security problems has positive impact in investments in formal surveillance ($\beta=.46$). However, there was no statistically significant impact on investments in informal surveillance ($\beta=-.05$). This may indicate that retailers have more trust on the effectiveness of formal surveillance on preventing crime.

Investments in formal surveillance had negative impact on retailer’s assessment of the feeling of security related to customers and employees ($\beta=-.26$). This result indicates that retailers do not trust that formal surveillance such as CCTV and security guards do make consumers and employees feel secure. This finding supports a survey by Lin et al. (1994) who found that formal surveillance devices were perceived to increase the environmental hostility within the store.

Investments in informal surveillance had positive impact on the retailer’s assessment of the feeling of security related to customers and employees ($\beta=.36$). Finally, retailer’s assessment of

the feeling of security related to customers and employees had positive impact on competitiveness of the retail store ($\beta=.29$).

We examined the explanatory power of the model for each dependent construct by using R^2 (squared multiple correlations). The explanatory power of the model, as expected, is relatively low towards competitiveness of the retail store (8 percent). We find this relatively low percent expected as there are a number of other factors explaining competitiveness of the retail store (e.g. location).

SUMMARY AND CONCLUSION

The goal of this paper was to create a more comprehensive understanding of the ways in which retail entrepreneurs perceive the links between security problems, investments in formal and informal surveillance and retailer's assessment of consumers' and employees' feeling of security and competitiveness of the retail store.

The study used elements of CPTED in its theoretical approach. According to CPTED, the design and management of a physical environment can discourage crime. CPTED is a multi-disciplinary approach to crime prevention and offers a wide range of strategies, such as access control, surveillance, territorial reinforcement and maintenance of the facility. Surveillance, either formal or informal, is a key component of the CPTED approach. The effectiveness of each CPTED method is based on the assumption that the crime can be prevented either by reducing the opportunities for crime or by increasing the risks of apprehension.

The study provided several interesting findings. First, retailers seem to emphasize investments in formal surveillance instead of investments in informal surveillance as an answer to security problems. This may indicate that retailers have more trust on the effectiveness of formal surveillance than informal surveillance. However, retailers' views of the impact of formal surveillance investments on the feeling of security related to customers and employees is negative. It seems that retail entrepreneurs think that forms of formal surveillance such as CCTV and security guards do not make consumers or employees feel secure. It is interesting to ponder why formal surveillance is perceived to have negative impact on the feeling of security. This finding is also interesting since there is a trend of equipping stores with formal security hardware such as sophisticated CCTV surveillance systems. It may be so that formal surveillance is seen to be effective way to prevent crimes (e.g. shoplifting) at the store level but it ultimately creates feeling of insecurity amongst consumers and employees. In other words, CCTV systems and uniformed guard patrols walking around store can be very effective deterrent to thieves (Pretious et al. 1995) but they can also cause wonderment and even insecurity among consumers.

Quite contrary to formal surveillance, informal surveillance had positive impacts on the assessment of the feeling of security related to customers and employees. In other words, retailers believe that informal surveillance such as pleasant store environment and well-cleaned premises reduce consumers' and employees' safety and security concerns at the store level. The results also showed that retailers view that feelings of security related to customers and employees have a positive impact on competitiveness of retail store. This result clearly underlines the fact that providing a safe and secure environment is a major factor in store management. Indeed, our results support the notion that one of retailers' main objectives is to ensure that the store and its environment make its consumers and employees feel safe.

LIMITATIONS

The present study has several limitations that need to be addressed in future research. First, the present study has focused on the effectiveness of surveillance from the retail entrepreneurs' point

of view. In other words, the findings are based solely on subjective perceptions of retailers. These subjective perceptions may differ from the actual effectiveness of various surveillance methods. In addition, there is a need to study meaning of surveillance from the consumers' and employees' viewpoint. Second, this study has focused only on surveillance; however, it should be noted that there are several other aspects of CPTED—such as maintenance and access control—that can also be used to tackle security problems. Third, conceptual and qualitative empirical studies are needed to obtain a clearer understanding of the effectiveness of surveillance in the store environment. In particular, there is a need to create a more comprehensive framework that takes into account contextual factors and the structural characteristics of store environment. Fourth, in-depth qualitative studies could reveal issues that would enable more thorough operationalization of the concepts linked the surveillance in store context.

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