

# **Formal and informal surveillance and competitiveness of shopping centers in Nordic countries**

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## **ABSTRACT**

Providing a safe and secure environment is a major factor in shopping center management and design. The theory of Crime Prevention through Environmental Design (CPTED) provides one theoretical approach to preventing crime and feeling of insecurity in shopping centers. The present paper formulates a path model based on CPTED-theory to investigate the links between formal and informal surveillance, customers' and employees' feeling of security, and competitiveness of shopping centers. The data for this paper was collected among shopping centers in four Nordic countries: Denmark, Finland, Norway, and Sweden. A total of 68 shopping center managers answered an Internet survey in 2009. Data was analyzed using structural equation modeling (SEM). The study revealed that informal surveillance (e.g. clean and well-lighted shopping environment) had positive impact on customers' or employees' feeling of security. However, formal surveillance (e.g. security guards and surveillance cameras) had no impact on customers' or employees' feeling of security. However, formal surveillance had impact on competitiveness of the shopping center directly, and also through consumers' and employees' feeling of security. Overall, the study shows that both formal and informal surveillance are important for competitiveness of a shopping center.

Keywords: shopping centers, formal surveillance, informal surveillance, structural equation modeling

## INTRODUCTION

There is a growing body of academic literature on shopping centers. Researchers have been most interested in studying what makes a shopping center attractive to consumers. According to the literature, both spatial and non-spatial factors are important. Ooi and Sim (2007) state that recent studies have shown that enhancement of shopping experiences through the employment of exciting trade types and activities can exert a significant magnetic attraction to shoppers. Factors such as retail image and tenant mix are also equally critical in enhancing shopping center patronage (see e.g. Beyard & O'Mara, 2006; Coleman, 2006; Hunter, 2006).

According to Coleman (2006), as exposure to crime and terrorist threats has increased, providing a safe and secure environment has become a new major factor in shopping center management and design. Obviously, if customers do not feel safe and comfortable in the shopping center, they are not likely to spend their time and money there. It can therefore be assumed that consumers' feeling of security is crucial for shopping centers. Feelings of insecurity may weaken the attractiveness of a shopping center and its reputation. Consequently, managers' main objective should be to ensure that the shopping center makes its consumers feel safe. The objective is very clear but how to create a safe shopping environment is not.

The theory of Crime Prevention Through Environmental Design (CPTED) is being used by urban designers, town planners, and city centre managers to tackle crime and the fear of crime (Cozens et al., 2001; 2005). CPTED asserts that "the proper design and effective use of the built environment can lead to a reduction in the fear and incidence of crime, and an improvement in the quality of life" (Crowe, 2000). CPTED is a multi-disciplinary approach to crime prevention and it offers a wide range of strategies to prevent crimes. These strategies include access control, surveillance, territorial reinforcement and maintenance of the facility.

Surveillance is a key component of the CPTED approach. In accordance with CPTED research, surveillance can be classified as informal or formal. Informal surveillance is promoted by physical features, activities and people to maximize visibility and foster positive social interaction. Formal surveillance aims to produce a deterrent threat to potential offenders through the deployment of personnel whose primary responsibility is security (e.g. police, security patrols) or through introduction of some form of technology, such as CCTV. (Cozens et al., 2005; Reynald & Elffers, 2009)

Relatively little empirical research has evaluated the surveillance investments and effectiveness of surveillance at shopping centers (Overstreet & Clodfelter, 1995; Lee et al., 1995), although many articles and reports have pointed out the importance of surveillance. This is clear shortcoming due to reason that it can be assumed that surveillance methods such as uniformed guard patrols and CCTV-systems influence both employees' and consumers' behavior and feel of security (Lin et al., 1994). Based on this research gap, this study investigates the links between formal and informal surveillance, customers' and employees' feeling of security, and competitiveness of shopping centers from the viewpoint of shopping center managers. The goal is to understand how shopping center managers perceive the impact of surveillance on the feel of security and competitiveness of shopping center as well.

The sample of the present study consists of shopping centers from four Nordic countries: Denmark, Finland, Norway and Sweden. Data is analyzed using structural equation modeling (SEM).

## THEORETICAL BACKGROUND

Crime Prevention Through Environmental Design (CPTED) was formulated by criminologist C. Ray Jeffery 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. Beavon et al., 1994; Clarke, 1992; Felson, 1998; Jeffrey, 1999; Taylor & Harrell, 1996). 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. (2006) argue that each CPTED method has individually contributed to reducing crime. However, Reynald and Elffers (2009) argue that there is a mass of conflicting empirical results and broad conclusions about the viability and effectiveness of these methods.

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 (Cozens, 2002). This assumption, in turn, is based on the rational choice

perspective, which hypothesizes that potential shoplifters makes an a priori decision to steal merchandise, calculate the costs and benefits of shoplifting, and select the alternative with the highest utility (e.g. Tonglet, 2002). Although research conducted from this rational choice perspective has provided valuable data about the effectiveness of various CPTED methods (Beck & Willis, 1999; Farrington et al., 1994), this perspective also has several limitations (Tonglet, 2002). The main criticism is that the rational choice perspective does not take into account 'irrational' offenders (e.g. those intoxicated by alcohol or drugs, or who act impulsively) who are potentially less likely to be deterred by CPTED methods. However, as Cozens et al. (2005) argue, these irrational offenders might be less likely to respond predictably to any crime prevention initiatives.

As stated earlier, the present study focuses on surveillance. In accordance with CPTED research, surveillance can be classified as informal or formal. This study aims to investigate the links between formal and informal surveillance, customers' and employees' feeling of security, and competitiveness of shopping centers from the viewpoint of shopping center managers. The goal is to understand how shopping center managers perceive the impact of surveillance on the feel of security and competitiveness of shopping center as well.

## **METHODOLOGY**

The sample of the present study consists of shopping centers from four Nordic countries: Denmark, Finland, Norway and Sweden. According to Nordic Council of Shopping centers, there are 893 shopping centers in these countries. These 893 centers form the sampling frame of the present study. The shopping center markets differ in these countries in several aspects. Key features of each country and shopping center market are presented in Table 1.

The data collection was carried out through an Internet survey in 2009 in these four Nordic countries. This was done in co-operation with the Nordic Council of Shopping Centers, whose managing director sent e-mail to managers of the shopping centers asking them to participate in the web survey. Two more e-mails reminding of the study were sent, and all together 68 managers completed the survey: 3 from Denmark, 5 from Finland, 10 from Norway, and 50 from Sweden. As there are 893 shopping centers in Nordic Countries, about 7.6 % of the shopping centers are represented in the final sample. Given the seniority of the respondents and the limited number of shopping centers in these countries, the number of respondents is satisfactory.

The development of the 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. A list of final items in each scale is presented in Table 2.

Problems of missing data are often magnified in structural equation modeling, and missing-data computation is particularly important (Ullman & Bentler, 2004). Therefore, the multiple imputation option was employed with Expected Maximization (EM) algorithm included in LISREL 8.80 for imputation of missing values. The technical details of this procedure are presented in Schafer (1997).

Scale construction and validation were completed using confirmatory factor analysis. The present study follows the two-step procedure recommended by Anderson and Gerbing (1988) and conducts two types of assessment: measurement model assessment and structural model assessment.

Table 3 presents fit indexes for the measurement model using the chi-square statistic ( $\chi^2$ ), the root mean square error of approximation (RMSEA), the goodness of fit index (GFI), the non-normed fit index (NNFI), and the comparative fit index (CFI). The root mean square error of approximation (RMSEA) is usually regarded as the most informative of the fit indexes. Values less than .05 are indicative of good fit, and between .05 and under .08 of reasonable fit (Browne & Cudeck, 1993; MacCallum et al., 1996). The goodness of fit index (GFI) is an absolute fit index, which means it assesses how well the covariances predicted from the parameter estimates reproduce the sample covariances. Here values equal or greater than .90 reflect good fits (Diamantopoulos & Siguaw, 2000). The last two of the fit measures are relative fit indexes, which show how much better the model fits compared to a baseline model, usually the independence model. Values of the non-normed fit index (NNFI), and the comparative fit index (CFI) range from 0 to 1, and values close to 1 indicate a good fit (Steenkamp & van Trijp, 1991). To conclude, the model fit is here reasonable, as RMSEA only slightly exceeds .06, and the other fit measures are within generally recommended thresholds.

To assess the reliability of the constructs, Cronbach's alpha values were calculated for each latent variable. Table 4 presents the means, standard deviations, Cronbach's alphas and correlations for the constructs. All alpha values were between .54 and .82, and indicate that the items were sufficiently related to justify their combination as constructs (Nunnally & Bernstein, 1994). To conclude, the reliability of all constructs is reasonable.

## ANALYSIS AND RESULTS

The conceptual model was tested simultaneously using structural equation modeling (SEM) via LISREL 8.80 (Jöreskog & Sörbom, 2001). The modeling was undertaken by deploying covariance matrix and the maximum likelihood estimation procedure. Figure 1 presents the structural model and standardized path estimates and fit indexes which indicate that the model fit is good.

The model provides several interesting findings. First, formal surveillance does not have a positive impact on consumers' and employees' feeling of security. It seems that forms of formal surveillance such as surveillance cameras and security guards do not make consumers and employees feel more secure. Second, formal surveillance had small negative impact ( $\beta = -.09$ ) on consumers' and employees' feel of security, but this relationship was not statistically significant. Quite contrary to formal surveillance, informal surveillance had strong and statistically significant positive impact on employees and consumers' feel of security ( $\beta = .48$ ). In other words, shopping center managers believe that informal surveillance makes consumers' and employees' feel more secure at shopping centers. Third, the model shows that both formal surveillance ( $\beta = .34$ ) and consumers and employees feel of security ( $\beta = .39$ ) have positive impact on the competitiveness of the shopping center. Taken together, the model suggests that the both formal and informal surveillance are important for the competitiveness of the shopping center. Formal surveillance has importance directly by, for example, reducing theft and other crime. And informal surveillance has importance as well, but this effect is not direct, but instead takes place through the higher feeling of security among consumers and employees.

The explanatory power of the model for the two dependent constructs was examined by using  $R^2$  (squared multiple correlations). The explanatory power of the model is relatively low towards competitiveness of retail store, as formal surveillance, informal surveillance and consumers' and employees' feeling of security together explain 12 percent of the variances

observed in competitiveness of shopping center. This is natural as there are a number of other factors explaining competitiveness of shopping center (e.g. location). Likewise, the two forms of surveillance explain 21 percent of consumers' and employees' feeling of security.

## SUMMARY AND CONCLUSION

There is a growing body of academic literature on shopping centers, especially with regard to the factors that make such centers attractive to consumers. Various factors have been suggested—including enhancement of shopping experiences through exciting retail offerings and activities, retail image, tenant mix, and the provision of a safe and secure environment for customers (Ooi & Sim, 2007; Beyard & O'Mara, 2006; Coleman, 2006; Hunter, 2006).

According to Coleman (2006), the provision of a safe and secure environment has become an increasingly important consideration in the management and design of shopping centers—especially as the risk of exposure to criminal and terrorist threats has risen. According to Lee et al. (1999), shopping centers face the same problems regarding crime as that of a central business district, and in a similar vein Fernando (1995) has argued that it is unrealistic to expect crime to be less prevalent in a shopping centre than a city street. Indeed, it has been suggested that several features of shopping centers—such as thousands of shoppers carrying cash, credit cards, and valuable merchandise—make such centers attractive targets for criminal activity.

It is therefore reasonable to infer that security concerns represent a significant issue for the managers of shopping centers. Feelings of insecurity among consumers have the potential to weaken the attraction and reputation of a given centre. It is thus apparent that a primary objective of management should be to ensure that a shopping centre makes its customers feel safe. However, although the objective is clear enough, the means of achieving it are less apparent.

This study formulated a path model based on CPTED-theory to investigate the links between formal and informal surveillance, customers' and employees' feeling of security, and competitiveness of shopping centers. The goal was to understand how shopping center managers perceive the impact of surveillance on the feel of security and competitiveness of shopping center as well.

The study revealed that informal surveillance had strong and statistically significant positive impact on employees and consumers' feel of security. In other words, shopping center managers believe that informal surveillance makes consumers' and employees' feel more secure at shopping centers. Quite contrary to informal surveillance, formal surveillance does not have a positive impact on consumers' and employees' feeling of security. Formal surveillance had even small negative impact on consumers' and employees' feel of security, but this relationship was not statistically significant.

The research also revealed that both formal surveillance and consumers and employees feel of security have positive impact on the competitiveness of the shopping center. Taken together, it can be argued that the both formal and informal surveillance are important for the competitiveness of the shopping center. Formal surveillance has importance directly by, for example, reducing theft and other crime. And informal surveillance has importance as well, but this effect is not direct, but instead takes place through the higher feeling of security among consumers and employees.

The present study has several limitations that need to be addressed in future research. First, the present study has focused on surveillance from the managers' point of view. In other words, the findings are based solely on subjective perceptions of managers. These subjective

perceptions may differ from the actual level of feelings of security. Consequently, there is a need to study these issues from the perspectives of customers and employees as well. 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 influence the incidence of crime and the fear of crime. Further studies should focus on these as well. Third, conceptual and qualitative empirical studies would help in reaching a clearer understanding of the effectiveness of surveillance at the shopping centers. In particular, there is a need to create a more comprehensive framework that takes into account contextual factors and the structural characteristics of shopping centers. Finally, it would also be fruitful to conduct comparative studies in other national settings in which the retail structure and business culture is different from that of Nordic countries.

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**Table 1: Key features of shopping center market in 2008: Denmark, Finland, Norway and Sweden**

Denmark	<ul style="list-style-type: none"> <li>• Population: 5.476 billion</li> <li>• GDP: 227 billion euro (2007)</li> <li>• GDP/inhabitant: 41,529 euro 1€=7,44 DKK</li> <li>• Total shopping center GLA: 1,5 million m<sup>2</sup></li> <li>• Total retail sales: 29.2 billion euro</li> <li>• Center definitions: Minimum 5000 m<sup>2</sup>, includes department stores</li> <li>• Total number of centers: 103 centers</li> <li>• SC retail sales/m<sup>2</sup>: app. DKK 35,700/m<sup>2</sup></li> <li>• Shopping center GLA/inhabitant on the above: 0.26 m<sup>2</sup></li> </ul>
Finland	<ul style="list-style-type: none"> <li>• Population: 5.328 million</li> <li>• GDP: 185 billion euro (2006)</li> <li>• GDP/inhabitant: 31,700 euro</li> <li>• Total shopping center GLA: 1.12 million m<sup>2</sup></li> <li>• Total retail sales: 34 billion euro</li> <li>• Center definitions: Enclosed with minimum 5000 m<sup>2</sup>, 10 stores and no store can take more than 50% of total GLA</li> <li>• Total number of centers: 58 centers,</li> <li>• SC retail sales/m<sup>2</sup>: 3,750 euro/m<sup>2</sup></li> <li>• Shopping center GLA/inhabitant on the above: 0.21 m<sup>2</sup></li> </ul>
Norway	<ul style="list-style-type: none"> <li>• Population: 4.737</li> <li>• GDP: 264 billion euro (2007)</li> <li>• GDP/inhabitant: 56,064 euro 1€=8.63 NOK</li> <li>• Total shopping center GLA: 3.72 million m<sup>2</sup></li> <li>• Total retail sales: 34.5 billion euro (taxes not included).</li> <li>• Center definitions: Minimum 2500 m<sup>2</sup> and 5 stores</li> <li>• Total number of centers: 394 centers</li> <li>• SC sales/m<sup>2</sup>: NOK 30,604/m<sup>2</sup></li> <li>• Shopping center GLA/inhabitant on the above: 0.79 m<sup>2</sup></li> </ul>
Sweden	<ul style="list-style-type: none"> <li>• Population: 9.256 million</li> <li>• GDP: 311 billion euro (2006)</li> <li>• GDP/inhabitant: 33,737 euro 1€=9.25 SEK</li> <li>• Total shopping center GLA: 4.85 million m<sup>2</sup></li> <li>• Total retail sales: 61.3 billion euro</li> <li>• Center definitions: Minimum 3000m<sup>2</sup> retail space</li> <li>• Total number of centers: 338</li> <li>• SC retail sales/m<sup>2</sup>: SEK 30,500/m<sup>2</sup> (2005)</li> <li>• Shopping center GLA/inhabitant on the above: 0.53 m<sup>2</sup></li> </ul>

Source: Nordic Council of Shopping Centers 2009.

**Table 2: Survey Items\* Used to Measure Constructs**

Formal surveillance	<ul style="list-style-type: none"> <li>• Surveillance cameras</li> <li>• Alarm systems</li> <li>• The presence of visible security personnel (e.g. uniformed guard patrols)</li> </ul>
Informal surveillance	<ul style="list-style-type: none"> <li>• Good lightning of the premises</li> <li>• Maintenance (e.g. cleaning the pedestrian areas) of the premises</li> </ul>
Consumers' and employees' feeling of security	<ul style="list-style-type: none"> <li>• The consumers visiting the shopping center feel secure</li> <li>• The employees at the center feel secure</li> </ul>
Competitiveness of the shopping center	<ul style="list-style-type: none"> <li>• The shopping center is more profitable than its closest competitors</li> <li>• The shopping center is financially successful</li> </ul>

\*The response options ranged from 1, (strongly agree) to 5, (strongly disagree).

**Table 3: Fit Indexes for the Measurement Model**

$\chi^2$ (df)	RMSEA	GFI	NNFI	CFI
26.82 (21), p<.18	.064	.92	.89	.94

RMSEA= root mean square error of approximation; GFI= goodness of fit index; NNFI= non-normed fit index; CFI= comparative fit index.

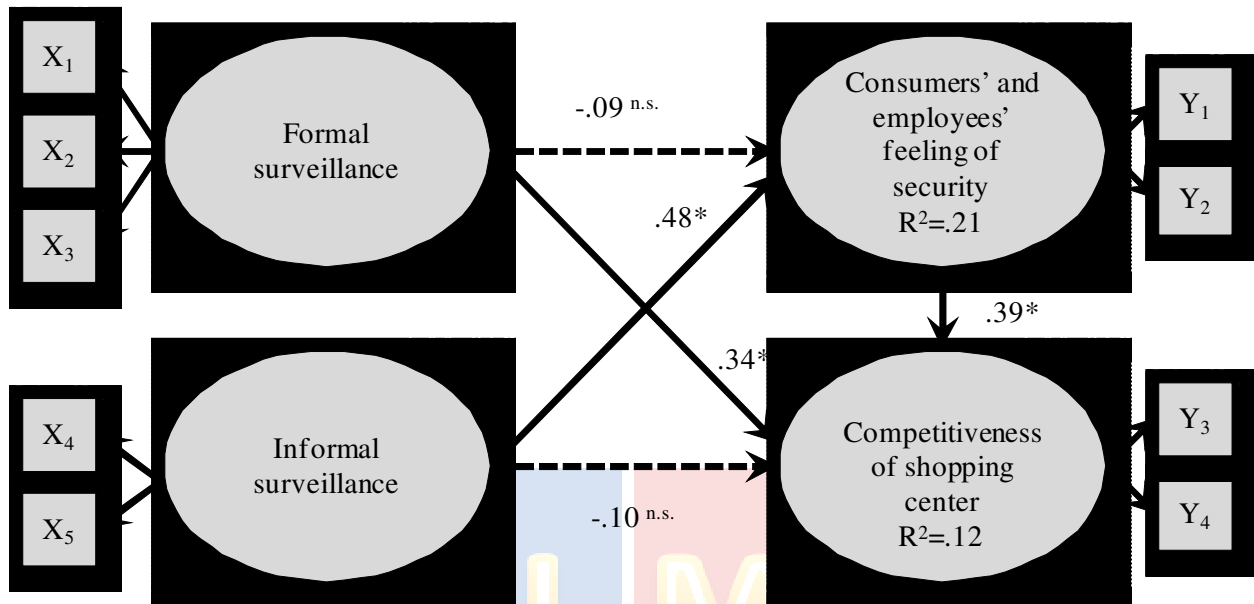
**Table 4: Means, Standard Deviations, Cronbach's alphas and Correlations**

Constructs	Mean	S.D.	$\alpha$	1.	2.	3.
Formal surveillance	3.00	0.85	.54			
Informal surveillance	2.40	0.72	.61	.26*		
Consumers' and Employees' feel of security	1.99	0.56	.70	.21	.29*	
Competitiveness of shopping center	2.40	1.00	.82	.36**	.20	.33**

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

\* Correlation is significant at the .05 level (2-tailed).

Figure 1: Structural Model: Standardized Path Estimates



\*= t-test significant at  $p < .05$ .  $\chi^2 = 26.82$ ,  $df=21$ ,  $p < .18$ ; RMSEA=.064; GFI=.92; NNFI=.89; CFI=.94.