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Unveiling retail omnichannel challenges: developing an omnichannel obstacles scale

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Abstract

Purpose – Retail omnichannel implementation faces barriers hindering accurate and efficient integration across marketing channels. Our desk examination identified a need for a broader perspective in investigating these barriers, moving away from a dominant, narrow approach. This research aims to develop a comprehensive set of items to measure retail omnichannel obstacles, refine the scale and assess its reliability and validity for a robust measurement tool.

Design/methodology/approach – Our approach combines quantitative and qualitative methods, using data from primary and secondary sources to create and validate the omnichannel obstacles scale.

Findings – This study emphasises the inclusive nature of retail functional areas, departing from prior literature that examined them in isolation. Instead of focussing on separate domains where retail omnichannel obstacles may arise, we adopt a holistic perspective by integrating previously disconnected elements.

Originality/value – We assert that challenges in retail omnichannel operations encompass three distinct dimensions: operational efficiency, channel inefficiency, and strategy and organisational culture within retailing. In our final validated measurement model, we consolidate the channel inefficiency dimension and refine the omnichannel obstacles scale to emphasise two areas of consideration.

Keywords Retailing, Omnichannel, Measurement scale, Omnichannel obstacles

Paper type Research paper

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Conflicts of interest: The authors have no conflict of interest to declare.

Availability of data and material: Upon request, the list of works analysed during the systematic literature review and the base of raw data collected in the quantitative study (in Polish) can be shared.

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1. Introduction

The interdisciplinary nature of omnichannel research makes it a thought-provoking area in several domains, such as logistics (Tanriverdi and Aydın, 2023; Mishra *et al.*, 2022; Verhoef *et al.*, 2015; Lorenzo-Espejo *et al.*, 2022), marketing (Nguyen *et al.*, 2022), strategic management (Akter *et al.*, 2021) and operations (Bijmolt *et al.*, 2021). In all these domains, scholars and practitioners agree that due to the possibilities of digital transformation (Radomska *et al.*, 2023), omnichannel has become a new retailing standard (Risberg, 2022), a new norm of strategic marketing (Silva *et al.*, 2024), or even a "*new normal*" (McKinsey and Company, 2021b). Despite becoming an expected convention in logistics, marketing, and strategic management, omnichannel implementation faces numerous challenges (Silva *et al.*, 2024). Industry reports highlight the scope and the intensity of struggles retailers face when going omnichannel, from aligning the omnichannel investments with strategy (McKinsey and Company, 2021a), through the fragmented consumer data (PwC, nd), and the selection of adequate technologies (McKinsey and Company, 2021a), to scaling the omnichannel business (Lemick, 2023). The repertoire of challenges is, therefore, long and varied. Unsurprisingly, retailers admit the managerial confusion related to the area – as Ankeny (2016) puts it: "... *omnichannel success remains a cipher wrapped inside an enigma smothered in secret sauce*". Previous studies suggest even that an omnichannel strategy may sometimes seem utopian (Hajdas *et al.*, 2022), particularly regarding its implementation. It is confirmed by practitioners' viewpoint: "implementing an omnichannel strategy is still easier said than done" (Lemick, 2023).

The challenges of adopting an omnichannel strategy are widely recognised as essential to its successful implementation (Barbosa and Casais, 2022). While scholars have studied the obstacles involved, the findings are often fragmented and lack integrated approaches. Many studies focus on specific areas, such as digital technology that supports omnichannel integration (Yang and Hu, 2024) or logistics (Mishra *et al.*, 2022; Verhoef *et al.*, 2015; Lorenzo-Espejo *et al.*, 2022), but more comprehensive perspectives that address the interdependencies between various obstacles are less explored. In addition to the lack of a holistic approach that considers the diverse and interdependent nature of omnichannel obstacles (Ailawadi and Farris, 2017; Barbosa and Casais, 2022; Saha and Bhattacharya, 2020; Hajdas *et al.*, 2022; Jasin *et al.*, 2019; Sousa *et al.*, 2021), existing scales fail to measure these challenges effectively. Current measures are either consumer-centric (Bouzaabia *et al.*, 2013; Chen and Chi, 2021; Yeğin and Ikram, 2022; Zhang *et al.*, 2018; Gahler *et al.*, 2023; Rahman *et al.*, 2022) or focus on a single domain (Cao and Li, 2018; Oh *et al.*, 2012). The consideration of managers' perspective toward the omnichannel process and the employee-related factors seems to be missing even in research that attempts to overcome some of the obstacles (Rahman *et al.*, 2022; Gahler *et al.*, 2023). In what concerns the omnichannel obstacles, although several measures have been offered, the lack of a more integrated and refined research instrument based on data collected from retailers (Yumurtacı Hüseyinoğlu *et al.*, 2018; Stojković *et al.*, 2023) limits the possibility of adequately identifying the full scope of omnichannel barriers (Akter *et al.*, 2019; Cao and Li, 2018). Despite previous attempts to provide a measurement for an integrated vision of omnichannel obstacles, exceptional attempts (Zhang *et al.*, 2022; Rahman *et al.*, 2022; Gahler *et al.*, 2023) do not detach from the customer-centricity that fail to capture all the necessary views of the phenomenon. Hence, an integrative instrument for omnichannel barriers has not been created and subjected to validation so far. Thus, we provide a multi-step investigation to answer the research question of how to comprehensively measure the barriers to omnichannel implementation.

This research develops and validates a new two-dimensional scale to identify, measure, and monitor omnichannel obstacles. It refines existing operationalisations across areas like physical balance, financial balance, process efficiency, organisational barriers, and employee-related factors at both operational and strategic levels. The key contribution is a comprehensive tool focused on operational efficiency and organisational strategy/culture.

2. Conceptual background

2.1 Omnichannel obstacles

Numerous barriers hinder firms' efforts to implement omnichannel strategies effectively. Logistics is a common challenge, as adopting omnichannel often presents problems (Mishra *et al*., 2022). Specific issues include a lack of inventory visibility across channels (Verhoef *et al*., 2015), inventory replenishment difficulties (Lorenzo-Espejo *et al*., 2022), packaging system design (Freichel *et al*., 2020), high costs associated with packaging, returns, and last-mile delivery (Larke *et al*., 2018), delivery trade-offs (Ratchford *et al*., 2023), and reverse logistics (Gauri *et al*., 2020). These logistics challenges can affect both strategic and functional areas, as omnichannel strategies increase the interdependence of various functional areas.

Omnichannel retailing faces significant challenges, particularly in integrating marketing and logistics functions and overcoming siloed channel management (Oh *et al*., 2012; Picot-Coupey *et al*., 2016). Key issues include managing data quality, diverse customer behaviours, and aligning performance indicators (Gielens and Lamey, 2024; Zhang *et al*., 2016; Larke *et al*., 2018). Beyond operations, a shift in organisational mindset and skill development is crucial (Sousa *et al*., 2021; Von Briel, 2018), along with resolving conflicts between business units over channel autonomy, logistics, and customer databases (Zhang *et al*., 2016; Larke *et al*., 2018). Technology barriers, including difficulties in selecting and implementing integration technologies, also pose challenges (Iftikhar *et al*., 2019; Zimmermann *et al*., 2022). These interconnected obstacles call for a more holistic approach to studying omnichannel challenges.

Omnichannel strategies face not only functional hurdles but also broader challenges, such as increased management complexity and operational barriers (Ailawadi and Farris, 2017; Saha and Bhattacharya, 2020; Barbosa and Casais, 2022). Hajdas *et al.* (2022) distinguish between internal obstacles (operational and strategic barriers, including employee-related, organizational, and vision-related factors) and external obstacles (product-related, customer-related, legal, and competitive drivers). Many strategies focus only on specific issues, limiting managers' ability to assess overall readiness for integration (Iftikhar *et al*., 2019; Verhoef *et al*., 2015; Gauri *et al*., 2020), underscoring the need for more holistic approaches, as current studies frequently focus narrowly on individual aspects or loosely related elements (Jasin *et al*., 2019).

2.2 Existing measures of omnichannel

Most omnichannel studies use various measures to examine implementation from different theoretical perspectives, often focussing on consumers. For example, Bouzaabia *et al.* (2013) developed a scale based on in-store logistics to assess customer outcomes like merchandise, layout, personnel, loyalty, satisfaction, and convenience. Gasparin *et al.* (2022) and Chen and Chi (2021) also take a customer perspective, while Yeğin and Ikram (2022) explore channel integration's effects on consumer intentions, but these scales don't fully capture the obstacles firms face. Yumurtacı Hüseyinoğlu *et al.* (2018) introduced "omnichannel capability" to evaluate logistics service quality but focused mainly on customer experiences. Only a few existing scales are designed for firm-centric settings. For instance, Cao and Li (2018) developed a scale that examines cross-channel integration, focussing on technology factors (IT capabilities, financial resources, relational resources), organisational characteristics (firm size, diversity), and environmental context (industry concentration, competitors' adoption of cross-channel integration). However, their scale emphasises IT capabilities rather than obstacles. Similarly, Oh *et al.* (2012) focus on IT-enabled retail channel integration and HR capability. Stojković *et al.* (2023) conducted a more comprehensive firm-centric study on omnichannel synergy creation but found that identified enablers had little impact on online channel synergy.

In summary, existing omnichannel scales have several limitations when studying omnichannel obstacles. Most are either consumer-centric (Bouzaabia *et al*., 2013; Chen and

Chi, 2021; Sun *et al*., 2020; Yumurtacı Hüseyinoğlu *et al*., 2018; Yeğin and Ikram, 2022; Zhang *et al*., 2018) or focus on a single domain (Cao and Li, 2018; Oh *et al.*, 2012), making them insufficient for evaluating the full range of obstacles firms face. Even more comprehensive firm-centric measures (Stojković *et al.*, 2023) don't fully capture the challenges. Existing scales overlook key obstacles, such as employee-related, organisational, and vision-related dimensions (Hajdas *et al*., 2022), as well as understanding, motivation, organisational mindset, and human omnichannel skills (Sousa *et al*., 2021; Von Briel, 2018). Scholars have called for more refined measurement instruments (Akter *et al*., 2019; Bouzaabia *et al*., 2013) and data collected directly from retailers (Yumurtacı Hüseyinoğlu *et al*., 2018). Our study addresses these gaps by developing and validating a comprehensive scale for measuring omnichannel obstacles.

3. Validation of the omnichannel obstacles scale

This research aims to develop a comprehensive, retail-centric measurement scale of omnichannel obstacles by generating a set of items that comprehensively measure the omnichannel obstacles, refining and purifying the initial scale, and examining its validity to provide a sound measurement approach. We have blended quantitative and qualitative methods and combined data from primary and secondary sources. Our research procedure was implemented in two main phases.

(1) PHASE I – item generation, refinement, and purification following a qualitative approach using secondary data in steps 1 and 3 and primary data in step 3.

(2) PHASE II – validation following a quantitative approach using primary data from large-scale surveying (step 4).

3.1 PHASE I – item generation, refinement, and purification

In the first phase, we conducted a systematic literature review (Paul and Criado, 2020) to define the theoretical foundations of the constructs (Bearden *et al*., 1993). Following a theory-driven, literature-based procedure (Hair *et al.*, 2019a, b), we applied a deductive approach to specify the constructs and examine scales developed by other researchers (Hinkin, 1995). To improve construct quality, we conducted three subsequent studies, detailed below.

3.1.1 Step 1: Item generation through systematic literature review. In the first step of Phase I, we have formulated the following research question (RQ). As we opted for a broad, comprehensive, and wide-ranging collection of results, we expressed our inquiry as open and general.

RQ. How have the barriers to the omnichannel been addressed in the previous research?

We conducted a literature review following a domain-based systematic approach (Paul and Criado, 2020) aimed to run a structured review concentrated on methods, theories, and constructs used in former studies (Knopf, 2006). To keep the qualitative rigour, we have used the Theory – Characteristic – Context - Method framework (Paul *et al.*, 2023). Therefore, in the review, we focused on the theory (we searched for the theoretical underpinnings and paradigms used by other researchers investigating omnichannel), context (we examined various settings that were used in previous omnichannel research), characteristics (we summarised the definitions employed to describe our constructs (barriers) and searched for the variables used) and finally the methods (with particular focus on sample details, measurements scales, research designs and analytical tools used).

To search the literature, we have decided to use the Scopus database as it covers broader research sources collection and content coverage and is a widely accepted and extensively used database by researchers in social sciences (Singh and Aurora, 2023). Following Singh *et al*. (2021), we find Scopus more adequate as the research sources collections are more comprehensive and expanded in their content, but more importantly – the content is monitored and assessed. We were interested in longstanding research trends on omnichannel barriers.

To grasp the comprehensive scope of the development of the channel integration stream of research and include papers that do not employ a technologically outdated perspective, we have considered the 10-year timeslot (01.01.2013 and 01.09.2022). We used various synonyms of barriers as they may be highly differentiated among researchers. We have used the following search criteria: TITLE-ABS-KEY (omnichannel OR (Channel AND Integration) AND (limit OR limitation OR barrier OR constraint OR drawback OR restriction OR obstacle OR challenge)). Based on the 6 W framework of Callahan (2014), we have developed the research protocol.

To maximise the quality of our analysis, we further examined all 259 papers (175 full-text articles and 124 abstracts). Following the initial screening of the papers, we have applied a detailed and extensive analysis using two sets of the following criteria (general and specific):

(1) General: Paper type; Reference theories/concepts; Research methods; Research techniques; Sample size; Retailer perspective/Customer perspective; Functional areas; Industry; Country; Variables; Research model; Conceptual framework; Interesting remarks.

(2) Specific: Omnichannel (measures, items), Internal obstacles (definition, types, measures, items); Industry drivers (definition, types, measures, items); Organisational capabilities (definition, types, measures, items).

In Step 1, we identified 20 scales in the initial data set for qualitative analysis. However, a deeper investigation revealed that previous studies lacked an integrated approach, with existing scales being fragmented and limited to specific areas like sales channels or logistics. As a result, we refined the initial set of items.

3.1.2 Step 2: Scale refinement through content validation. To analyse our set of items, we conducted an extensive content-centric thematic analysis (Kraus *et al*., 2020). After several iterations, we eliminated scales with a customer-centric perspective (e.g. Bouzaabia *et al*., 2013; Chen and Chi, 2021; Yumurtacı Hüseyinoğlu *et al*., 2018), as they were less relevant to our retailer-focused research goal. We engaged in seven iterative rounds, including brainstorming sessions and workshops with external experts, to refine the scale, remove overlaps, and address gaps in previous scales. We based our final items on the proposal by de Borba *et al.* (2021) and qualitative findings from Hajdas *et al*. (2022), who called for further validation. Ultimately, we retained 33 items for further analysis, which are listed in Table A1 in the Appendix.

3.1.3 Step 3: Scale purification through face validation. We conducted face validation of the final set of items (Nevo, 1985) with two primary objectives: to clarify the items and assess their cohesion, and to ensure the final meanings aligned with our expectations. To achieve this, we performed qualitative assessments through unstructured individual interviews (Connell *et al*., 2018), using the initial research tool to gather comments and recommendations. We engaged two samples of experts (four interviews, two from each sample) with professional experience in omnichannel implementation, encompassing advisory roles or academic backgrounds. These samples were drawn from non-English-speaking countries, specifically Portugal and Poland, to enhance the study's impact. We employed forward and backward translations to ensure item quality and followed the parallel translation procedure recommended by Malhotra *et al*. (1996) to reduce potential sample bias and face validate the study in an international context. After carefully analysing all feedback, we revised the final research tool. This simplified version was then used for primary study validation (Netemeyer *et al*., 2003).

3.2 PHASE II – validation

3.2.1 Step 4: Multidimensional scale validation. National quantitative research was conducted to validate the scale. The scale validation process proceeded through several stages (Hinkin, 1995; Hair *et al*., 2019a, b) using the gathered data, starting with preparatory analysis, moving through factor analysis, and verifying various validity parameters.

3.2.1.1 Sample and data collection. The primary study data collection was outsourced to a professional agency, and the data-gathering phase lasted three months (July–September 2023). The planned sample size was calculated as 383 online shops, which is adequate for estimating the entire population in Poland to be 71,000. With a confidence level of 95% and assuming a response distribution of 50%, the obtained acceptable margin of error is 5% (Roasoft, 2023). According to research by Adyen and KPMG, only 19% of Polish retailers allow customers to shop as omnichannel (Mierwinski, 2022). At the end of 2021, the number of retail stores in Poland can be estimated at just over 376,000 (Rzeczpospolita, 2022). Our final sample was higher than expected and included 412 valid responses. Our key informants were people leading the positions responsible for channel integration (IT, sales, marketing) and having expert knowledge (Bagozzi *et al.*, 1991). We have targeted companies with two established channels (offline and online for the exact products). We opted for the mixed-mode survey (CATI, CAWI, PAPI, and CAPI) to bring the maximum response rate (De Leeuw, 2005). Following the standard and recommended measurement approach in social sciences (Taherdoost, 2019), we used a 7-point Likert symmetric scale where the possible answers ranged from 1 – I strongly disagree to 7- I strongly agree.

3.2.1.2 Data preparation and preliminary analyses. First, the overall data quality was assessed and verified whether there were duplicate observations and outliers in the database. As a result of preparatory work, six abnormal observations (ID: 16, 23, 129, 309, 411, 412) with anomaly indices above 2 (range of indices for outliers from 2.002 to 2.454) were excluded from the database, thus reducing the final sample size to 406. Subsequently, the raw data was checked for normal distribution. The results of the Kolmogorov-Smirnov and Shapiro-Wilk tests indicate that the data are not normally distributed (p-value < 0.05). Furthermore, an analysis of z-kurtosis and z-skewness values indicated that for most items, the distributions are non-normal (absolute z-kurtosis values > 2; absolute z-skewness values > 1), while basic skewness and kurtosis analysis (the most lenient criterion) showed that distributions for all data are approximately normal (absolute skewness and kurtosis values < 1.96). Due to the results of normality assessment, Spearman's Rho was employed for correlation analyses.

3.2.1.3 Factor analysis. Our questionnaire included all items without dividing them into constructs and sub-constructs to avoid suggesting their assignment to a particular category. We decided to use non-orthogonal rotation. As the dimensions of the omnichannel obstacles are likely to be correlated, we used Promax as the rotation method. However, the data analysis showed low inter-item correlations, so finally, Varimax was used as the most common orthogonal rotation method. Regarding the number of factors to be extracted or retained, we did not specify the number of factors, as this was an exploratory factor analysis (EFA) aimed at identifying the structure of the latent theoretical construct of omnichannel obstacles. Then, we tested our data for sampling adequacy using the Kaiser-Meyer-Olkin and Bartlett's sphericity test. Both tests showed our data as well suited for factor analysis as KMO = 0.962 (>0.5), and Bartet's test gave sig.0.00 (<0.5) (Hair *et al.*, 2019a, b). The rotation reached convergence in 6 iterations.

The obtained solution covered 33 items aggregated in the following three factors reflecting – given on the content and literature origin of the uploaded items – following latent the omnichannel obstacles dimensions: operational efficiency, channel inefficiency, and strategy and organisational culture, labelled as factor 1 (F1) covering 11 items representing operational efficiency dimension of omnichannel obstacles (OE1–OE11); factor 2 (F2) covering 11 items representing channel inefficiency dimension of omnichannel obstacles (CI1−CI11); factor 3 (F3) covering 11 items representing strategy and organisational culture dimension of omnichannel obstacles (SC1–SC11) (Table 1).

3.2.1.4 Internal consistency and validity. The risk of common method bias (CMB) was assessed by examining the unrotated factor solution and Harman's single-factor test (Sharma *et al.*, 2009). The results show that no single factor emerges as the solution, nor does any general factor account for most of the covariance. There is no risk of CMB, as a solution without rotation and imposed number of factors shows 16 factors with eigenvectors greater

Table 1. Results of factor analysis and Cronbach's alpha

Items	Code	F1	F2	F3	Cronbach's α Initial structure	Final structure	Assigned label
My company has inefficiency in logistics operations	OE8	0.799			0.954	0.949	Operational efficiency
My company has difficulty measuring the returned volume	OE3	0.790					
My company has misplaced products	OE6	0.788					
My company has product restocking problems	OE1	0.780					
My company has a store forecast imbalance	OE4	0.773					
My company has an increase in operating costs	OE2	0.764					
My company has difficulty with receiving orders	OE9	0.763					
My company has difficulty in managing the processing of order	OE10	0.746		0.320			
My company has high return costs	OE11	0.742		0.350			
My company has the risk of stockout	OE5	0.735					
My company has a problem with financial balance	OE7	*0.747*				*Excluded: RhoS > 0.7 for 5/10 items*	
My company has a problem with the reverse flow of the supply chain	CI10			0.788	0.955	0.941	Channel inefficiency
My company has poor internal communication	CI5			0.751			
My company has problems with resource (tangible and intangible) allocation between the channels	CI11			0.751			
My company has distinct information systems between channels	CI4			0.738			
My company has a problem with data integration and analysis	CI9		0.315	0.727			
My company has different product handling and storage processes among the different channels	CI6			0.723			
My company has increased the distribution costs	CI3	0.309		0.721			
My company has increased warehouse costs	CI2			0.701			
My company has increased the order processing time	CI1	0.307		0.695			
My company has no synchronisation between information technologies and organisational structures	CI7		*0.333*	*0.761*		*Excluded: RhoS>0.7 for 6/10 items*	
My company has a problem with inventory sharing between the channels	CI8		*0.348*	*0.757*		*Excluded: RhoS>0.7 for 7/10 items*	

(*continued*)

Table 1. Continued

Items	Code	F1	F2	F3	Cronbach's α Initial structure	Final structure	Assigned label
My company has an inconsistent organisational strategy	SC8		0.817		0.948	0.94	Strategy and organisational culture
My company has an ineffective communication strategy	SC9		0.784				
My company has a low level of knowledge and information sharing between the departments	SC3		0.771				
My company has no measurement process for channel efficiency	SC11		0.762				
My company has misaligned corporate motivations	SC5		0.755				
My company has difficulties in providing a consistent consumer experience	SC1		0.729				
My company has no personnel skilled in channel integration capabilities	SC2		0.727				
My company has a problem with willingness to share information or knowledge between employees or across different departments within a company	SC7		0.72				
My company has a low level of organisational learning competencies	SC4		0.717				
My company has different mindsets between departments concerning how to integrate the different channels	SC6		0.676				
My company is not considering channel integration in the overall strategy	SC10		*0.819*			*Excluded: RhoS > 0.7 for 2/10 items; RhoS >0.8 for 1/10 items*	

Source(s): Authors' own work based on: de Borba *et al.* (2021) and Hajdas *et al.* (2022)

than 1, which together explain 89.144% of the total variance. Furthermore, the factor with the highest eigenvalue explained less than half the total variance, i.e. 23.253%. In contrast, the factor analysis assuming three factors together explained 68.431% of the total variance (threshold of 70%, according to Fuller *et al.*, 2016). The above results further support the absence of CMB risk.

Next, we used Cronbach's alpha to check internal consistency. The obtained solution cannot be proven reliable as two indices for the identified factors (F1 = 0.954 and F3 = 0.955) are not within the tolerance range of 0.7–0.95 (Tavakol and Dennick, 2011). As the solution cannot be considered internally consistent, actions have been taken to remedy this. We had to purify the scale by eliminating redundant items from the multi-item scale (Gerbing and Anderson, 1988). For this purpose, we carried out intra-factor item correlations and excluded those for which RhoS > 0.7 occurs in many cases. This procedure confirmed the reliability of the developed measures, as all Cronbach's alpha lie between 0.7 and 0.95. To further verify the internal consistency, we ran the confirmatory factor analysis (CFA). We have chosen Covariance-Based Structural Equation Modelling (CB-SEM) with Amos because (Hair *et al.*, 2017; Dash and Paul, 2021) our primary goal was to test the theory on the measurement of omnichannel obstacles (since the measures are already established in the literature), our initial model was factor-based, and considered measurement model is not complex, sample size in the study is quite large (n > 100), and raw data can be considered as normally distributed (Figure A1 in the Appendix).

3.2.1.5 Convergent and discriminant validities. Standardised factor loadings, composite reliability (CR), and composite reliability variance extracted (AVE) were calculated to test convergent validity. Each standardised factor loading exceeds 0.5, and each CR exceeds 0.7 (Bagozzi *et al.*, 1991). Moreover, all AVEs exceed 0.5 (Fornell and Larcker, 1981) (see Table 2). Thus, the concurrent validity criterion is met. Discriminant validity is confirmed for all variables. The results of our analyses support reliability, convergent validity, and discriminant validity.

3.2.1.6 Nomological validity. Two alternative approaches to verifying nomological validity can be distinguished in methodological literature. Firstly, to check if the theoretically recognised association of a given phenomenon being under our study with another phenomenon or phenomena is confirmed by analysing it using a developed measurement scale (Danneels, 2016; Czakon *et al.*, 2023; Tabaeeian *et al.*, 2023). Secondly, to verify if the assumed and theoretically justified structure of the scaled variable, consisting of its components and questions, is reflected in the study (Kumar and Anjaly, 2017). In our study, nomological validity was verified using the second dominant approach. However, considering the EFA results confirming the literature-based factor loading structure (see Table 2), it could be assumed that the entire scale covering three identified factors is nomologically valid according to the second approach.

Internal obstacles that hinder channel integration may imply various adverse consequences, such as inconsistent brand image (Picot-Coupey *et al.*, 2016), reduction of profit margin (Pennarola *et al.*, 2019), increase in return costs (Ang and Tan, 2018), as well as an increase in warehouse costs (Andersson and Wictor, 2018) and finally – negatively affecting multichannel retailing profitability (Zhang *et al.*, 2010). Therefore, the aim of verifying nomological validity was to analyse whether the identified factors of internal obstacles are negatively related to profitability. In terms of profitability, two measurement indicators were utilised: "*We are meeting profitability targets*" and "*We are increasing profitability*" (Ben-Oz and Greve, 2015; Mizik and Jacobson, 2007). Like Danneels (2016), directional dependencies were tested using multiple regression analysis (not correlations as in the case of Tabaeeian *et al.*, 2023), with variables in the analysis representing the averages of their assigned items. Regression analysis results (Table 2) indicate that two out of three dimensions of internal obstacles (i.e. operational efficiency and strategy and organisational culture) exhibit adverse effects on profitability in line with theoretical assumptions. First, in the case of operational efficiency, the estimated negative effect on profitability is −0.139

Table 2. Convergent, discriminant and nomological validity

	CR	AVE	Operational efficiency	Channel inefficiency	Strategy and organisational culture
Operational efficiency	0.950	0.654	*0.808*		
Channel inefficiency	0.942	0.643	0.693	*0.802*	
Strategy and organisational culture	0.941	0.615	0.603	0.701	*0.784*

Nomological validity assessment								
Model parameters	Profitability 3-Factor model				Profitability 2-Factor model			
Independent variable	Standardised beta coef	Std. Error	Tolerance	VIF	Standardised beta coef	Std. Error	Tolerance	VIF
Main effects								
Factor 1: Operational efficiency	−0.139*	0.045	0.541	1.849	−0.177**	0.040	0.683	1.463
Factor 2: Strategy and Organisational culture	−0.190**	0.050	0.522	1.914	−0.229***	0.044	0.664	1.506
Factor 3: Channel inefficiency	−0.092	0.051	0.446	2.244	N/A			
Controls								
Firm size	0.028	0.043	0.962	1.040	0.028	0.043	0.962	1.040
Constant		0.189				0.187		
R^2	0.137				0.133			
Adjusted R^2	0.128				0.127			
Durbin-Watson	1.829				1.833			
No. of surveyed firms	406							

Note(s): *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$
Source(s): Authors' own work

($p < 0.05$) in the 3-factor model and −0.177 ($p < 0.01$) in the 2-factor model. Second, when it comes to the strategy and organisational culture, the estimated negative effect on profitability is even greater, as it is −0.190 ($p < 0.01$) in the 3-factor model and −0.229 ($p < 0.001$) in the 2-factor model. The goodness of fit is satisfactory as the adjusted R-squared is at the level of 0.128 for the 3-factor model and 0.127 for the 2-factor model. Therefore, these two of the three examined dimensions can be considered nomologically valid.

We justified reducing the initial three-factor model to a two-factor model based on nomological validity results (Figure A1 in the Appendix). To improve model fit quality, we performed a modification index (MI) analysis (MacCallum *et al.*, 1992). Suppose MI > 4; the covariance of error can be made within the factor. We adopted a more restrictive criterion in our model, MI > 10. The reduced model was evaluated for goodness of fit. The results of the model assessment demonstrate a strong and well-supported fit which confirms its suitability for measuring internal obstacles. The chi-square statistic divided by the degrees of freedom (CMIN/DF = 1.660) indicates a good fit, as values below 5 suggest that the model captures the observed data effectively without being overly complex. Additionally, the *p*-value is less than 0.001, reinforcing the statistical significance of the fit. The Goodness-of-Fit Index (GFI) is

0.945, and its adjusted version, the Adjusted Goodness-of-Fit Index (AGFI), is 0.921, both of which are above the generally accepted threshold of 0.90, indicating that a high proportion of the variance in the data is accounted for by the model. Similarly, the Normed Fit Index (NFI) at 0.964 and the Incremental Fit Index (IFI) at 0.986 further confirm that the model compares well against a baseline model. The Tucker-Lewis Index (TLI) is 0.981 which similarly suggests a good fit, as values close to 1 are desired. Regarding the parsimony indices, the Parsimony Goodness-of-Fit Index (PGFI) of 0.662 and the Parsimony Normed Fit Index (PNFI) of 0.746 (both over the threshold of 0.6) reflect a reasonable balance between model complexity and goodness of fit, showing that the model is not overly complicated for the given data. The Root Mean Square Error of Approximation (RMSEA) is 0.040, with a 90% confidence interval ranging from 0.031 (LO 90) to 0.049 (HI 90). RMSEA below 0.05 indicates an excellent fit, suggesting that the model's error approximation is low. Lastly, the Comparative Fit Index (CFI) is 0.985, which is close to the ideal value of 1, signifying that the model fits the data exceptionally well compared to a baseline model.

4. Discussion and conclusions

The omnichannel concept has attracted much attention in recent years, both in theory and practice. Still, effective omnichannel implementation (Barbosa and Casais, 2022) must be studied, especially regarding obstacles firms face when going omnichannel. Our study aimed to develop a valid omnichannel obstacles scale by integrating the construct, articulating its dimensionality, and validating valuable items. We used several qualitative and quantitative approaches to create the omnichannel obstacles scale, including a review of previous studies, individual interviews, and a survey. The results provided support for a bidimensional omnichannel obstacles scale. Finally, this study developed a 2-factor scale consisting of 20 items. The two dimensions we identified are (1) operational efficiency, (2) strategy, and organisational culture.

4.1 Theoretical contribution

Our systematic literature review shows that the initial conceptualisation of omnichannel obstacles is granular, with six dimensions (Table A1 in the Appendix). Our multi-stage empirical research has verified those dimensions. Based on our analysis, we initially claimed that omnichannel obstacles cover three distinct reasoned dimensions: operational efficiency, channel inefficiency, and strategy and organisational culture. However, in our final, valid measurement model, the dimension of channel inefficiency is reduced. Thus, we develop a final scale where attention should be paid to "operational efficiency" and "strategy and organizational culture," shifting the managerial attention to organisational coherence and providing the strategic and cultural fit with more focus on relational and communicational factors grounded in employee-related perspective. We extend and verify the research results proposed by de Borba *et al.* (2021) and Hajdas *et al.* (2022). Through the development of our scale, our contribution covers integrating the existing measures and transforming them into one scale with new dimensions to offer a comprehensive perspective. We have connected previously disparate factors to provide a cross-organisational approach, allowing us to address various processes postulated within the systems approach (Chen, 1975). We have also developed the areas of transformation that need to be handled to adopt omnichannel effectively outlined by de Carvalho *et al.* (2024), and by its comprehensiveness, our scale outlines the significance of integration and synchronisation, which was indicated as one of the important trends in retailing by Wang *et al.* (2024).

Our contribution to retailing theory is twofold. First, by offering a comprehensive view of omnichannel barriers, we help bridge the gap between operational challenges and the implementation of omnichannel solutions, which have been heightened by the pandemic. Our study, conducted post-pandemic, builds on the work of Cocco and De-Juan-Vigaray (2022)

and addresses the need for further examination of retail operations impacted by pandemics, as suggested by Jum'a *et al.* (2024).

Second, we advance the literature by integrating human resources into the "strategy and culture" construct. Responding to calls for deeper exploration of human and intellectual factors (de Borba *et al.*, 2021), our scale addresses employees' skills in channel integration, organisational learning competencies, knowledge sharing, and the silo mentality between departments. This contribution aligns with Derwik and Hellström (2023), who emphasised the importance of human competence development for overcoming retail sector challenges.

4.2 Methodological contributions

We also offer two methodological contributions. First, we provide original, comprehensive, and valid measurement tool for omnichannel obstacles. The offered scale stresses the importance of a broader focus considering the non-exclusive nature of the functional areas of barriers investigated separately in the previous research. So far, researchers focused on exploring one research context, sometimes consciously or unconsciously omitting other relevant threads, while our scale allows researchers to take a multidimensional and multi-item perspective. Second, when considering methodological novelty in the field of omnichannel research, it is worth emphasising that - following the methodological recommendations of Bagozzi (1981) and Danneels (2016) - nomological validity is verified by examining the directional relationship using regression. This approach differs from prior and criticised approaches assuming examining the correlations (Tabaeeian *et al.*, 2023) or using the theoretical dimension structure in line with EFA results (Kumar and Anjaly, 2017). In this context, our approach may serve as a benchmark for further research in the omnichannel context.

4.3 Managerial implications

We offer two managerial recommendations. First, while an omnichannel approach aims to integrate offline and online channels for a unified customer experience, it often encounters technological, organisational, cultural, and communication challenges. Understanding and navigating these complexities is crucial for competitive success. Second, by identifying and measuring the obstacles associated with omnichannel adoption, retail companies can proactively address these challenges. This knowledge allows managers to anticipate barriers, implement preventative measures, make informed decisions, and allocate resources effectively to optimise their omnichannel strategies.

4.4 Limitations and future research directions

Our study has limitations that future research should address. First, the scale was validated using a sample from one country, which may affect results due to country-specific factors related to strategy and organisational culture. Expanding the study to multiple countries, particularly culturally distant ones, could uncover unique factors. Second, omnichannel practices are dynamic and evolve from multichannel to omnichannel and beyond (Costa Climent *et al.*, 2022), suggesting the need for longitudinal studies to capture these changes. Lastly, product features like fragility or perishability, along with industry-specific factors, should be considered, as they may impact omnichannel implementation.

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Further reading

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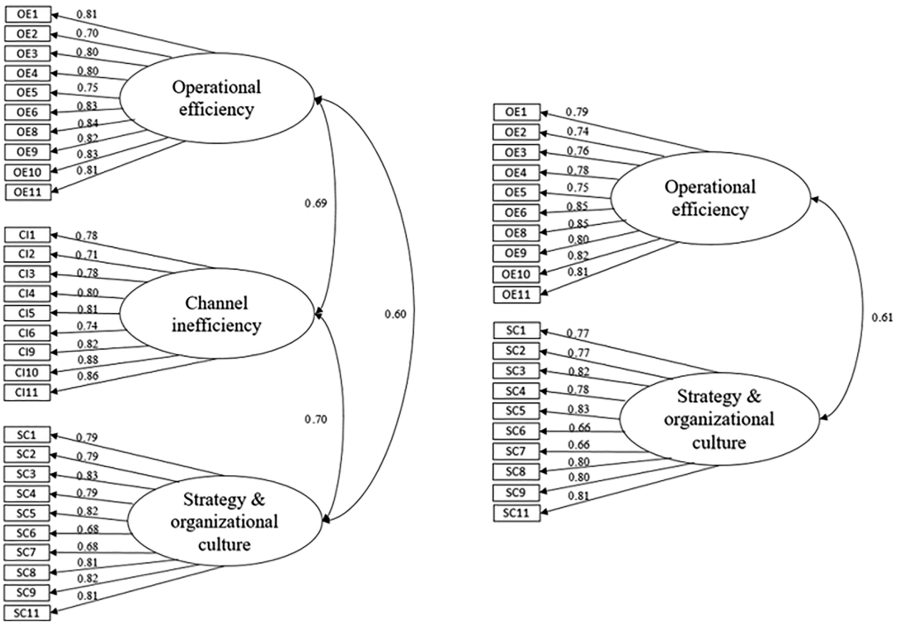
Appendix

Table A1. The initial set of items

Construct	Items	Reference
Physical and financial balance	My company has product restocking problems My company has an increase in operating costs My company has difficulty measuring the returned volume My company has a store forecast imbalance My company has the risk of stockout My company has misplaced products My company has a problem with financial balance	de Borba *et al.* (2021)
Process efficiency	My company has inefficiency in logistics operations My company has difficulty with receiving orders My company has difficulty in managing the processing of order My company has high return costs My company has increased the order processing time My company has increased warehouse costs My company has increased the distribution costs My company has distinct information systems between channels My company has poor internal communication My company has different product handling and storage processes among the different channels	de Borba *et al.* (2021)
Organisational	My company has no synchronisation between information technologies and organisational structures My company has a problem with inventory sharing between the channels My company has a problem with data integration and analysis My company has a problem with the reverse flow of the supply chain My company has problems with resource (tangible and intangible) allocation between the channels My company has difficulties in providing a consistent consumer experience	de Borba *et al.* (2021)
Employee-related operational	My company has no personnel skilled in channel integration capabilities My company has a low level of knowledge and information sharing between the departments My company has a low level of organisational learning competencies	Hajdas *et al.* (2022)
Employee-related strategic	My company has misaligned corporate motivations My company has different mindsets between departments concerning how to integrate the different channels My company has a problem with the willingness to share information or knowledge between employees or across different departments within a company	Hajdas *et al.* (2022)
Vision-related	My company has an inconsistent organisational strategy My company has an ineffective communication strategy My company is not considering channel integration in the overall strategy My company has no measurement process for channel efficiency	Hajdas *et al.* (2022)

Note(s): Own work based on de Borba *et al.* (2021), Hajdas *et al.* (2022)
Source(s): Authors' own work



Source(s): Own work based on calculations in IBM SPSS Amos (ver. 24)

Figure A1. Initial and valid measurement model of omnichannel obstacles (standardised estimates)

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