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COMMERCIAL REAL ESTATE LOANS – CATEGORIZATION OF AN INVESTMENT SEGMENT

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ABSTRACT

Commercial real estate loans (CREL) are a modern essential business segment and of major relevance to the financial stability of an economy as they interconnect the financial markets and the real economy. Consequently, CREL are of specific interest to regulatory authorities. As far as the author knows, there exists no universal definition of CREL in the global financial industry and the regulatory environment. This has been subject to criticism due to resulting gaps and bias in data generated by regulatory filing. This study contributes to academia and applied sciences by providing the missing link. It develops a comprehensive categorization of CREL on a foundation of 34 sources predominately provided by regulatory authorities in the US and the EU. The categorization is based on a qualitative synthesis of main CREL characteristics of this particular heterogeneous asset class outlined in the detected sources. The objective of this work is to support the development of a common understanding of this investment segment among banks, institutional investors and regulatory authorities in order to allow an accurate and prompt filing.

KEY WORDS

financial economics, commercial real estate loans, investment decision, risk management

JEL CODES

G21, G32, G110, R33

1 INTRODUCTION

Commercial real estate (CRE) lending is intertwined with the financial economy through financial intermediaries like banks, insurance companies or CMBS lenders (Glancy et al., 2019). A downturn of the CRE markets might affect the financial industry through losses from CRE lending and spread into the real economy. As evidenced from existing empirical research, CRE markets tend to be volatile and are correlated to the economic cycle. In addition, a

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decline of CRE values might lead to a decrease of CREL funds provided by lenders (ECB Review, 2007) and shorten the loan supply necessary for new real estate investments. In this context, CRE finance is of specific interest to the regulatory authorities. One of the main features that separates CREL from other loan types like consumer loans, commercial and industrial loans (C&I loans), or residential real estate loans (RREL) is the linkage to the CRE that may serve as security for the loan (OCC Handbook, 2013; Glancy et al., 2019; Phillips, 2009). The commercial property represents simultaneously the collateral and the primary source of repayment of the loan which is generated by rental income or sale proceeds (Federal Register, 2006). Corporate loans in contrary, even if they are secured by a mortgage on a property, do not qualify as CREL because their repayment source is funded by the borrower's operational business (OCC, BOG, FDIC Sound RM Practices, 2006). According to FDIC's homepage[1], CRE lending includes the "acquisition, development, and construction (ADC) financing and the financing of income-producing real estate" that is leased to third parties. The investment segment CREL is noticeably heterogeneous and its characteristics are multidimensional. There is, to this author's knowledge, per se no common definition for this investment segment in place despite the CREL market being globally linked. Bassett and Marsh (2017) outline the necessity for a joint understanding of CRE between regulators and banks in order to generate an accurate data base, for instance to identify concentrations of CREL. The global financial crises of 2008 that was triggered by a downturn of the US real estate market is a perfect example that an accurate data base and prompt reporting is essential. The FDIC Financial Institution Letter (2008) that was issued on March 17, 2008, only 6 months prior to Lehman Brothers Holding Inc.'s filing for bankruptcy protection, illustrates that the FDIC had identified a deterioration of the CRE market that threatened banks with high CREL concentrations. The FDIC's recommendation to combat the risk had been too late for some of the institutions to encounter the hazard. This reveals that a common categorization of CREL is of utmost importance for regulatory authorities, banks, and the real estate industry.

The missing comprehensive definition is the identified white spot and the key motivation for this study. This work contributes to academia and applied sciences by establishing a categorization of CREL with the goal of supporting the supervisory authorities' ability to analyze and evaluate their member institutions' CREL risk patterns. Their assessment may then be based on accurate and prompt data processing and regulatory filing provided by the lenders. In addition, this study shall support to develop a common understanding of this asset class for the financial industry and regulatory authorities.

First, this paper identifies the main characteristics of CREL. Second, it outlines the risks that are involved in this asset class in order to develop a universal understanding of CREL. Third, it establishes a categorization of CREL based on the predominant loan characteristics and the inherent credit risk which is closely linked to the CRE market. Recommended classifications within the categorization reflect the various CREL types subdivided upon their risk hierarchy. According to Jacob (2004), a categorization is a composition of groupings that display similarities based on context or perception. A classification, in contrast, outlines the relation and hierarchy within the grouping. The borders of a categorization are permeable and leave room for further perceived similarities (Jacob, 2004).

The remainder of this paper is organized as follows. Section 2 covers the various information sources that were utilized. Section 3 is dedicated to the identification of the main characteristics of CREL and outlines the various risks that are involved in CRE lending. Section 4 contributes by way of qualitative synthesis in order to categorize CREL. Section 5 concludes with a final recapitulation.

[1]FDIC Banker Resource Center. For details, please visit `https://www.fdic.gov/resources/bankers/credit/commercial-real-estate-lending/`.

2 INFORMATION SOURCES

According to Pana (2010), supervisory authorities have a strong impact on the lending policies and the risk management of financial institutions. Significant CREL providers are banks and insurance companies, both regulated institutions. For this reason, records of supervisory authorities with the main focus on the US and the EU were employed for the review. The US and the EU represent major CRE and financial markets. In addition to regulatory sources, scientific articles from electronic data providers were employed to complement the review.

Essential US depository regulators include the Federal Reserve (Fed), represented by the Board of Governors (BoG) and 12 regional reserve banks, the Office of the Comptroller of the Currency (OCC), the Federal Deposit Insurance Corporation (FDIC) and the National Credit Union Administration (NCUA). Astonishingly, US insurance companies are regulated on a state level and not by federal agencies. The National Association of Insurance Commissioners (NAIC) serves as unifying and coordination entity (Labonte, 2020). The financial supervision on EU level is represented through the European Banking Authority (EBA), the European Securities and Market Authorities (ESMA), and the European Insurance and Occupational Pensions Authority (EIOPA). The European Systemic Risk Board (ESRB) is affiliated to the ECB and is supplementing the three authorities. The Federal Financial Supervisory Authority (BaFin) is supervising German financial institutions on the national level.

Systematically all homepages of the aforementioned supervisory authorities have been assessed by using the keywords "commercial real estate lending" and "commercial mortgages". Throughout the initial screening process 33 relevant sources were detected, 23 sources thereof were assigned to the US regulation. The remaining ten sources belong to the EU regulation. If identical records by different regulatory providers of one country were identified, only one source was assigned to the review set. 11 sources were found in the electronic data providers Google Scholar, Science Direct, Scopus, Springer, and Core. Ten papers thereof were published in scientific journals, one source represents a white paper by the staff of BoG. The majority of documents have been published between the years 2003 and 2020. Ten documents of the original set of 44 identified sources have been excluded as they either provided no additional insight or were irrelevant in the context of CREL. The review was therefore based on 34 records.

Utilizing the method of coding based on the Grounded Theory (Schreier, 2012), diverse components were detected, grouped and through qualitative synthesis re-arranged with the aim to categorize the asset segment CREL. A profile matrix was established for the coding process following Kuckartz (2014). The horizontal lines of the matrix pick up on the research questions and outline the essential headlines. Special attention has been paid to add adequate subcomponents during the second screening of the records. The different literature sources were stringed in vertical columns. The design of the profile matrix enables a subject-related overview of the thematic extracts (Kuckartz, 2014). The review of records included a ranking of the sources which connects to Okoli and Schabram's guidelines (2010). The records were divided into four classes. Laws and regulation were assigned to the premier quality class 1, supervisory sources to level 2. Level 3 includes journals published in renowned journals. Further sources were labelled level 4. 23 identified sources, representing more than two-thirds of the records, were grouped into the category level 1 and 2 (legal sources), ten records were assigned to level 3 (excellent quality) and one source to level 4 (other).

This examination shall capture the main characterizing elements of CREL detected in literature and further data. It is beyond the scope of work to summarize all and each detail provided by the reviewed sources. This would diminish the purpose to give an overview of the major attributes of CREL. This review includes a critical evaluation of the researched literature as well as a qualitative synthesis with the aim to categorize CREL.

3 RESULTS

3.1 Predominant CREL Characteristics

One of the main features that distinguishes CREL from other loan types is the underlying *commercial real estate* that serves *as collateral* for the loan. The Comptroller's Handbook (2013) and further sources of the Federal Deposit Insurance Corporation (FDIC), for example the Federal Register (1992), refer to CREL as a loan that is secured by a lien on or interest in real estate. Glancy et al. (2019) mention the security instrument commercial mortgage. Phillips (2009, p. 337) refers to real estate finance that is "almost universally secured by a mortgage". Blanket mortgages may cover multiple properties in cross-collateralization for one or multiple loans (Bardzik, 2019). The ESRB as well connects to CRE as collateral for a loan and refers in this context to corporate lending (ESRB Report, 2018). According to the Regulation (EU) 575/2013 (CRR) (2013) art 14, CREL is fully secured by the commercial property if the loan does not exceed the market value or, depending on the member state, the mortgage lending value. Robins et al. (2012) dig deeper in the fundamentals of the US mortgage law and outline that through a mortgage the lender receives an interest in the CRE as security for debt service and repayment of the loan. The Regulation (EU) 575/2013 (CRR) (2013) art 208 requires the mortgage or land charge to be enforceable at loan closing. In case the mortgagor, which in the vast majority – but not necessarily – is the borrower, does not perform according to its duty, the mortgagee has the right to foreclose on its lien on the property. The performance of borrower includes its payment duty as evidenced by the promissory note (Bardzik, 2019) or due to the loan agreement. This predominately includes the payment of debt service and the repayment of loan at maturity. Prior to a foreclosure an event of default remains uncured (Bardzik, 2019). Depending on the jurisdiction, the foreclosure includes a judicial or non-judicial sale of the property as remedy for the mortgagee's claims (Robins et al., 2012). Consequently, the value of the property is essential for the ultimate repayment of the loan. This aspect might be captured in the FDIC Financial Institution Letter (2009) recommending lenders to appraise the value of the underlying collateral if the decision of a loan workout shall be made. The Regulation (EU) 575/2013 (CRR) (2013) art 208 refers to commercial immovable property and requires banks to monitor the value of the CRE once a year. Depending on the country, the expression market value is legally defined. The Regulation (EU) 575/2013 (CRR) (2013) art 4 No 76 refers to the market value as the sales price on the evaluation date at which a willing purchaser buys an at arm's-length transaction from a willing seller. In the EU jurisdiction, Regulation (EU) 575/2013 (CRR) (2013) art 4 No 74, there exists another property value, the so-called mortgage lending value, which is defined as the future value of the property under the consideration of long-term sustainable rents under ordinary market conditions. As environmental hazard may cause huge damage to the commercial property which might result in a decrease of value, the FDIC has established its Guidelines for an Environmental Risk Program for its member institutions (FDIC Financial Institution Letter, 2006). The security of CREL does not necessarily depend solely on the CRE. Also, additional collateral may serve as loan protection. Federal Register (1992) depicts further real estate and unconditional, irrevocable standby letters of credit as additional security for CREL.

According to the Federal Register (2015), the institutions should take the nature of the underlying collateral into account. This term might refer to the *property type of CRE* which is an outstanding characteristic of the collateral of CREL. The type of property includes several dimensions of CRE and it seems quite demanding to categorize this parameter. Supervisory authorities might consequently face challenges in their aim to select data from a common data base provided by banks or financial institutions.

Predominantly, the property type refers to the *use of the real estate*. The Comptroller's Handbook (2013) identifies five primary real estate types that can also be identified in further sources: office buildings, retail properties, industrial properties, hospitality and multifamily residential real estate. These main CRE types might be sub-segmented. Retail properties have several specifications, among them shopping centers, strip malls, and department houses. Industrial properties, for instance, include manufacturing plants, warehouses or distribution facilities. Hospitality might include hotels and motels. The Regulation (EU) 575/2013 (CRR) (2013) art 126 (1) (a) includes offices or other commercial premises and art 128 (2) (d) hints at speculative immovable property that is according to (EU) 575/2013 (CRR) (2013) art 4 No 79 bought with the predominant aim to generate profit due to resale. The spectrum of CRE usage is broad and the Comptroller's Handbook (2013) serves as a detailed source that refers to assisted-living facilities, dormitories, residential health care and religious organization facilities as well. Case (2003) refers to single-purpose properties like assisted living or nursing homes. Mixed-use properties like retail, on the contrary, might be used for several purposes. This might be an advantage for the marketability of the premises. Within the second dimension of property type, *income-producing property is segregated from real estate under construction or under development*. Income-producing properties generate rent that primarily serves for the payment of debt service. This fact is even narrowed in the Federal Register (2006) as the guidance relates to properties where 50% or more rental income is generated from third parties that are non-affiliated with the borrowing entity. The OCC Handbook (2013) refers to non-owner-occupied property in this context and considers hospitals, golf-courses, car washes, and recreational facilities as owner-occupied if not rent to unaffiliated third parties. BoG, FDIC and OCC (2016) separate real estate-secured business loans when the real estate does not generate the repayment or debt coverage. The Regulation (EU) 575/2013 (CRR) (2013) art 402 (2) (d) also distinguishes between commercial immovable properties under construction and fully constructed. Johnston Ross and Shibut (2020) refer to a specific feature of CREL that is essential when segregating the property types into income-producing property and construction and development. They point out that the underlying CRE has not only the function to secure the loan. Rental income from the collateralized CRE is partially used for the payment of debt service. Properties under construction, however, do not generate rent. Their sale proceeds are used to repay the loan. This is the predominant pivotal point where the financial markets and the real economy are interconnected as the commercial property is the primary source of CREL repayment (Federal Register, 2006; Regulation (EU) 575/2013 (CRR), 2013). The interrelation between the CRE sector and the financial sector is derived from debt service payment and repayment of the CREL generated by rents and ultimately by sale proceeds of the CRE. In their risk management guidelines, the Board of Governors of the Federal Reserve System, Federal Deposit Insurance Corporation, and the Office of the Comptroller (Federal Register, 2006) point out that the cash flow of the property is the primary source of debt service coverage, whereas the loan exposure is covered by the value of property as the secondary source of repayment. Consequently, corporate loans, even if they are secured by a mortgage on a property, do not qualify as CREL as their repayment source is based on the borrower's operational business. The dimension *property quality* refers to specific quality metrics of CRE that might belong to the building substance, the tenant base, as well as the micro location of the property. In order to attract tenants, property owners have to increase their capital expenditures in the property or make rent concessions (Johnston Ross and Shibut, 2020). The OCC Handbook (2013) outlines three classifications of office buildings, varying from class A (high-quality) to class C (functional), depending on the quality of used construction material and quality of design and fixtures and their status of maintenance. The real estate industry often refers to land-

mark buildings and trophy buildings as quality classification. Bardzik (2019) refers to quality with regard to the overall construction status of the building, the location, the occupancy rate, and the demand for the property in the market. BaFin refers to core real estate as fully leased properties with creditworthy tenancy base and tenancy structure in prime locations (BaFin Fachartikel, 2012). The cash flow of the property is as well determining the classification. Further risk classifications for real estate investments are core, core plus, value add, and opportunistic, depending on the degree of involved risk. During the recent years, building certifications in context with environmental social and governance (ESG) requirements of supervisory authorities have become more significant. Eichholtz et al. (2019) refer to LEED and Energy Star property certification systems in their examination. They show that the building certification has a positive impact on the cash flow of the building. Some countries in the EU, like the Netherlands, have already started to require a minimum environmental label in order to reserve the right to operate a building. Remarkably, CRE markets might be defined by property type. The various property types include corresponding risk intensities in response to economic downturns.

The Regulation (EU) 575/2013 (CRR) (2013) art 126 uses the term commercial immovable property for CRE which relates to an elemental feature of real estate. It is bound to its location and has to respond to changes of the environment. The evaluation of the property should include an extensive analysis of the location. The *micro location* describes the immediate surroundings of the property and its position within the immediate competitors. Each constellation is unique which supports the heterogeneous character of real estate (OCC Handbook, 2013; ESRB Report, 2018). The determining factors of the site analysis according to the OCC include the access of the property, the availability of public utilities, adjacent shopping utilities and further amenities, and possible future land development (OCC Handbook, 2013). Closeness to public utilities like schools or universities are positive aspects that increase the property value. Also, the vacancy rate of property compared to its competitors is important. Certainly, the evaluation of micro location should take the property type as well as competing neighboring real estate into consideration. The micro location requirements for large shopping malls, for instance, are completely different compared to multifamily estates. The *macro location* analysis responds to the broader economic environment of the property. Indicators for the economic developments are, among others, the employment rate and population trends including demographical developments (Federal Register, 1992). According to OCC, the demographic analysis should answer the question of household formation and household income (OCC Handbook, 2013). The OCC refers to the U.S. Census Bureau data provider in this context. Glancy et al. (2019) collect information on geography based on the zip codes of the properties. Some sources refer to location as geographic location, geographic market or geographic region (Federal Register, 2015; Federal Register, 2006; ESRB Report, 2018). Those terms are not defined but may be assigned to macro location. The Regulation (EU) 575/2013 (CRR) (2013) art 126 (2) (a) brings up macro-economic factors that may impact the value of the real estate. Case (2003) refers to the geographic region in terms of concentration risk. He illustrates that properties of the same region are likely to be impacted by similar economic factors. This seems to be coherent, but might depend on the property type. A distribution center might not respond as severely to negative regional economic changes, compared to an office building. Most sources do not distinguish between micro and macro location. Bardzik (2019) refers to location in general. The CRE markets can be defined in terms of micro and macro location as primary, secondary and tertiary markets (Bardzik, 2019). In relation to retail properties, the micro location classification might vary from 1a locations (most frequented micro location) to 2b locations (mediocre frequented micro location, mixed use location). They include favorable site conditions, compared to B or even C locations. This connects to the risk classification

core, core plus, value add, and opportunistic. The classification of macro locations reflects the criteria metropolitan area, urban aria and suburban area. Cities can be classified from A cities to D cities, depending on their economic significance to the region.

The value of the property is essential as it covers, in its function as collateral, the loan exposure. Especially at loan maturity it is an indicator for loan coverage (Bardzik, 2019). But as well throughout the loan term the property value is considered in the determination of the financial covenant loan to value (LTV). The property is usually evaluated by an independent appraiser that has the required knowledge (Federal Register, 1990). The *market value* is defined as the most likely property price in a regular market and at fair sale conditions under which the purchaser and seller maneuver in a far-sighted savvy manner (Federal Register, 1990). The FDIC Financial Institution Letter (2009) refers to the market value in the context of collateral valuation. The market value reflects the value at a certain point in time, it may change due to the market conditions (FDIC Financial Institution Letter, 2009). The FDIC refers to three basic valuation methods known as cost approach, direct sales comparison approach and income approach (FDIC RMS Section 3.2 Loans, 2020). For the evaluation of income-producing CRE the income approach is essential. Basically, it represents a discounted cash flow method to determine the net present value of the property. The value of income-producing real estate depends on the vacancy rate of the property, the lease renewal trends inclusive projected rents, discount rates, and direct capitalization rates (FDIC Financial Institution Letter, 2009). With regard to developments, the OCC refers to the market value on an as-is, as-completed or as-stabilized basis (OCC Handbook, 2013). The Regulation (EU) 575/2013 (CRR) (2013) art 229 (1) refers to valuation rules and to an independent appraiser to evaluate the market value. Unforeseen events like environmental hazard might negatively impact the property value and shall be taken into consideration in the assessment of the value (FDIC Financial Institution Letter, 2006). Further explanation of the approaches is beyond the scope of this study. The BOG, FDIC and OCC (2015) refer to low capitalization rates and rising property values. The capitalization rate (cap rate) is the ratio between rental income and the value of the real estate. It reflects the profitability of the investment and the risk pattern of the CRE. The higher the cap rate, the higher the investment risk in the real estate market. The cap rate is an indicator of the CRE market condition for a defined property type but also a property value determinant. The Regulation (EU) 575/2013 (CRR) (2013) art 229 (1) refers to the *mortgage lending value* as a further value to appraise the property. This value is defined in Regulation (EU) 575/2013 (CRR) (2013) art 4 No 74. It shall be determined by a prudent assessment of the future marketability of the real estate based on long-term sustainable criteria of the property under regular market conditions. In Germany, for example, the mortgage lending value is based on the Pfandbrief Act and the Regulation on the Determination of the Mortgage Lending value (BelWertV). Usually, the mortgage lending value is a more conservative value compared to the market value.

Bardzik (2019) refers to the *borrowers* of CREL as corporate entities or private individuals. Usually in this loan segment, ring fenced special purpose vehicles (SPV) are the borrowing entities. Frequently, the borrower and the property owner are the same entity. An SPV's only function is to own and operate the collateralized property and this is *usually of non-recourse* to the sponsor. The sponsor is the managing and controlling entity of the borrower and the equity investor (Robins et al., 2012). Fig. 1 illustrates the sponsor – borrower relationship in connection with an SPV as mortgage borrower. The capital from the shareholders might be provided to the borrowing entity through shareholder loans which should be subordinated to the CREL by means of a subordination agreement (FDIC RMS Section 3.2 Loans, 2020). The non-liability of the sponsor is one reason according to the ESRB Report (2018) why CREL is relatively volatile

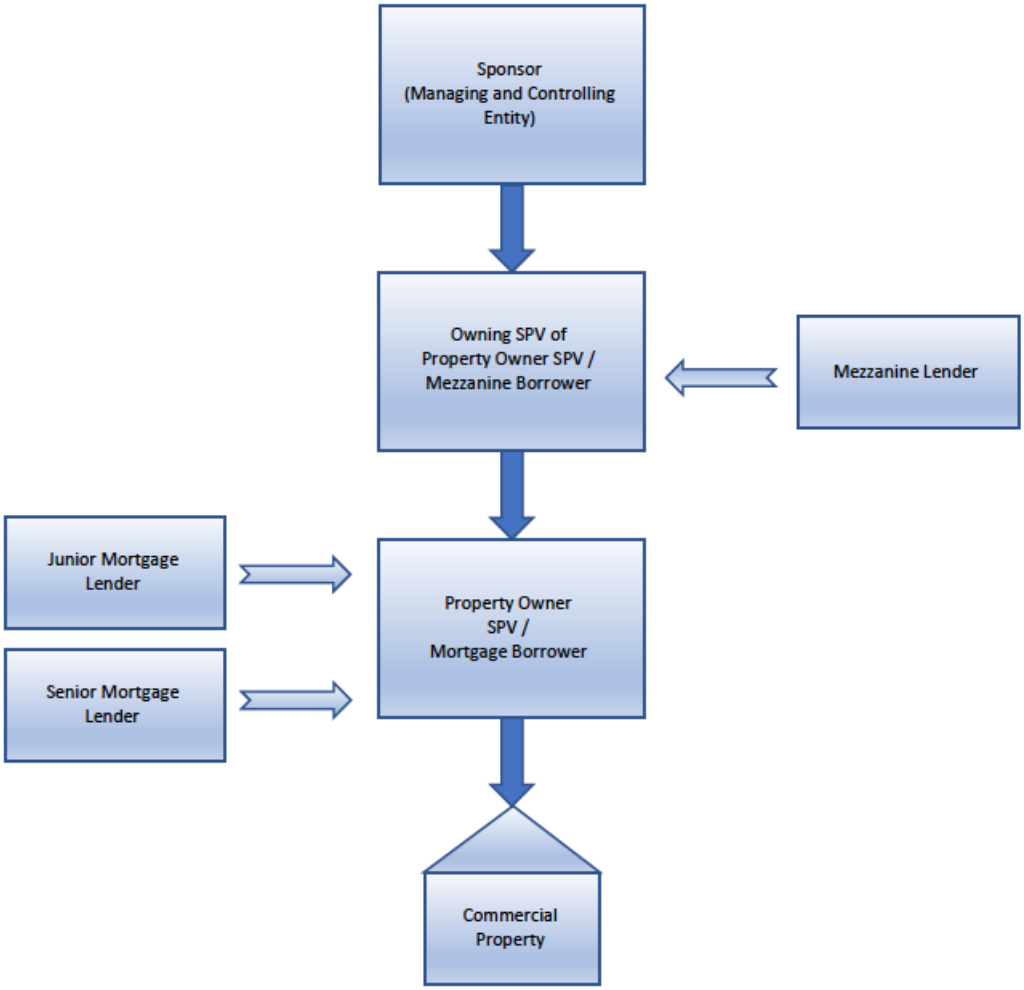

Fig. 1: Commercial Real Estate Ownership Structure with Senior Lender, Junior Lender, and Mezzanine Lender. Following Robins et al. (2012).

in comparison to RREL where the private individual's home represents the collateral. The sponsor, nonetheless, plays an important role for the success of the undertaking and asset management of the property. Special attention shall be paid to its track record and market standing. A sponsor might, depending on the risk profile of the CREL, provide a guarantee for the financing as additional collateral. In order to evaluate the guarantee, a lender shall consider the financial capacity of the guarantor and its ability to cover and repay its total indebtedness (FDIC Financial Institution Letter, 2009). Especially with regard to developments of CRE, the sponsor's capabilities to complete the project within the predetermined cost and time budget is essential (OCC Handbook, 2013). The Regulation (EU) 575/2013 (CRR) (2013) art 126 (2) ascribes to CREL a particular risk dimension, as the value of the property depends upon the credit quality of the borrower. The performance of the borrower as the owning SPV and the performance of the securing property to repay the CREL are unconditionally linked. The motivation for a borrower to engage in debt financing rather

than to contribute in an equity investment, is based on the desire for diversification (Phillips, 2009). The so-called leverage effect plays a further dominant role. The return on equity might be increased employing debt financing. In case of portfolio financing, multiple borrower might be engaged. In this context it is important that each borrower is jointly liable and that a defaulting borrower, due to insolvency, is triggering a cross-default. Special attention within the risk monitoring shall be paid, if the borrower is an out-of-territory entity (FDIC Financial Institution Letter, 2015). In order to determine the utilization of borrower limits, the lenders shall identify the borrower's respectively the sponsor's aggregate exposure including derivatives (Federal Register, 2006).

3.2 Broader CREL Characteristics

CREL comprise specific loan structures. The *maximum loan term* should correspond with the type of property (Federal Register, 1992; OCC Handbook, 2013) and should not exceed the remaining useful life of the real estate. The OCC refers to CREL secured by income-producing multifamily properties with a longer loan term and hotel financing with a shorter term (OCC Handbook, 2013). Warehouse facilities represent a property type for an even compressed loan term due to their relatively short useful life span. The FDIC Financial Institution Letter (2009) and the Federal Register (2006) refer to the loan term and the structure of the loan. The OCC outlines a maximum term of 30 years, even if the property might have a longer useful life (OCC Handbook, 2013). The amortization schedule shall be in line with the loan term because the amortization protects against any diminishing collateral value during the loan term (OCC Handbook, 2013). Closely associated with the appropriate loan term is the tenancy structure. In case of a single tenant property, the lease expiration date should survive loan maturity by a determined timeframe in order to provide for a smooth loan exit. It is beneficial, if a part of the free cash flow is swept into a re-leasing and capital expenditure reserve to cover expenditures for refurbishment, rent concession, and rent-free periods. With regard to multi-tenant properties, the loan term might be linked to the weighted average lease term or the weighted average lease term to break option. If leasehold properties are involved, the loan term should expire at least ten years prior to the ground-lease expiration (OCC Handbook, 2013). Black et al. (2017) find that construction loans are short-term loans. Glancy (2019) shows that banks usually provide short-term loans whereas life insurers tend to lend long-term with more than ten years until maturity. Bardzik (2019) finds that commercial banks may provide shorter term loans based on underlying properties with less stable cash flows in contrast to life insurance companies. Ambrose et al. (2003) find that nonbank lenders that are not publicly traded or undergo a separate tax regime, like insurance companies, tend to be long-term lenders. Usually, the CREL is not completely paid off at maturity which requires a careful assessment of the property value to ensure loan exposure coverage at the end of the loan term (Bardzik, 2019). Johnston Ross and Shibut (2020) find that only 20% of the loan proceeds were repaid at maturity in their sample data of FDIC loans. This may have resulted from the sample date having included shorter-term bank loans. Black et al. (2017) find out that CMBS lenders provide in majority a loan term of ten years. Case (2003) finds that the average loan term for the financing of fully constructed properties amounts to five years and to one year for development and construction loans. The loan agreement may provide for termination rights or extension rights of the borrower. In case of early termination, the lender should make sure that a prepayment fee at-arms-length will be due to compensate for the lost interest portion respectively the reinvestment loss.

Loan term and *amortization* are closely interlinked. Both influence the loan structure (OCC Handbook, 2013). According to the Federal Register (2015), the borrower shall repay the loan in a timely manner. This might be done through graduate payments (Johnston Ross and Shibut, 2020) or annuity payments. As Bardzik (2019) states, each amortization

reduces the loan exposure. The repayment of CREL might be recorded in an amortization schedule (Federal Register, 1992) which could include interest-only payment periods (BOG, FDIC and OCC, 2015). Ongoing amortization for CREL is generated by the rental income of the real estate securing the loan (FDIC Financial Institution Letter, 2015; Federal Register, 2006; Case, 2003). According to the Regulation (EU) 575/2013 (CRR) (2013) art 126 (2) (b), the *repayment of CREL* is derived from the performance of the underlying property. Pana (2010) describes this as main characterization of CREL. According to the OCC Handbook (2013), the amortization criteria is dependent on the loan type. Construction loans usually do not require ongoing amortization (OCC Handbook, 2013). They are usually repaid by sale proceeds of the project. OCC Handbook (2013) recommends to limit the interest-only periods until the cash flow from property is stabilized. Interest-only loan structures require a balloon payment at maturity (Johnston Ross and Shibut, 2010). Any re-amortization throughout the loan term increases the risk potential of the lender (OCC Handbook, 2013). The exit scenario relates to the ultimate payoff of the loan which might be accomplished through the refinance of the current lender or an alternative lender, through the sale of the property or, in a worst-case scenario, by foreclosure proceeds. The latter follows an event of default with acceleration of the loan (Bardzik, 2019). Mandatory repayments of the loan prior to maturity might be triggered through a sale of the property or the sale of shares in the borrowing entity that might be followed by a change of control. In case of portfolio financing, the loan documents might allow for partial repayment by sale proceeds from released units. The lender is advised to specify the allocated loan amounts for the sold units in order to maintain the quality of the remaining portfolio. During an ongoing event of default, proceeds from captured cash flow after debt service might be used to repay the loan amount. This usually follows an uncured cash trap or cash sweep event.

Traditionally, CREL are *high loan volume* transactions. The Federal Register, 2015 pushes the responsibility to the bank and points out that its loan procedure should take the loan amount into consideration. The loan approval process should consider the volume of the loan in connection to the property type and to the initial loan to value (LTV) as well as outlined in the supervisory maximum LTV limits of the Federal Register (1992). The Federal Register (2006) and the OCC Handbook (2013) pick up on these two determinants, too. In addition to these features, the lender shall consider the maximum loan amount per transaction and the maximum loan exposure of the borrower group in order to limited the maximum possible underwriting volume. Construction facilities usually include a budgeted interest reserve that increases the loan amount (FDIC Financial Institution Letter, 2009). This forces the borrower at the time of loan origination to fund the remaining necessary investment volume via equity or mezzanine loan proceeds. The loan documents should include cash trap or cash sweep mechanism to force borrower to partially repay the loan amount in case of non-compliance with the LTV covenant during the loan term. Glancy et al. (2019) find that CMBS transactions exceed portfolio lender loan amounts by 200% on average. Black et al. (2017) call up on this fact as well. Wong and Kaminski (2019) find that the loan volume per transaction of life insurance companies is usually higher compared to loan amounts provided by property and casualty insurances. It is common in the CREL industry, that a club of lenders is providing a high-volume loan. Club deals or participations are types of loan syndication.

Basically, the CRE *loan type* may be classified according to the usage of the loan proceeds, the purpose of the loan, as well as the degree of borrower's liability. Following this rationale, CREL can be classified as land development loans (Federal Register, 2006; Pana, 2010), commercial construction or development loans (Federal Register, 2006; FDIC RMS Section 3.2 Loans, 2020; Johnston Ross and Shibut, 2010), and acquisition loans. In the case where the loan proceeds are allotted to the improvement of the property (BOG, FDIC and OCC, 2015),

the classification includes refurbishment loans. The acronym ADC includes acquisition, development and construction loans (FDIC Financial Institution Letter, 1998; OCC Handbook, 2013). The OCC Handbook (2013) further relates to bridge loans to cover the short-term period of rental income stabilization of the property and to bridge the time slot until the refinancing of the loan. The refinance of CRE is the replacement of an existing mortgage with a new loan. Depending on the individual circumstance, the total loan amount might be divided into several tranches, such as an acquisition tranche and a capital expenditure tranche. The capital expenditure advances shall be used to improve the property quality and might increase the chance of successful releasing in case of value-add properties. The loan proceeds might not be necessarily invested in the underlying property but may be used for other purposes. Depending on the degree of borrower's liability, CREL are non-recourse loans, recourse loans or partially recourse loans (Federal Register, 1992). Frequently, CREL are provided to non-recourse ring-fenced borrower structures due to sponsor liability protection but as well to shelter the lender from any cross-default within the sponsor entity structure. With regard to the loan risk evaluation of the supervisory authorities, CREL may be classified as substandard, doubtful, loss, and special mention depending on borrower's capability of repayment (FDIC RMS Section 3.2 Loans, 2020; FDIC Financial Institution Letter, 2009). Depending on the ability to repay the loan, CREL may be assigned to performing loans and non-performing loans.

An important feature of the CRE loan structure is the lender's contractual *ranking of security position*. The ranking classifies the loss absorption in case of a foreclosure (Robins et al., 2012). CREL might be structured with regard to the risk profile of the lender (OCC Handbook, 2013). There might be senior loans and junior loans in place depending on the ranking of the lien on the property, also referred to as first lien and second lien (OCC Handbook, 2013). Bardzik (2019) refers to subordinate ranking in connection with second and third mortgages. Depending on the lender's risk appetite, the structuring of a senior and a junior portion might be obsolete and the lender might finance the so-called whole loan. In case of a restructuring of a loan, the inclusion of first and subordinate liens might be reasonable in order to distinguish between performing and non-performing tranches (FDIC Financial Institution Letter, 2009). Mezzanine loans are often referred to in connection with CREL. But in contrast to CREL they are secured by a pledge of ownership interest in the property owner and not by a mortgage on the property (Bardzik, 2019). Upon foreclose in the company shares, the mezzanine lender might bid and ultimately become the indirect owner of the property. Mezzanine loans include an in place structural subordination to senior and junior loans (Robins et al., 2012). Therefore, they provide a higher risk component compared to CREL but represent a lower risk in comparison to equity (Phillips, 2009). Fig. 1 displays the specific loan relationships including senior/junior finance and mezzanine finance in an SPV structure.

Of utmost significance are the *loan documents* of CRE finance as the loan agreement and the accompanying finance documents establish the contractual frame for the relationship between lender and borrower throughout the whole loan term. As expressively pointed out in the Federal Register (2015), the lender shall make sure that its legally valid loan claim is enforceable. According to FDIC Financial Institution Letter (2006), the loan agreement should as well protect the lender against any environmental liability in connection with the contamination of the property. Also, loan purchase and participation agreements that concern the relation of lenders amongst each other are of high relevance (FDIC Financial Institution Letter, 2015). It is important that voting and enforcement rights within the lender group should be addressed as well. Additionally, the right to sell the loan participation should be included (FDIC Financial Institution Letter, 2015). Intercreditor agreements rule the relationship among the lenders with differing ranking, especially the relationship between mortgage lenders and

mezzanine lenders (Robins et al., 2012). The lender may mandate an external legal advisor for the review of the participation agreement and especially for high volume CRE finance documents (FDIC Financial Institution Letter, 2015). A certain degree of standardization with regard to the loan documentation is beneficial to maintain the fungibility of the CREL and to keep the loan transaction costs low. The standardization of loan documents is evidenced by CMBS transactions that are usually less complex than loan documents used in portfolio transactions (Robins et al., 2012). The loan market association standard (LMA) for loan agreements is also well known in the industry. One disadvantage of standardized finance documents is, that they do not provide space for flexibility, for instance during times of special situations. This is where portfolio lenders generate a comparative advantage using non-standardized loan agreements (Black et al., 2017).

The *interest rate structure* of CREL ranges between fixed and adjustable rates (FDIC RMS Section 3.8 Off-Balance Sheet Activities, 2019; Federal Register, 2006). Life insurers and CMBS lenders tend to arrange fixed rates with the borrower, banks usually provide floating rate loans (Glancy et al., 2019; Black et al., 2017). Pricing components like commitment fees, upfront fees, and agency fees impact the price structure of CREL. The interest rate shall bear the cost of loan funding, loan administration and credit risk. The interest rate should as well compensate illiquidity cost since CREL are a rather illiquid asset class with only a secondary market in place. The profit/risk profile shall also take the type of the underlying property into consideration (Federal Register, 1992). Compared to office buildings, leisure accommodation and hotels represent higher risk as those property types quickly respond to economic downturns. Therefore, they demand a higher pricing (Glancy et al., 2019). The recent changes in the perception of the financial industry of environmental sustainability and ESG performance might have an impact on future pricing of CREL. A first approach in this context has been included in the BaFin Guidance (2020).

The *cash flow* generated by rental income or sale proceeds deducted by operating costs of the underlying property impacts the structure of the loan. Johnston Ross and Shibut (2020) point out that CREL are structured with regard to lease payment schedules. The Regulation (EU) 575/2013 (CRR) (2013) art 126 (2) explicitly relates to the cash flow generated by the underlying property. Pana (2010) refers to the cash flow as main source of repayment of CREL. The cash flow shall grant the appropriate debt service coverage at all times during the loan term and the repayment of the loan (BOG, FDIC and OCC, 2015). Certainly, a long-term predictable cash flow is beneficial for CMBS transactions (Black et al., 2017). The cash flow analysis is the pivotal element in the evaluation of CREL and based, among others, on the lease agreements. The cash flow projections should account for appropriate vacancy rates and adequate re-leasing periods (OCC Handbook, 2013). The analysis should as well take rent increases (Bardzik, 2019) and indexed rents into consideration. In the case of insufficient cash flow in combination with shortage of reserves or equity, the borrower might take third party capital providers into consideration (Robins et al., 2012). Eichholtz et al. (2019) find that environmentally certified buildings might account for a constant cash flow and reduce consequently the risk of CREL.

CREL might include *loan covenants* in the loan documentation that may impact the loan quality. Financial covenants may bridge the information gap between borrower and lender and might reduce lenders' risk. The LTV or the modified version loan to mortgage lending value (LTMLV) belong to the capital covenants. The LTV represents a limit for the maximum loan amount L. Tight senior loan LTV-limits require higher borrower equity or third-party contributions (Robins et al., 2012). According to the Federal Regulation (1992), the maximum supervisory LTVs are connected to the underlying property type. The loan amount shall not excess a certain threshold of the property market value V (Cremer, 2019), all senior liens shall be taken into consideration (OCC Handbook, 2013). Some German banks

prefer to focus on the LTMLV as defined in the Regulation on the Determination of the Mortgage Lending Value (BelWertV) instead of the market value as it reflects a conservative sustainable property value. Glancy et al. (2019) examine the LTV limits by lender type and discover that banks even provide loans above 75% LTV, life insurers generally offer loans within the range of 50% to 67% LTV and CMBS lenders from 60% to 71% LTV. Equation (1) reflects the LTV ratio.

$$\text{LTV} = \frac{L}{V} \tag{1}$$

The performance covenant yield on debt (YoD) exposes the property cash flow C_t relative to the loan amount L_t at a defined point in time. This reflects the ability of property's cash flow to cover indebtedness. Equation (2) outlines the YoD ratio.

$$\text{YoD}_t = \frac{C_t}{L_t} \tag{2}$$

The debt service covenant (DSCR) or interest service covenant (ICR), belong to the performance covenants as well. The DSCR is the key indicator to measure the debt coverage capability of the property's net operating income (NOI). DSCR_t depicts to what extend the debt service for a loan amount L_t is covered by cash flow C_t or by NOI_t of the property (Cremer, 2019; OCC Handbook, 2013). Lenders determine a DSCR covenant depending on the risk grid of the underlying property. As an example, the DSCR covenant for a loan secured by an office building might be lower compared to a DSCR of a hotel financing. Glancy et al. (2019) detect the typical DSCR at 1.50, for hotel financing at 1.85. The DSCR covenant is outlined in equation (3).

$$\text{DSCR}_t = \frac{C_t}{L_t} \tag{3}$$

The ICR is an alteration of the DSCR covenant and a "second line of defense" (Cremer, 2019, p. 378) outlining coverage in case of deferral of amortization or in case of bullet loan structures. There exist further covenants like guarantor financial requirements or requirements of minimum borrower equity. LTV and DSCR should not be a static reflection at loan origination but should be calculated on an ongoing basis during loan term (Bardzik, 2019). Non-compliance with financial covenants might lead to an event of default and ultimately to the acceleration of loan and the foreclosure.

Typical *CREL lenders* are commercial banks, life insurance companies and CMBS lenders (Glancy et al., 2019; Bardzik, 2019). The ECB Review (2007) further includes pension funds as CRE debt investors but not as immediate CREL lender. According to BaFin, banks might withdraw from the CREL market due to high capital charges in respect to Basel III and insurers might bridge the resulting financing gap (BaFin Fachartikel, 2012). Commercial banks perform in their function as loan originator and balance sheet lender and benefit from the immediate borrower relationship (Downs and Xu, 2015). CMBS lenders, on contrary, have almost no deeper relationship to the borrower (Downs and Xu, 2015). The lender strategy might focus on a loan sale right after origination without recourse to the purchaser (Federal Register, 1992). Especially after the excessive loan sales experienced during the global financial crisis 2008, this type of business might be currently rather limited. Some institutions, especially those without direct relationships to potential CRE customers, implement loan participations in their business model. The main drivers for this business strategy are fast CREL exposure increase and the diversification of risk and profitability (FDIC Financial Institution Letter, 2015). For the selling institutions risk diversification is a benefit as well. In addition, exhausted borrower limits might get released in order to provide leeway to originate new business with the CREL borrower (FDIC RMS Section 3.2 Loans, 2020).

3.3 CREL Inherent Risks

According to the OCC Handbook (2013), CRE lending might be accompanied by seven risk categories. These comprise the credit risk, interest rate risk, liquidity risk, operational risk, compliance risk, strategic risk, and reputation

risk. The various risk types may be in place simultaneously. They may as well interrelate and interconnect.

The underlying CRE might serve as collateral and debt service provider for the CREL and in this respect could be considered as a two lines of defense system (Kim, 2013; Johnston Ross and Shibut, 2020). The *CRE markets* are essential risk drivers of CREL as rents impact the cash flow of a property and its value. Prospering CRE markets depend on an intact legal, economic and political system. These attributes as well define a performing debt market (Phillips, 2009). The OCC refers to the CRE markets as the "key elements of risk" of CRE finance (OCC Handbook, 2013, p. 1). The CRE markets are correlated to the real economy (Black et al., 2017) and thus respond to local and national economic developments (OCC Handbook, 2013). As outlined in the Statement on Prudent Risk Management for Commercial Real Estate Lending rents, sale prices, and operating expenses impact the repayment and debt service coverage of the loans (BoG, FDIC and OCC, 2015). According to the Federal Register (2015), the lenders shall analyze the respective market of the underlying CRE. The Federal Register (1992) recommends a market condition monitoring in order to adequately respond to market changes. According to the Federal Register (1990) abnormal market developments shall be explicitly outlined in an appraisal. Those market developments could be caused due to excessive price increases of certain CRE that follow the strong demand of investors in a defined risk bucket (BaFin Fachartikel, 2012). The turning of CRE markets with asset price deterioration or increasing vacancies could cause non-compliance with contractual LTV covenants or, in the worst case, unsecured loan exposures and uncovered debt service. The FDIC Financial Institution Letter (2008) recommends to request from borrower current cash flow statements and rent schedules. It might be necessary for the lender to mandate a revised appraisal in case of deteriorating CRE market conditions in order to re-evaluate CREL collateral (FDIC Financial Institution Letter, 2008). This emphasizes the linkage between the CRE markets and the CREL inherent credit risk. Once CREL defaults become systemic, they may infect the financial economy and ultimately harm the real economy (ESRB Report, 2018). A CRE market bubble might be inflated as a result of a long-term low yield environment (ESRB Report, 2018) caused by investor's high demand of additional alpha. Signs for a turning CRE market might be the increase of rent concessions, substantial amendments to construction and development projects inclusive construction delay, prolonged re-leasing of rental space and slow unit sale (FDIC RMS Section 3.2 Loans, 2020). Excessive property development activities with vast increase of supply of CRE space might affect the CRE markets negatively (FDIC Financial Institution Letter, 1998). Cheap loan supply and extensive lending could even boost CRE market developments but also cause an immediate market drop if the loan supply runs dry (Bassett and Marsh, 2017). Property types might respond to economic changes differently (OCC Handbook, 2013). The hotel sector may be intensely linked to the development of wages and the unemployment rate. The success of construction projects depends on the accurate timing within the economic cycle and the demand of the market participants. According to the OCC Handbook (2013), construction projects respond extremely sensitive to the economy. As Case (2003) points out, supervisory authorities, as the Federal Reserve Board, deem construction loans as highly sensitive to downturns of the CRE markets. To mitigate the risk, lenders should insist on adequate pre-leasing or pre-sales. Important economic indicators for CRE markets are demographic changes, the development of income and of the unemployment rate (OCC Handbook, 2013). Changes to existing laws like rent control or condominium conversion rules, could strongly impact the CRE market condition (OCC Handbook, 2013). Both, lender and borrower might be hit by a CRE market downturn. However, they might be affected with different severity. Depending on the LTV of the financing, the lender might disproportionally participate in the investment compared to the borrower's

equity contribution. Notwithstanding this fact, borrower's equity can be deemed as the first loss piece if the property value drops. The Directive 2009/138/EC (Solvency II) (2009) art 105 No 5 (c) refers to property risk in connection with "market prices of real estate". In addition, the Commission Delegated Regulation 2015/35 (Solvency II) (2014) art 174 reflects the CRE risk within the risk sub-module property risk. The ECB Review (2007) refers to the CRE market risk in connection with the potential of cross-border spreading of CRE price decreases.

The Federal Register (2015) refers to increased *credit risk* as the outcome of extensive lending. This risk is defined as the borrower's inability to repay its loan obligations. The Directive 2009/138/EC (Solvency II) (2009) art 13 defines credit risk as "the risk of loss or adverse change" of the counterparty's financial condition. The Regulation (EU) 575/2013 (CRR) (2013) mentions the terminology credit risk 263 times which emphasizes its significance to this regulation. A loss might occur if the loan exposure is not sufficiently covered by foreclosure proceeds of the underlying property or if the cash flow generated by the CRE does not cover the debt service during the loan term. According to the Federal Register (1990), the quality of a lender's collateral is influenced by the physical condition of the building. The lender shall pay special attention to the triangle of loan exposure, potential sale price of the property and the market demand for the type of property (FDIC RMS Section 3.2 Loans, 2020). Black et al. (2017) outline the property type as a predominant risk driver. According to the FDIC RMS Section 3.2 Loans (2020, p. 23), "adverse economic developments" could cause the lender to re-evaluate the credit risk. Construction delays might result in cost overruns (FDIC RMS Section 3.2 Loans, 2020) and threaten the completion of the project. Excessive and especially speculative property developments might negatively impact the existing properties in a sub-market, jeopardize their long-term financing, and ultimately lead to a loan quality deterioration (Bassett and Marsh, 2017). Usually, CREL are provided on a non-recourse basis without liability of the sponsorship (ESRB Report, 2018). The Commission Delegated Regulation 2015/35 (Solvency II) (2014) art 42 (2) connects the credit risk to the defaulting counterparty and art 42 (5) explicitly states that the probability of Default (PD) of a borrower is related to its assets. The ECB refers to the credit risk as the main risk driver in CMBS transactions (ECB Review, 2007). Higher equity contributions of the sponsor, result in a lower LTV at origination, which might mitigate the credit risk. This shifts the risk from lender to the borrower and improves the risk sharing between lender and borrower (ESRB Report, 2018). The credit risk of distressed loans might be increased by asymmetric information distribution between lender and borrower, agency conflicts of securitized loans, contracting frictions in case of multiple lenders, and regulatory pressure (Downs and Xu, 2015). According to FDIC Financial Institution Letter (2009), distressed loans are classified as substandard loans, doubtful loans, loss assets, and special mention. Loss assets are defined as loan exposures that are not covered by the market value of the property (FDIC Financial Institution Letter, 2009). If a loan is in distress, it is crucial to accelerate the decision, if a restructuring shall be processed or if the loan shall be foreclosed upon. Downs and Xu (2015) detect that portfolio lenders seem to resolve a special loan situation quickly compared to lenders of a securitization. They point out that balance sheet lenders, in contrast to CMBS lenders, are more likely to foreclose on a loan than to restructure the loan. The lender should not solely rely on the appraised value as the actual sales price of the property could differ (FDIC RMS Section 3.2 Loans, 2020). Inappropriate loan documentation might increase the credit risk (FDIC RMS Section 3.2 Loans, 2020). The risk measure expected loss (EL) might be used as a pricing component for CREL to compensate for the credit risk (Bardzik, 2019). The EL includes the PD, the loss given default (LGD) and exposure at default (EaD) as outlined in equation (4).

$$\mathrm{EL} = \mathrm{PD} \cdot \mathrm{LDG} \cdot \mathrm{EaD} \tag{4}$$

According to Kim (2013), the property cash flow has an impact on the PD whereas the LGD depends on the property value. Environmental property certification might positively influence the cash flow due to rent increases or short re-leasing periods (Eichholtz et al., 2019). Johnston Ross and Shibut (2020) are of the opinion that defaulting non-seasoned CREL are stronger impacted by economic turmoil and reveal higher LGDs compared to seasoned CREL. Increasing property values over time due to successful re-leasing or indexed rents might be the reason. The quality of a lender's loan portfolio might be classified by EL groups. Another signal of portfolio quality might be the extend of delinquencies (Pana, 2010).

The lender could be affected by the *interest rate risk* on its portfolio level. This risk might be hedged through derivatives like swaps (FDIC RMS Section 3.2 Loans, 2020). On transaction level, rising interest rates that are not accompanied by an increase of the property cash flow could cause a loan default (Phillips, 2009). The lender may push back this risk to the borrower and require borrower to enter into an interest rate hedging. Interest rate lock commitments counter borrower's interest rate risk during the loan approval process (FDIC RMS Section 3.2 Loans, 2020). The Regulation (EU) 575/2013 (CRR) (2013) addresses the terminology interest rate risk 21 times. The Commission Delegated Regulation 2015/35 (Solvency II) (2014) art 165 requires insurance undertakings to cover this risk with capital.

CREL are an illiquid asset class. The ECB Review (2007) refers to the underlying commercial property as illiquid. This emphasizes the fact that the liquidity risk of CREL is linked to the liquidity risk of the underlying asset. The *liquidity risk* is inherent during the entire loan term and especially at loan maturity as most of the CREL are not amortized during loan duration. The exit possibilities of CRE lending include the refinancing of the loan by a different lender, the securitization or the sale of the loan, and the full amortization throughout the loan term (OCC Handbook, 2013). The lack of fungibility of CREL represents the liquidity risk for the lender (Directive 2009/138/EC (Solvency II) (2009) art 13 No 34). The Regulation (EU) 575/2013 (CRR) (2013) refers to the terminology liquidity risk nine times, much less in comparison to the reference to credit risk. The ESRB refers to this risk as lender's refinancing risk caused by a lack of liquidity to repay the loan at maturity (ESRB Report, 2018). Eichholtz et al. (2017) refer to the beneficial influence of environmental certified buildings as collateral on the cost of funds for the CRE financing. This mitigates the liquidity risk and might be an indicator for the quality of CREL. Environmental certification of the asset may reduce the liquidity risk during loan term and at maturity (Eichholtz et al., 2019). The Commission Delegated Regulation 2015/35 (Solvency II) (2014) art 326 requires the value of the asset of an SPV to be sufficient to cover the liquidity risk among others. The ECB refers to this risk bucket with regard to indirect investment products like speciality funds that do not have a primary market in place and therefore are less fungible (ECB Review, 2007).

BoG, FDIC and OCC (2015) refer to the *operational risk* as the risk that is inherent in a lender's internal processes and connected to lender's risk management. The FDIC Financial Institution Letter (2015) relates to this risk in context with lenders' activities in unfamiliar business segments or new markets. It is emphasized, that those segments and markets shall be comprehensively monitored and controlled. The OCC refers to *strategic risk* as a lender's risk of failure to effectively oversee the CRE lending activities which could lead to a non-compliance with the lender's CRE lending policy (OCC Handbook, 2013). This risk per definition could also be assigned to the operational risk bucket. A significant amount of defaulting loans might cause banks to adjust their lending strategy which ultimately could result in restrictive lending. In the worst case, this might trigger a credit crunch and limit the real economy's new investments (ESRB Report, 2018). Supervisory requirements could as well affect the lender's strategy. Pana (2010) investigated changes in the strategies of banks prior to the global financial crisis. Pana showed that banks adjusted their strategy and

shifted from CRE lending to RRE lending in order to decrease supervisory capital charges. The Regulation (EU) 575/2013 (CRR) (2013) mentions the terminology operational risk 53 times. The Directive 2009/138/EC (Solvency II) (2009) art 13 No 33 specifically defines this risk as risk resulting from internal processes that could also be triggered by external factors. The Commission Delegated Regulation 2015/35 (Solvency II) (2014) art 204 encloses the calculation of capital requirements for the operational risk. The ECB points out that this risk may be inherent in transactions of private equity funds and hedge funds (ECB Review, 2007). These investment groups usually are not regulated. They might not have sufficient internal processes and control systems in place.

Environmental issues like the contamination of the property do not only impact a lender's liability but may also account for a lender's *reputation risk*. The FDIC Financial Institution Letter (2006) require lenders to organize an adequate environmental risk assessment during the entire loan term. In general, the reputation of a lender could be negatively affected by lender liability lawsuit (OCC Handbook, 2013) or the negative influence of the borrowing entity or by a shady tenancy base. The Regulation (EU) 575/2013 (CRR) (2013) uses the terminology reputation damage only once. According to Directive 2009/138/EC (Solvency II) (2009) art 102 (4), this risk is allotted to the operational risk.

The OCC Handbook (2013) refers to *compliance risk* as the risk of non-compliance with laws and regulation, including environmental laws. The Regulation (EU) 575/2013 (CRR) (2013) does not refer to the term compliance risk at all. According to the Commission Delegated Regulation 2015/35 (Solvency II) (2014) art 270 (1), the undertaking shall set up a compliance management to encounter the compliance risk.

The Federal Register (1992) directly mentions the necessity for an institution to diversify its loan portfolio with respect to loan type, geographic market and loan quality in order to face the *concentration risk*. It is important that the lender takes the transaction loan amount and lender's entire CREL loan exposure into consideration. The concentration risk refers to a lender's portfolio cash flow correlation. The risk may be higher if the cash flows of a portfolio are positively correlated, which could be the case in connection with properties of the same macro location and similar economical exposure (Case, 2003). The Federal Register (2006) forces the supervised institutions to report in case their CREL exposure exceeds a defined threshold, such as construction loan threshold of 100% of the total capital of the institution or other CREL threshold of 300% of the total capital of the institution. The FDIC RMS Section 3.2 Loans (2020) includes the risk of the lender's loan exposure to a single entity or person. Some lenders have difficulties in diversifying their loan portfolio with regard to location or business segment as they are only active in limited local markets (FDIC RMS Section 3.2 Loans, 2020). According to BoG, FDIC and OCC (2015), the management board shall approve concentration limits within its risk management process. The Regulation (EU) 575/2013 (CRR) (2013) mentions the terminology concentration risk ten times. According to the Directive 2009/138/EC (Solvency II) (2009) art 13 No 35, this risk could be severe and threaten the undertaking's going concern. The Commission Delegated Regulation 2015/35 (Solvency II) (2014) recital (62) refers to geographical or sector concentration of assets. According to Bardzik (2019), lender's CREL portfolio concentration may include LTV, YoD, DSCR, EL, PD, LGD segmentation in addition to property type and to the geographic area of the property. The diversification of asset classes and geographical markets creates a possibility to mitigate concentration risk. Pana (2010) fears that smaller banks might not encounter concentration risks fast enough to diversify their loan portfolio if necessary. This could be the case for local banks that provide CREL to borrowers in a limited geographical area. The ESRB also addresses the risk of concentration of losses and recommends cross-border syndication of CREL in order to mitigate the financing risk (ESRB Report, 2018).

4 DISCUSSION

CREL are an essential investment segment in the economy which accounted in 2019 for 14% of the US GDP (Glancy, 2019). Commercial banks, life insurance companies, and CMBS lenders are the main CREL providers (Glancy et al., 2019; OCC Handbook, 2013). As intermediaries, they clearly influence the capital flow into the real estate sector. Supervisory authorities extensively monitor the institutions' CREL activities as any deterioration in the financial market could infect the real economy. A synchronized and accurate database is essential for effective CREL supervisory monitoring, mainly because the asset class is particularly heterogeneous. Data gaps have been criticized especially by regulatory authorities (ESRB, 2018). With regard to the filing of the banks' CREL data base, time is of the essence. This was clearly evidenced by the experience made shortly prior to the global financial crisis of 2008 which was triggered by the deterioration of the US real estate market. Accordingly, the supervised institutions themselves might have an interest to fill this gap as their capital charges correlate with their risk weighted assets. Surprisingly, and as far to this author's knowledge, no universal definition of CREL exists in the global financial world. Only few articles of the reviewed set explicitly define this loan type, among them the Federal Register (2006) and Pana (2010). Although they provide a solid guidance, in some respect their definition might be misleading and ambiguous. The Federal Register (2006) basically ties CREL to the rental income generated by the underlying property as primary source of repayment and draws a second quantitative precondition. In the case where the borrower or an entity of the borrowing company group is providing 50% or more of the rental income, the criteria for CREL is not met. This is a notable approach to capture loans that are correlated to the CRE market risk. In this author's opinion, the threshold of 50% is rather high as consequently up to 49% of the rental income could be derived from the borrowing company group. This represents a risk sphere other than the CRE market. The risk of distortion of the tenancy schedule would shift from CRE market to the borrower's financial ability. Pana (2010) interconnects CREL to the cash flow from the property as well, but her definition does not include any threshold for third party rental income. She connects CREL to the usage of the loan for construction, land development, and other land loans. This list could have been completed by the acquisition of CRE, the refurbishment of the property, and the refinance of CREL. Pana (2010, p. 17) defines CRE among others as "multi-family residential properties". This gives room for interpretation. It is unclear if the term is based on the definition of multifamily property according to 12 CFR §1266.1 which includes nursing homes, dormitories and homes for elderly. The Federal Register's definition (2006) takes land development loans, construction loans and land loans into account and explicitly includes 1-to-4 family residential construction and commercial construction. This would comprise one family residential construction which rather should be allotted to RREL. The definition includes as well multi-family and nonfarm nonresidential properties. It is beneficial, that loans to REITs and unsecured loans to developers are defined as CREL (Federal Register, 2006) as they are correlated to the CRE markets, too. Pana (2010) does not refer to these borrower groups at all.

In order to categorize CREL it is in this author's opinion important to focus on the main risk drivers of CREL and to understand how they impact the asset class. The general risk of providing loans is the inability of borrower to pay the debt service and ultimately, the risk of non-repayment of the loan obligation. This risk is defined by regulators as credit risk. The generated cash flow that provides for the debt service and the repayment of the loan is in focus. The Regulation (EU) 575/2013 (CRR) (2013) art 126 (2) (b) relates to exposures where the risk of repayment of the CREL is derived from the "performance" of the collateralized commercial property and is not generated by other sources. The Federal Register (2006)

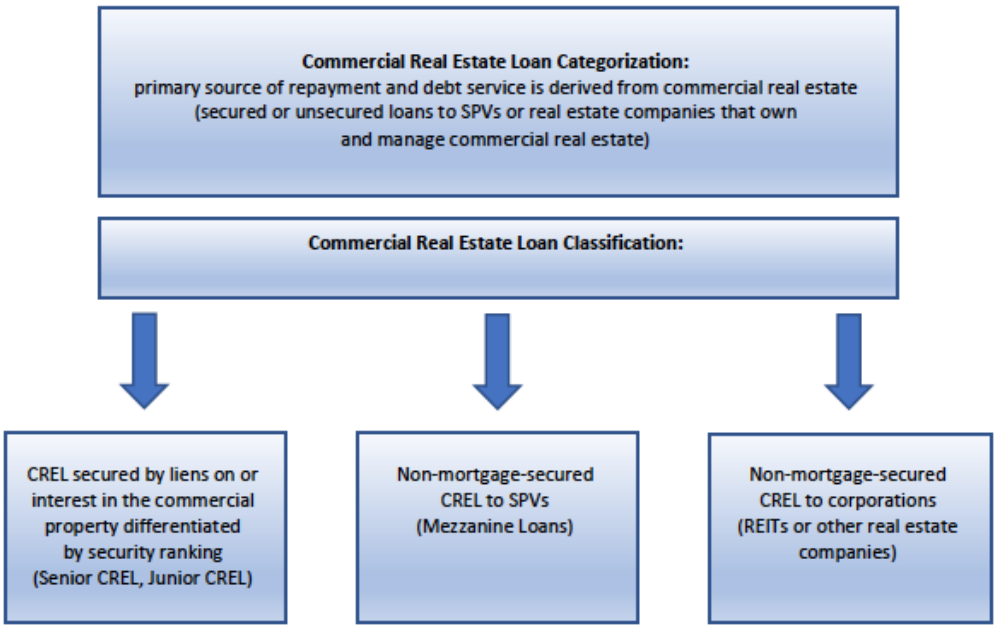

Fig. 2: Commercial Real Estate Loan Categorization and Classification

refers to the cash flow that is produced by CRE as a primary source of repayment. This excludes loans that are secured by CRE but where the primary source of repayment comes from the business operations that owns the property. It also excludes CRE where the borrowing entity is a tenant who exceeds a threshold of the tenancy base. The Federal Register (1992) interlinks the requirement to appraise a property by a State certified or licensed appraiser to those loans whose repayment depends on the sale or rental income as primary source. The BOG, FDIC and OCC (2015) deem the CRE cash flow analysis broken down to rents, sale proceeds and operating costs of extreme importance in order to evaluate the borrower's loan repayment ability. The OCC, in addition, outlines the significance to comprehend "the income generating capacity of real estate" (OCC Handbook, 2013, p. 36). Despite the rental income, sale proceeds of the CRE are essential for the repayment of the CREL, either generated through open sale or upon foreclosure on the loan. The value of the property is either determined by future rents or sale prices. The Federal Register (2015) requires institutions to evaluate the value of collateralized properties. The Federal Register (1992) refers to the value of mortgaged CRE as main credit factor of the loan decision. The determination of market value is essential and for this reason it should be perfected by an independent appraiser (Federal Register, 1990). Cost approach, Direct Sales Comparison Approach and Income Approach are the main valuation concepts (FDIC RMS Section 3.2 Loans, 2020; BOG, FDIC and OCC, 2016). Their approach to evaluate the property interconnects with the evaluation of the CRE markets (BOG, FDIC and OCC, 2015).

Credit risk seems to be closely linked to the CRE markets. Following this rationale, *CREL might be categorized as loans whose primary source of repayment and debt service is derived from CRE*, either from rents or sales proceeds sourced mainly by non-borrower-affiliated third parties. The primary source of repayment might be derived from CRE that serves as collateral for the CREL. Secured or even unsecured loans to SPVs or real estate companies that own and manage CRE, like REITs, should be included

as well in the categorization of CREL as their repayment is dependent on the development of the CRE markets. Classifications beneath the categorization might be established to differentiate among the various CREL risk characteristics. First, CREL might be classified as loans that are secured by liens or interest in the property depending on their security ranking. Second, CREL might be grouped in non-mortgage-secured loans to SPVs like mezzanine loans. Third, CREL might be clustered as non-mortgage-secured CREL to corporations, as REITs or other real estate companies. Fig. 2 exemplifies this categorization of CREL.

The developed categorization of CREL allows a broad approach on the one hand, and on the other hand captures different characteristics of this asset class. It separates CREL from further loan types like RREL where the risk is assigned to the value of the real estate as well, but where the cash flow is derived by other sources of the borrower, such as wages. The categorization separates CREL from corporate loans secured by properties where the cash flow that covers the debt service is generated by the operating business of borrower.

5 CONCLUSION

The aim of this work is to establish a categorization of CREL that is, to this author's knowledge, missing in the global financial sector. The developed categorization shall close the gap and provide a consistent structure of an extremely heterogeneous asset class. The classifications within the categorization of CREL shall set up a risk hierarchy and could support supervisory authorities' ability to analyze and evaluate the institutions' CREL risk pattern. A comprehensive CREL categorization might support lenders in their accurate and prompt data processing and regulatory filing. Additionally, this work shall assist in creating a common global understanding of this asset class between banks, institutional investors and regulatory authorities.

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INDUSTRY-SPECIFIC FACTORS IMPEDING THE IMPLEMENTATION OF VALUE-BASED PRICING

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ABSTRACT

Value-based pricing (VBP) is often considered the most profitable pricing method. However, VBP is rarely implemented by companies. This research study asks the question Why? and investigates the obstacles to an implementation of VBP. The objectives of this paper are to provide an assessment of customer-based obstacles to implement VBP in four different German industries and to evaluate the degree of company-based obstacles by industry. For that purpose, 792 consumer questionnaires were collected and 20 expert interviews were conducted.

The results show that the technology industry is the German industry with the lowest obstacles, while the pharmaceutical industry experiences the strongest obstacles. The degree of obstacles varies significantly by industry.

This study contributes to theory by taking both a customer perspective and a business perspective towards VBP while identifying the degree of the obstacles to implement VBP by industry. This paper allows future researchers and business practitioners to assess the industry-specific obstacles and take appropriate measures to overcome them.

KEY WORDS

value, pricing, implementation, obstacles, strategy

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1 INTRODUCTION AND OBJECTIVE

Across the globe, there exists universal agreement that pricing is one of the most powerful revenue-generating strategies, but it is still underestimated in many cases (Baker et al., 2010; Bruck, 2010). According to Simon and Fassnacht (2016), three main profit drivers exist, namely price, quantity, and costs. Price management is often referred to as a value-

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and revenue-maximizing tool (Jommi et al., 2020). Overall, today's literature has shown a strong interest in the marketing mix and its implications for companies. Out of the factors of the marketing mix – product, price, place, promotion and people – the factor price has received the least research so far, despite the outstanding significance and impact it has on overall returns. Research has rather focused on the factors product, place, promotion, and people than on the factor price (Harvey, 1993; Harris, 1994; Rosenbloom et al., 1997; Baker et al., 2010; Bruck, 2010; Reynolds, 2018).

This seems an astonishing fact, as prices are the ubiquitous factor with practical interest by each company and each service-providing organization. In today's quickly changing market environments, adapting to new circumstances is crucial. Pricing power – being defined by Tacke et al. (2012, p. 2) as "the ability of a company to get the prices it deserves for the value it delivers to customers" is needed by companies to be able to respond to these changes. Within the approach of price determination, several different methods may be elaborated upon. The emerging pricing method value-based pricing has increasingly attracted researchers' attention in recent years (e.g. Hinterhuber, 2008a; Anderson et al., 2010; Hinterhuber and Bertini, 2011; Nagle et al., 2011; Hinterhuber and Liozu, 2012; Michel and Pfäffli, 2012; Töytäri et al., 2015; Töytäri et al., 2017; Nagle and Müller, 2018; Reynolds, 2018). Particularly, the striking aspect of a low implementation rate of VBP among companies surfaced (e.g. Codini et al., 2012; Michel and Pfäffli, 2012; Töytäri et al., 2017). While literature has already explained some obstacles to its implementation, a cross-industry analysis of the barriers and an assessment of their weight was lacking. This was confirmed by Töytäri et al.'s (2017, p. 245) findings, who encouraged that "research could investigate several [...] industries" in the investigation of VBP obstacles.

Thus, the objective of this paper was to derive an evaluation of the industry-specific obstacles to implement VBP from both customer data and company data. First, a customer-based evaluation of the main obstacles to the implementation of VBP was conducted to identify the industries with the strongest and weakest barriers to implement VBP. Second, a company-based evaluation of existing barriers to implement VBP should lead to a detailed assessment of the degree of these barriers by industry and define whether they differ significantly or are rather similar. Therefore, two research questions were used for this research study which are stated as the following:

RQ_1: In which German industry are the customer-based obstacles to the implementation of value-based pricing the largest?

RQ_2: Are there significant differences between the obstacles in the industries analyzed?

2 LITERATURE REVIEW

2.1 Traditional Pricing Methods

Cost-based pricing is a pricing method where a desired profit amount or margin is added to direct and indirect costs of a product or service (Noble and Gruca, 1999; Shipley and Jobber, 2001). This method is also referred to as cost-plus pricing, mark-up pricing or target-profit pricing (Cannon and Morgan, 1990). Cost-based pricing reaps the benefits of reduced complexity in price determination as well as readily available information (Harmon et al., 2009). However, researchers Noble and Gruca (1999) and Dutta et al. (2002) suggest that a customer-centric price determination method can be recommended in today's business environment. Cost-based pricing is rather company-driven, with a lack of customer value reflection (Guerreiro and Amaral, 2018, p. 394). Frohmann (2018, p. 75) further stated that if the expected profit margin based on overall costs is unreasonably high, market share and volume are lost to competitors.

A second and very widely used pricing method is competition-based pricing, where prices are determined by competitors' prices

on the market (Simon and Dolan, 1997; Roll et al., 2012; Simon and Fassnacht, 2008, 2016; Frohmann, 2018). According to Hinterhuber (2008a), competition-based pricing is the most relevant pricing method in B2C markets, mainly because the approach ensures the ability to constantly adapt prices based on average market prices. With increasingly transparent players on the market, observing and monitoring competitors' prices is strongly facilitated (Frohmann, 2018, p. 77). However, competition-based pricing can lead to dangerous spiral effects if one competitor starts with a price reduction. With suppliers underbidding themselves constantly, the whole industry may be led into lengthy price wars with reduced sales volumes for all market participants, often referred to as Game Theory in literature (Simon and Fassnacht, 2016; Frohmann, 2018; Dixit and Nalebuff, 2019).

2.2 Value-Based Pricing

Cannon and Morgan (1990, p. 22) defined value-based pricing or perceived-value pricing as an "approach (that) involves pricing on the basis of the monetary value a product has for target customers. It is a demand-oriented method which assumes that a firm can determine what people are willing to pay for a product and its various forms". Ding (2007, p. 386) explained the concept of it: "Value-based pricing is an important conceptual approach [...] that leverages the benefits of the service offering in order to match the buyer's willingness-to-pay with the value received". Garrison and Towse (2017, p. 2) stated that "the value of a good or service to an individual is what that individual would be willing to pay for it in monetary terms or give up in terms of other resources or time to receive it. [...] in market transactions, there may be a difference between what the individual would be willing to pay and the market price they face: that difference (if price is lower) is called the 'consumer surplus'." Garner et al. (2017, p. 5) mentioned that "VBP is a well-established pricing strategy for commodities. The basic idea behind this approach is that the price of goods should reflect the value to the buyer rather than the actual costs of production plus a margin."

Over the last decades, research interest has been growing in this new pricing method. Slywotzky (1996) explained this growing attention with the belief that value-based pricing could lead to more successful pricing outcomes. Garrison and Towse (2017, p. 1) confirmed this finding by explaining that value-based outcomes and pricing "are high on the list of buzzwords". According to several researchers, this growing interest roots in the fact that VBP reaps the strongest benefits within pricing methods (e.g. Drummond and Towse, 2019). Blois and Ramírez (2006) and Gosselin and Bauwen (2006) mentioned that creating customer value is strongly connected to the achievement of strong business performance. This was confirmed by more recent research: Nagle and Müller (2018) stated that the customer perceived value should always be reflected in the pricing process of products or services.

Further, Eggert et al. (2006) explained that long-term success and survival are consequences to the creation of customer value. According to Anderson et al. (2010), value-based pricing is both favorable to the buyer and the supplier, creating a positive sum-game (Terho et al., 2012). A multitude of researchers further agreed that value-based pricing is the most profitable pricing method in today's business environment (e.g. Hünerberg and Hüttmann, 2003; Piercy et al., 2010). Moreover, value-based pricing is positively correlated with the success of new products, while there is no such positive correlation between the success of new products and cost- or competition-based pricing (Ingenbleek et al., 2003).

Additionally, "VBP helps to maximize value within the available budget" (Jommi et al., 2020, p. 15). Furthermore, it is likely that a higher customer perceived value and higher effectiveness with VBP can be achieved through digital marketing efforts (Reynolds, 2018). Another advantage of VBP is that the "VBP price would grant all the consumer surplus to the producer, which in theory provides optimal incentives for investment in R&D at the margin.

High expected returns may encourage multiple competitors of slightly differentiated products" (Danzon, 2018, p. 253).

As value-based pricing usually comes along with higher prices than cost- or competition-based pricing (Hinterhuber, 2008a), higher revenues often are the result. Therefore, it can be stated that the more a consumer is price-sensitive, the lower the chances for successful implementation of VBP. Drummond and Towse (2019, p. 945) concluded that "Value-based pricing (VBP) is considered by many to be far superior to most of the alternatives, such as uninformed price negotiations, or internal or external reference pricing. However, there are issues in the application of VBP, with differences of opinion about what constitutes 'value' and about the determination of the 'cost-effectiveness threshold' against which value is to be judged."

2.3 Implementing VBP

When it comes to the implementation or usage of these pricing methods, several interesting results were found. In a study conducted by Horngren and Foster (1991), the researchers found that in the United States, a cost-based pricing approach was used by 46% of companies. Hinterhuber and Bertini (2011, p. 47) found that in a summary of all published research from 1983 to 2006 in business practice, 44% of companies employed a competition-based approach, while 37% used a cost-based approach. Only 17% of companies utilized customer value-oriented approaches such as value-based pricing. Thus, if academic theory suggests and researchers agree on the fact that value-based pricing is the most profitable, recommendable, and game-changing pricing practice, why have not more companies across industries implemented value-based pricing? What are the factors preventing it?

Researchers have already found some obstacles to the implementation of VBP (e.g. Hinterhuber, 2008a; Hinterhuber and Bertini, 2011; Nagle et al., 2011; Hinterhuber and Liozu, 2012; Michel and Pfäffli, 2012; Töytäri et al., 2015; Töytäri et al., 2017; Nagle and Müller, 2018; Reynolds, 2018). According to Forbis and Mehta (1981), VBP is a highly sophisticated pricing approach but complicated because of a high customer specificity. Several researchers stated that a value-based pricing approach is by far a more complex way to price products or services in comparison to other pricing methods (Nenonen and Storbacka, 2010; Liozu et al., 2012a; Töytäri et al., 2017).

Hinterhuber (2008a) and Hinterhuber and Bertini (2011) identified the main barriers in implementing VBP as the difficulties in assessing value, communicating value, market segmentation, sales force management and senior management support. Hinterhuber and Bertini (2011, p. 47) stated that "companies are frequently forced to revert to cost-based or competition-based pricing, simply because they do not have the tools to measure customer value reliably. In fact, it is not uncommon for marketing and sales teams to be uncertain of what value actually is. [...] Companies successful at implementing value-based pricing generally employ a series of rigorous empirical tools to reliably measure (and continuously track) customer value." In another study, Nagle and Hogan (2007) mentioned two organizational barriers when implementing a different pricing method other than the one already established. These were the lack of willingness to accept changes in pricing decisions as well as the compensation dilemma among salespeople, where salesforce is often compensated by quantity sold or by volume, encouraging them to sell on low price, high quantity.

In a more recent study conducted by Töytäri et al. (2017), representatives from industrial markets and the technology industry were asked to define the barriers to the implementation of value-based pricing. The outcomes of their study were threefold: First, individually induced barriers such as the complexity of value quantification and the lack of experience or skills could be identified. Second, organizationally induced barriers such as the product-oriented sales culture and the lack of governance or tools were existent. Third, externally induced barriers such as a prevailing buying culture and incompatible time horizons were additional

factors impeding the implementation of VBP (Töytäri et al., 2017). Based on an extensive literature review by the authors, the fourteen most frequently known obstacles to implement VBP were the following:

- Customer's feeling of injustice (Michel and Pfäffli, 2012)
- Danger of customer loss (Dittmer, 2017)
- Different value perception of buyer and seller (Töytäri et al., 2017)
- Difficult market segmentation (Hinterhuber, 2008a; Hinterhuber and Bertini, 2011; Michel and Pfäffli, 2012; Töytäri et al., 2017)
- Difficulties in assessing the customer perceived value (Ramírez, 1999; Flint et al., 2002; Vargo and Lusch, 2004; Lindgreen and Wynstra, 2005; Kowalkowski, 2011; Dittmer, 2017)
- Difficulty in communicating the value of the product to the customer (Hinterhuber, 2008a; Hinterhuber and Bertini, 2011; Michel and Pfäffli, 2012)
- Habit of using traditional pricing methods (Hinterhuber, 2008a; Hinterhuber, 2008b; Indounas, 2009; Kurz and Többens, 2012; Liozu et al., 2012b; Töytäri et al., 2015; Liozu, 2017; Kienzler, 2018)
- High costs and complexity (Nenonen and Storbacka, 2010; Codini et al., 2012; Liozu et al., 2012a; Michel and Pfäffli, 2012; Töytäri et al., 2017)
- Lack of availability of suitable tools (Dutta et al., 2003; Tohamy and Keltz, 2008; Provines, 2010)
- Lack of experience and skills (Töytäri et al., 2017)
- Lack of motivation of the respective department (Nagle and Hogan, 2007; Töytäri et al., 2015; Töytäri et al., 2017)
- Lack of support from top management (Tohamy and Keltz, 2008; Hinterhuber, 2008a; Hinterhuber and Bertini, 2011; Liozu et al., 2012b; Liinamaa et al., 2016)
- Missing data (Töytäri et al., 2015; Kienzler, 2018)
- Product-oriented sales culture (Hinterhuber, 2008a; Hinterhuber and Bertini, 2011; Töytäri et al., 2017)

In the pharmaceutical industry, additional obstacles may even be added for consideration. In pharmacy, VBP epitomizes a "method of drug pricing in which the drug cost is based on the magnitude of benefit it provides to those who use it, and perhaps to society as a whole" (Shaker and Greenhawt, 2018, p. 2). As Garrison et al. (2019, p. 794) emphasized, the value can hardly be judged in therapeutics and treatments: "If a therapy 'cures' a disease that would be fatal in early childhood, an additional question emerges about the value of a full life." This was confirmed by Drummond and Towse's (2019, p. 945) research, who stated that VBP is inappropriate "in the pricing of treatments for ultra-rare diseases". Garner et al. (2017, p. 5) confirmed this by stating that "in the context of pharmaceuticals there is no widely accepted definition of VBP." Further, "VBP for pharmaceuticals has been for years considered superior compared with cost-plus methods of price determination" mainly because "it exhibits heterogeneous understanding" (Jommi et al., 2020, p. 15).

In a more recent investigation on newer obstacles to the implementation of VBP, four additional obstacles were found. These new obstacles are the non-holistic pricing approach, the fear to lose customers, the lack of value recognition and the inconsistency in execution (Steinbrenner, 2020).

2.4 Research Gaps

The main research gaps this study addressed were the lack of cross-industry focus of the impediments on VBP. Most of the currently available research was focused on the obstacles themselves without any scale or degree of their impact by industry. It would be interesting to identify the degree how strongly the barriers truly prevent or impede an implementation of VBP. Further, no available study has yet focused on the evaluation of an implementation of value-based pricing in German companies in particular. The German economy is of high relevance in Europe and an in-depth analysis of the German market with its industries may be needed. In addition, no available study has

yet focused on the consumer perspective and the business perspective of an implementation of value-based pricing simultaneously. Furthermore, very recent studies about the obstacles to implement VBP lack in literature. Most studies identifying the obstacles to implement VBP were published before 2017, making an updated assessment highly necessary. This study addressed these research gaps by providing a holistic approach to identify and scale the industry-specific obstacles to an implementation of value-based pricing both from a customer-based and a company-based perspective.

3 METHODS AND MATERIAL

3.1 Methodology

As a methodological choice to this study, a mixed-methods research design has been used. On the one hand, a mono method quantitative design was taken by using a quantitative online questionnaire as a consumer study. On the other hand, by using a qualitative data collection method in conducting expert interviews, rather a mono method qualitative design was utilized, leading to a mixed-methods research design based on the definition of Saunders and Tosey (2013). The time horizon of this research study utilized both a cross-sectional as well as a longitudinal research approach.

3.2 Hypotheses

The hypotheses used for this research study and their connected research questions are stated below.

RQ_1: In which German industry are the customer-based obstacles to the implementation of value-based pricing the largest?

- H_0: The customer-based obstacles to an implementation of value-based pricing in the technology industry are higher than or the same as in other analyzed industries.
- H_1: The customer-based obstacles to an implementation of value-based pricing in the technology industry are lower than in other analyzed industries.

Research question RQ_1 will be responded to by using van Westendorp's Price Sensitivity Meter (van Westendorp, 1976).

RQ_2: Are there significant differences between the obstacles in the industries analyzed?

- H_0: There is no significant difference in the distributions of the obstacles between the industries analyzed.
- H_1: There is a significant difference in the distributions of the obstacles between the industries analyzed.

Research question RQ_2 will be responded to by using the statistical Kruskal-Wallis H test.

3.3 Industry Focus

The objectives of this study were to provide an evaluation of customer-based barriers to implement VBP as well as to derive an assessment of the degree or weight of the specific barriers by industry. Thus, four industries needed to be investigated in which barriers have already been identified by researchers. Therefore, the four industries investigated in this research paper were the technology industry, the travel & tourism industry, the retail and consumer goods industry and the pharmaceutical industry in Germany.

For each of these industries, one representative product was chosen. The prerequisite for this product was that each survey participant had already, at least once, purchased this product in the past. Therefore, specific products were chosen to increase the likelihood that all survey respondents were able to provide a response to the associated questions in the survey. For the technology industry, the smartphone was selected as the product with a very high likelihood that survey participants that use the online survey of this study were familiar with a device like a smartphone.

For the travel & tourism industry, the rental car was chosen. The idea was, again, to achieve a very high likelihood for previous experiences with the product among survey participants. For the retail industry, the winter coat was chosen for the German market, as it was very likely that every German citizen older than 18 years had purchased one in the past. Further, for the pharmaceutical industry, a basic representative product was used with the headache-relieving pills where, in our belief, the likelihood was the highest that each participant had bought some before.

The industry focus was chosen to be broad intentionally. This was done in order to be able to derive generalizable results and compare the obstacles in four completely unrelated industries and to see whether there are differences. A summary of the chosen German industries with previous research on the obstacles to implement VBP along with the representative product selected for this study is found below.

1. Technology industry (Töytäri et al., 2015; Liinamaa et al., 2016; Kienzler, 2018). Representative product in this study: Smartphone.
2. Travel & tourism industry (Collins and Parsa, 2006; Hung et al., 2010). Representative product in this study: Rental car (rental for 1 week).
3. Retail and consumer goods industry (Codini et al., 2012). Representative product in this study: Winter coat.
4. Pharmaceutical industry (Provines, 2010; Dittmer, 2017; Garner et al., 2017; Garrison and Towse, 2017; Danzon, 2018; Shaker and Greenhawt, 2018; Garrison et al., 2019; Parmar et al., 2019; Jommi et al., 2020). Representative product in this study: Headache-relieving pills.

3.4 Data Collection Methods

In order to respond to research questions RQ_1 and RQ_2, both quantitative and qualitative data were collected. The quantitative data was collected with an online questionnaire in a cross-sectional time horizon, addressing the consumer perspective of prices in the four main industries investigated. In the online questionnaire survey, 792 German consumers responded, and a mixed form of quota sampling and convenient sampling was applied. The quantitative data was collected between October 2019 and February 2020. Consumers were asked about their willingness-to-pay for the selected product from each of the four industries. Questions were stated to ensure a proper analysis of their price sensitivity and willingness-to-pay based on van Westendorp's Price Sensitivity Meter (van Westendorp, 1976). The analysis for RQ_1 was conducted in SPSS Statistics v. 26 and Microsoft Excel 2016.

For RQ_2, the idea was to delve deeper into the daily business of pricing practitioners, to investigate realistic scenarios of the usage and implementation of VBP. According to Flick et al. (2008), qualitative data is most useful for analyzing the daily business of an interviewee. Thus, in the qualitative data collection process of this study, semi-structured expert interviews (SSI) were conducted, reflecting the advantages of flexibility during the interview to be open to unexpected topics or issues (Adams, 2015).

The qualitative data was collected in a longitudinal time horizon, as expert interviews were conducted over a time span of several months in a small number with constant adaptations of the expert interview guideline. This approach reflects a grounded theory methodology (Strauss and Corbin, 1994). The telephone interview approach was chosen due to the physical distribution of the interviewed pricing experts across Germany and because of mandatory limitations due to the corona virus precautions imposed by the German government in spring 2020. A purposive selection method was used to collect knowledge from pricing experts. In total, 20 pricing experts from four different industries were interviewed. The sample size 20 was utilized because responses started to repeat consistently after the first 10 to 12 interviews. Therefore, it was very likely to state that responses would even further repeat and overlap if more interviews had been conducted.

Tab. 1: Overview of interviewed experts

Expert	Industry	Company type	Company size by number of employees
1	Pharmacy	Consulting	50
2	Retail	Consulting	1,000
3	Technology	Industry	140,000
4	Retail	Consulting	600
5	Technology	Consulting	70
6	Technology	Consulting	40
7	Retail	Consulting	50
8	Technology	Consulting	20
9	Technology	Consulting	5
10	Travel & Tourism	Consulting	5
11	Travel & Tourism	Consulting	12
12	Pharmacy	Industry	75
13	Technology	Industry	25
14	Technology	Industry	10
15	Retail	Industry	1,500
16	Retail	Industry	105
17	Pharmacy	Industry	60,000
18	Travel & Tourism	Industry	1,500
19	Travel & Tourism	Industry	750
20	Pharmacy	Industry	120

Source: Authors' qualitative data collection ($n = 20$)

The pricing experts were partially from consulting companies with their clients being companies from one of the four industries, or directly pricing representatives from industrial companies from one of the four industries. An overview of the interviewed pricing experts with their industry, company type and size is shown in Tab. 1.

As one part of the interview, the experts were asked to evaluate the fourteen most significant obstacles defined in the literature review on a slightly adapted Likert scale from 1 (strongest obstacle) to 5 (weakest obstacle) based on their experience (Likert, 1932). This evaluation was a basic pillar in the response to RQ_2. The qualitative data was collected in German language, coded by topic and context in MAXQDA and then translated, based on the qualitative content analysis guideline by Mayring and Brunner (2009). The data analysis tools employed in the scope of this research study are described in the following chapter.

3.5 Data Analysis Tools

3.5.1 Data Analysis Tool for RQ_1

In order to respond to research question RQ_1, van Westendorp's price sensitivity meter was utilized (van Westendorp, 1976). By using van Westendorp's tool, the subsequent six values could be generated for each of the four products (Ceylana et al., 2014):

- Optimum price point (OPP, intersection of 'too cheap' and 'too expensive' curves),
- Indifference price point (IDP, intersection of 'cheap' and 'expensive' curves),
- Point of marginal cheapness (PMC, intersection of 'expensive' and 'too cheap' curves),
- Point of marginal expensiveness (PME, intersection of 'cheap' and 'too expensive' curves),
- Range of acceptable prices (ROAP, range between PMC and PME),
- Gap of IDP and OPP (range between IDP and OPP).

The following assumptions can be made based on van Westendorp's analysis:

1. The narrower the range of acceptable prices, the higher the price sensitivity is among the consumers for that product.
2. The closer the IDP and OPP are, the higher the price sensitivity is among consumers for that product (Reinecke et al., 2009).

It needs be stated that the two previously mentioned assumptions cannot be directly applied to all products from all industries by simply using the absolute numerical value because of potentially large initial price differences between, for instance, a smartphone and a pharmaceutical drug. The absolute value of a consumer's possible range of acceptable prices (ROAP) for a smartphone may be from €500 to €750, i.e., €250, while for the headache pills the ROAP may be from €10 to €15, thus, €5. This may lead to untruthful assumptions like a failed evaluation of price sensitivity between these two products.

Therefore, before creating any conclusive statement about a consumer's ROAP with absolute figures, the ROAP for each product needed to be put into relation. To achieve this, the authors created a relative range of acceptable prices (RROAP). This relative range simply represents the range of acceptable prices (ROAP), calculated as PME − PMC, but with an added denominator being the minuend, PME. Using the point of marginal expensiveness here creates the needed relation to be able to compare the ROAP of two or more products. Therefore, the authors derived the formula 1 stated below to address the first assumption from above:

$$\text{RROAP} = \frac{\text{PME} - \text{PMC}}{\text{PME}} \cdot 100 \quad [\%] \qquad (1)$$

Next, assumption 2 needed to be addressed. For this assumption, the gap between IDP and OPP was calculated, but use of absolute figures could lead to the same issues as with assumption about RROAP (1). Therefore, the gap of IDP and OPP, calculated as IDP − OPP, needed to be put into relation as well by using the denominator being the former minuend, IDP. Thus, the authors derived the formula stated below to address assumption RGIO (2):

$$\text{RGIO} = \frac{\text{IDP} - \text{OPP}}{\text{IDP}} \cdot 100 \quad [\%] \qquad (2)$$

For each of the observed four products from the four different industries, both the RROAP and the RGIO were calculated in % and compared. To reduce complexity within this approach, the mean between RROAP (in %) and RGIO (in %) was taken for each product to give a final percentage value, the Mean Score of Relative Values (MSRV). Thus, the MSRV was calculated as:

$$\text{MSRV} = \frac{\text{RROAP} + \text{RGIO}}{2} \quad [\%] \qquad (3)$$

3.5.2 Data Analysis Tool for RQ_2

Research question RQ_2 was focused on the business perspective and aimed to identify in which industry an implementation of value-based pricing is most difficult. In total, 20 experts from the four analyzed industries were questioned in semi-structured expert interviews. As part of the interview, each pricing expert was asked to evaluate the fourteen most significant obstacles found in the literature review on a slightly adapted Likert scale from 1 (strongest obstacle) to 5 (weakest obstacle).

In order to respond to research question RQ_2, a statistical tool was utilized. To identify the appropriate statistical test, the sample data needed to be categorized. The type of data was ordinal, as ranks between 1 to 5 were given by the pricing experts. To test a potential normal distribution among the collected data, a Shapiro-Wilk normality test was used. Tab. 2 provides the results of the Shapiro-Wilk test, indicating that the significance is far below the level 0.05 for each of the four industries, thus, there was no normal distribution in the data sets. To ensure validity of the stated conclusion regarding normality, the Kolmogorov-Smirnov test was used as well and led to the same outcome.

Tab. 2: Results of the Shapiro-Wilk normality test

	Shapiro-Wilk statistic	Shapiro-Wilk significance
Pharmacy	0.782	< 0.001
Travel & Tourism	0.867	< 0.001
Technology	0.921	< 0.001
Retail	0.909	< 0.001

Source: Pricing expert interviews, $n = 20$

As the distribution of responses to each score by industry did not follow a normal distribution, a non-parametric test was to be used. Further, the differences within unrelated, independent samples were to be investigated for the purpose of responding to RQ_2. Four samples were analyzed (Technology industry, Pharmaceutical industry, Retail industry, Travel & Tourism industry). These are the prerequisites for using a Kruskal-Wallis H test (Vargha and Delaney, 1998). As the mean ranks and distributions between the four samples were investigated between each other, six different individual comparisons needed to be made within the Kruskal-Wallis H test. The level of significance α was 0.05 with a confidence interval of 95%. As $n = 280 > 30$, the asymptotic significance was used instead of the exact significance value. In order to reduce the risk of α error accumulation, a post-hoc Bonferroni adjustment was used within the Kruskal Wallis H test analysis.

4 RESULTS

As discussed in the literature review, it can be stated that the lower a consumer's price sensitivity, the higher the chances for a successful implementation of value-based pricing. This was the basic assumption for research question RQ_1. To respond to RQ_1, the German consumers' price sensitivities were evaluated with van Westendorp's price sensitivity meter. The four values of MSRV (Mean score of relative values) for the four analyzed products were eventually compared to derive a response to RQ_1. The results of the van Westendorp's Price Sensitivity Meter analysis are shown in Fig. 1.

Tab. 3 shows the price points derived from the quantitative data analysis.

As can be seen in Tab. 3, the smartphone, representing products from the technology industry, showed the lowest price sensitivity among the four products observed based on van Westendorp's price sensitivity meter. The winter coat showed a similar but slightly lower mean score of relative values and ranked 2nd of the products with the lowest price sensitivity. The headache pills representing products from the pharmaceutical industry showed a higher price sensitivity among consumers than a rental car. This concludes that consumers are very price-focused when choosing a rental car with a high sensitivity towards prices and that they are likely to compare prices before their purchasing decision is made. Further, consumers are even more price sensitive when choosing a box of headache-relieving pills. Thus, RQ_1 can be responded to: In which German industry are the customer-based obstacles to the implementation of value-based pricing the strongest?

The largest customer-based obstacles to an implementation of value-based pricing seem to be in the pharmaceutical industry.

H_0: The customer-based obstacles to an implementation of value-based pricing in the technology industry are higher than or the same as in other analyzed industries.

Based on this study, German consumers show a lower price sensitivity for technological products than to other analyzed products. Thus, H_0 can be rejected.

To respond to research question RQ_2, the interviewed pricing experts evaluated the 14 most frequently named obstacles to implement VBP on the adjusted Likert scale with values ranging from 1 to 5, with 1 meaning the strongest weight, or the obstacles with the highest relevance in business practice. The results are shown in Tab. 4.

When the mean scores and mean ranks of all 14 obstacles were calculated by industry, the

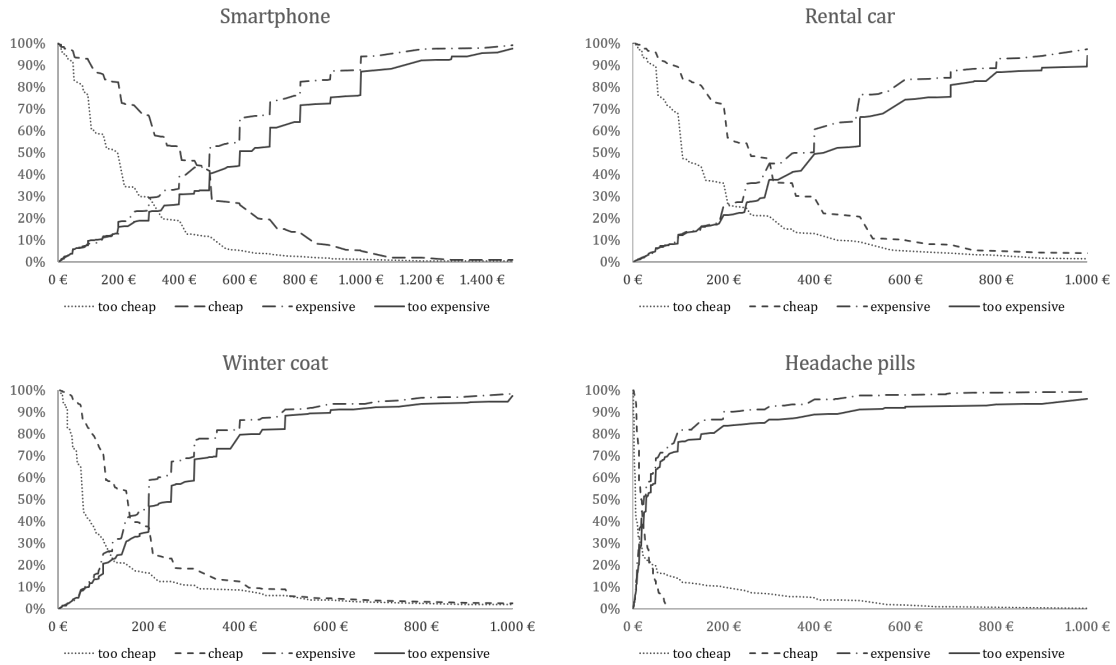

Fig. 1: van Westendorp's Price Sensitivity Meter applied to the four products
Source: Questionnaire survey, 2019/2020, $n = 792$

Tab. 3: Price points of the four investigated products

Price points	Smartphone (technology)	Rental car (travel & tourism)	Winter coat (retail)	Headache pills (pharmaceutical)
Optimum price point (in EUR)	329	247	120	18.00
Indifference price point (in EUR)	477	302	158	20.20
Point of marginal cheapness (in EUR)	301	209	112	14.50
Point of marginal expensiveness (in EUR)	499	308	198	23.20
Range of acceptable prices (in EUR)	301–499	209–308	112–198	14.50–23.20
Relative range of acceptable prices (RROAP) (in %)	39.7	32.1	43.4	37.5
Relative gap of IDP and OPP (RGIO) (in %)	31.0	18.2	24.1	10.9
Mean score of relative values (MSRV) (in %)	35.4	25.2	33.8	24.2
Rank of lowest price sensitivity based on MSRV	1	3	2	4

Source: Questionnaire survey, 2019/2020, $n = 792$

following results could be found. In Tab. 5, the column Number of ratings was derived from the number of experts multiplied by the number of obstacles (14) where a rank was asked to be given by the expert. Further, the mean score and the mean rank for each of the industries was calculated. In total, the 14 obstacles were ranked by 20 experts, resulting in 280 scores. These 280 scores served as the new sample size n for the statistical analysis conducted here.

For value clarification, it must be stated that 'obstacles are lower' refers to the fact that the mean score of obstacles is 'higher'. That is because the strongest obstacle received the lowest value 1, while the weakest obstacle was evaluated with the highest value 5. Therefore, the higher the obstacles in reality, the lower the mean score of obstacles in this analysis. Based on Tab. 5 it can, therefore, be stated that in the pharmaceutical industry, the mean score

Tab. 4: Industry-specific obstacles to the implementation of value-based pricing

Rank	Technology	Travel & Tourism	Retail	Pharmacy
1	Missing data (1.80)	Habit of using traditional pricing methods (1.25)	Difficulties in assessing the customer perceived value (1.20)	Customer's feeling of injustice (1.25)
2	High costs and complexity (2.03)	Danger of customer loss (1.25)	Different perception of value by seller and buyer (1.50)	Difficulty in communicating the value of the product to the customer (1.25)
3	Habit of using traditional pricing methods (2.20)	Customer's feeling of injustice (1.25)	Lack of experience and skills (1.50)	Different perception of value by seller and buyer (1.25)
4	Difficulties in assessing the customer perceived value (2.60)	Difficulties in assessing the customer perceived value (1.50)	Missing data (1.53)	Missing data (1.25)
5	Lack of experience and skills (2.69)	Lack of experience and skills (1.50)	Habit of using traditional pricing methods (2.33)	Lack of availability of suitable tools (1.25)
6	Difficult market segmentation (2.69)	Difficulty in communicating the value of the product to the customer (1.75)	Difficult market segmentation (3.00)	Habit of using traditional pricing methods (1.25)
7	Lack of availability of suitable tools (2.80)	Product-oriented sales culture (1.75)	Difficulty in communicating the value of the product to the customer (3.00)	Lack of support from top management in implementing value-based pricing (1.50)
8	Difficulty in communicating the value of the product to the customer (2.80)	Lack of motivation of the respective department (2.00)	Product-oriented sales culture (3.40)	Lack of experience and skills (1.50)
9	Lack of motivation of the respective department (3.03)	Lack of support from top management in implementing value-based pricing (3.50)	High costs and complexity (3.50)	Product-oriented sales culture (1.75)
10	Product-oriented sales culture (3.14)	Missing data (3.50)	Lack of support from top management in implementing value-based pricing (3.80)	Danger of customer loss (1.75)
11	Different perception of value by seller and buyer (3.25)	Different perception of value by seller and buyer (3.75)	Lack of motivation of the respective department (4.20)	Difficulties in assessing the customer perceived value (3.00)
12	Lack of support from top management in implementing value-based pricing (3.31)	Lack of availability of suitable tools (4.00)	Lack of availability of suitable tools (4.27)	High costs and complexity (3.25)
13	Customer's feeling of injustice (3.49)	High costs and complexity (4.25)	Danger of customer loss (4.27)	Difficult market segmentation (4.00)
14	Danger of customer loss (3.80)	Difficult market segmentation (5.00)	Customer's feeling of injustice (4.40)	Lack of motivation of the respective department (4.00)

Source: Pricing expert interviews, $n = 20$

Tab. 5: Mean scores and mean ranks of obstacles by industry

Rank	Industry	Experts	Number of ratings	Mean score	Mean Rank
1	Pharmacy	4	56	2.02	98.48
2	Travel & Tourism	4	56	2.59	135.11
3	Technology	7	98	2.83	152.52
4	Retail	5	70	2.99	161.60

Source: Pricing expert interviews, $n = 20$

was lower than in the other three industries. To determine if the differences in distributions were statistically significant, a statistical tool was needed to compare the mean ranks and distributions of obstacles to VBP among the different industries. A summary of the independent samples Kruskal-Wallis H test is shown in Tab. 6.

Tab. 6: Summary of Independent samples Kruskal-Wallis H test

Total N	280
Test Statistic	23.048*
Degree of Freedom	3
Asymptotic Significance (2-sided test)	< 0.001

Note: *) The test statistic is adjusted for ties.
Source: Pricing expert interviews, $n = 20$

It needs to be added here that the risk of α error accumulation existed for this type of test, as $\alpha = 0.05$ was taken for each individual test between any two samples. In total, six tests were conducted, leading to a total accumulated α error of $0.05 \cdot 6 = 0.3$. Thus, by simply looking at the significance values of the Kruskal-Wallis H test, the robustness of the test could hardly be increased. In order to reduce the risk of α error accumulation, a post-hoc Bonferroni adjustment was used to find an adjusted significance value for each of the six tests between the four groups and, thus, enhance robustness of the method. This was done by using an adjusted $\alpha = 0.05/6 = 0.0083$ for each test. Tab. 7 provides an overview of the test results of the Kruskal-Wallis H test for the four independent samples, including a post-hoc Bonferroni correction for the adjusted significance value determination.

These results could, therefore, be interpreted and conclusions for H_0 could be drawn. The Bonferroni-adjusted significance levels for each of the six conducted tests now need to be compared to the significance threshold of $p = 0.05$. If the adjusted significance value is lower than 0.05, H_0 must be rejected. If the adjusted significance level is higher than 0.05, H_0 cannot be rejected. Tab. 8 illustrates the conclusions for the null hypothesis.

In conclusion, as in at least one Sample1-Sample2 comparison the adjusted significance level was lower than 0.05, H_0 can be rejected. There seemed to be differences in the distributions between the analyzed industries. Particularly, the differences between the Pharmacy-Technology and the Pharmacy-Retail pairs were statistically significant. A response to research question RQ_2 could, thus, be given:

RQ_2: Are there significant differences between the obstacles in the industries analyzed? Based on the Kruskal-Wallis H test analysis of the 280 scores given by the 20 interviewees from four different industries, it can be stated that there are significant differences between the distributions of evaluated obstacles, namely within the pairs Pharmacy-Technology and Pharmacy-Retail.

H_0: There is no significant difference in the distributions of the obstacles between the industries analyzed. The Kruskal-Wallis H test analysis with Bonferroni adjustment has shown that there is a statistically significant difference in the distributions of the evaluated obstacles between the industries analyzed. Therefore, the null hypothesis can be rejected.

Tab. 7: Results of Kruskal-Wallis H test with Bonferroni correction

Sample 1-Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Significance	Adj. Sig.*
Pharmacy-Travel & Tourism	−36.625	15.032	−2.436	0.015	0.089
Pharmacy-Technology	−54.038	13.324	−4.056	< 0.001	< 0.001
Pharmacy-Retail	−63.118	14.260	−4.426	< 0.001	< 0.001
Travel & Tourism-Technology	17.413	13.324	1.307	0.191	1.000
Travel & Tourism-Retail	26.493	14.260	1.858	0.063	0.379
Technology-Retail	9.080	12.448	0.729	0.466	1.000

Notes: *) Significance values have been adjusted by the Bonferroni correction for multiple tests.

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same. Asymptotic significances (2-sided tests) are displayed. The significance level is 0.05.

Source: Pricing expert interviews, $n = 20$

Tab. 8: Kruskal-Wallis H test with Bonferroni correction and conclusion for null hypothesis

Sample 1-Sample 2	Significance	Adj. Sig.*	Adj. Sig.* $\leq$ 0.05?	Conclusion for H_0
Pharmacy-Travel & Tourism	0.015	0.089	No	H_0 not rejected
Pharmacy-Technology	< 0.001	< 0.001	Yes	H_0 rejected
Pharmacy-Retail	< 0.001	< 0.001	Yes	H_0 rejected
Travel & Tourism-Technology	0.191	1.000	No	H_0 not rejected
Travel & Tourism-Retail	0.063	0.379	No	H_0 not rejected
Technology-Retail	0.466	1.000	No	H_0 not rejected

Notes: *) Significance values have been adjusted by the Bonferroni correction for multiple tests.

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same. Asymptotic significances (2-sided tests) are displayed. The significance level is 0.05.

Source: Pricing expert interviews, $n = 20$

5 DISCUSSION

The results of this study were extracted from the first author's doctoral dissertation about the obstacles to an implementation of value-based pricing.

Previous studies have already focused on the benefits and the future potential of value-based pricing along with the identification of certain obstacles to the implementation of VBP (e.g. Hinterhuber, 2008a; Hinterhuber and Bertini, 2011; Michel and Pfäffli, 2012; Töytäri et al., 2015; Töytäri et al., 2017; Nagle and Müller, 2018; Reynolds, 2018). The advantages of using VBP successfully have widely been described as value maximization (Jommi et al., 2020), higher effectiveness (Reynolds, 2018), granting consumer surplus to the producer (Danzon, 2018), and the superiority in comparison to other pricing method alternatives (Drummond and Towse, 2019). Researchers have, therefore, recommended to consider an implementation of VBP not only because of the large profit potential (Hünerberg and Hüttmann, 2003; Piercy et al., 2010).

Some barriers to the implementation of VBP in industry-specific contexts have been identified by previous studies, however, these studies usually focused on the barriers only in specific industries: Töytäri et al. (2015), Liinamaa et al. (2016) and Kienzler (2018) identified barriers in the technology industry, while Collins and Parsa's (2006) and Hung et al.'s (2010) research focused rather on the travel and tourism industry. The retail or consumer goods industry as market for implementing VBP was investigated by Codini et al. (2012). Lastly, the pharmaceutical industry has received very recent interest in terms of the obstacles to implement VBP by Provines (2010), Dittmer (2017), Garner et

al. (2017), Garrison and Towse (2017), Danzon (2018), Shaker and Greenhawt (2018), Garrison et al. (2019), Parmar et al. (2019), and Jommi et al. (2020). Thus, conclusions about the obstacles to implement VBP have been ambiguous and highly industry-specific. Barriers that were found by researchers in the pharmaceutical industry may not be valid barriers in the technology industry, and vice versa.

The theoretical contribution of this research study was, thus, the comparison of obstacles to implement VBP among industries which had not yet been drawn in previous research studies, enhancing the relevance of this paper and opening up further research potential. The customer-based obstacles to implement VBP based on one of the underlying principles of VBP, price sensitivity, has never been compared among four products from four different German industries. It was found that for the technology industry, customer-based obstacles to implement VBP were lower than for the other industries investigated.

Furthermore, the evaluation of the degree of existing obstacles to implement VBP in these four industries by interviewing pricing business practitioners had not yet been focused upon. This study has evaluated the degree of the obstacles and how strongly they impact businesses in four different industries, making the barriers comparable. It was found through the Kruskal-Wallis H test that the distributions of the obstacles vary significantly across industries. This allows the conclusion that broad recommendations to overcome certain barriers are not applicable across industries and may rather apply for certain industries solely. In addition, the connection of the consumer perspective as well as the business perspective through collecting both quantitative and qualitative data in the same research study about VBP obstacles was lacking so far. Most research studies either focused on the obstacles to implement VBP in one specific industry and from one perspective, either consumer or business, making it hardly possible to compare or evaluate barriers on a cross-industry basis. These newly discovered insights epitomize a significant theoretical contribution.

Still, the empirical results reported in this study must be considered in light of some limitations. For each industry, only one product was used as a representative product. This one product then led to conclusive statements and recommendations for the whole industry, which represents a limitation. In retail, the winter coat was used. Would the results be similar if instead of a winter coat, an FMCG product would have been chosen? Or in the technology industry, would a flatscreen TV or a power bank have led to similar results as the analysis of the smartphone has? These are interesting questions that could not be responded to in the scope of this study and they provide large potential for future research.

Second, the quantitative empirical data collected in the scope of this study were 792 German inhabitants, spread across Germany as online panels were used for the data collection. The very broad distribution across Germany did not take into account region-specific characteristics, such as a possibly different willingness-to-pay between metropolitan and rural areas in Germany. Further, in research question RQ_1, consumers were asked about their willingness-to-pay for four different products. Consumer-specific characteristics like a possible affinity towards technology products and, thus, a higher willingness-to-pay were not considered.

Besides, for research question RQ_2, only the 14 most frequently named obstacles from literature were investigated. Pricing experts from the four industries investigated were asked to evaluate and rank the weight and frequency of these obstacles in business practice. However, there may have been other obstacles neither evaluated nor mentioned by the pricing experts interviewed. For the scope of this study, only a reduced number of obstacles to the implementation of value-based pricing could be taken to the experts, representing another research gap.

After the investigation and interpretation of the results, a critical view of these results needs to be taken to put them into perspective. First, the data collection timeframe needs to be reviewed. The quantitative data was collected mostly in autumn and winter of 2019, where an economic boom with economic success swept

Germany. The qualitative data, however, was collected in the spring of 2020, where the emergence of the new CoVid-19 coronavirus tremendously impacted the worldwide economy and led to a moderate economic recession. Therefore, the quantitative data collection and the qualitative data collection were conducted in different economic stages, one during a boom and one during a moderate recession. These unequal economic circumstances may have influenced the collected data and possibly led to diverging situational behavior or responses.

Second, the statement that only a very low number of companies already utilized value-based pricing may possibly be flawed. In research as well as in business practice, there is no distinct point defined from where value-based pricing starts. It may be the case that several companies have already implemented value-based pricing into their corporate decision-making without knowing it or without actually having devoted resources to the implementation. That is yet to be researched.

Third, in response to research question RQ_1, the authors have created a formula to determine the RROAP and MSRV. These formulas and eventual values are likely to reflect the quantitative data collected; however, they are not historically proven or widely accepted standards. It would be interesting to see whether these formulas reflect reality when applied in other studies or whether they require possible adjustments in the future.

6 CONCLUSION

Several pricing methods have been identified in literature and are used by business practitioners and companies across all industries. In today's literature, value-based pricing is seen as the most profitable pricing method available, while frequently used methods like cost- or competition-based pricing seem to have tremendous disadvantages. Cost-based pricing can lead to unexploited profit margins and pricing too low, while competition-based pricing is likely to lead to downward price spirals, decreasing profits in the long run. Both pricing methods have one major mistake in common, neglecting the customer perceived value. Starting the pricing process on the customer side instead of the business or manufacturer's side can lead to significant conclusions if a proper customer analysis is conducted.

Value-based pricing epitomizes the process of pricing products based on the customer perceived value and this method can lead to higher average prices which are still paid by the consumer, as the consumer perceives them as fair, value-reflecting prices. Therefore, value-based pricing allows companies to exploit different consumer segments' willingness-to-pay, increasing the possibility of higher sales figures even when prices are increased.

In business practice, cost- and competition-based pricing seem to be relatively easy to implement, while VBP seems to be implemented only rarely by companies. The reasons for this observation are that several barriers to the implementation of VBP run rampant. These obstacles include organizationally induced barriers, externally induced barriers, managerial biases, customer-based barriers, and very specific barriers in different industries.

This research study has taken a deeper look into the topic of value-based pricing and the obstacles impeding its successful implementation. Questionnaire survey ($n = 792$) among German consumers was collected as well as 20 semi-structured interviews with German pricing experts were conducted. In research questions RQ_1 and RQ_2, the industry-specific barriers to an implementation of value-based pricing were investigated.

First, in RQ_1, the consumer side was analyzed. The outcome was that German consumers show a lower price sensitivity for technological products than to other products from the analyzed retail, pharmaceutical or travel & tourism industries. Therefore, the conclusion was made that German consumers are not stable in their price sensitivity across indus-

tries, but rather more targetable for VBP by companies operating in technological markets in comparison to other industries. Further, this research has shown that the pharmaceutical industry entails the biggest customer-based obstacles to a successful implementation of value-based pricing.

Second, in RQ_2, the business side was analysed and pricing experts were asked to rank the 14 most common obstacles to the implementation of VBP based on their perceived weight and frequency in business practice. A statistical non-parametric Kruskal-Wallis H test with Bonferroni adjustment was employed to test the statistical relevance and to see whether the distributions of the evaluated obstacles to value-based pricing are different between the industries analyzed. The derived conclusion shows that the distributions of the evaluated obstacles differ across industries, suggesting that the obstacles vary greatly in their weight or degree depending on the industry. Again, the pharmaceutical industry was found to experience the most severe obstacles also from a company perspective.

The authors of this study highly encourage researchers to devote resources to the highly relevant trend towards the most profitable pricing method. Every piece of research aids the facilitation process of the implementation of VBP into business practice and contributes to literature on a topic that has not yet received the attention it certainly merits.

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THE MEDIATING ROLE OF BIG DATA TO INFLUENCE PRACTITIONERS TO USE FORENSIC ACCOUNTING FOR FRAUD DETECTION

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ABSTRACT

Globally, the financial industry in the recent times has witnessed various forms of fraudulent activities in the financial markets creating dilemma for the professionals, and the auditors who owns responsibility of ensuring accuracy and transparency. This article aims at finding the emergence of Big Data technology to fraud and forensic accounting by practitioner accountants in in India. A research model and hypotheses has been developed to examine the relationship between the awareness level of forensic accounting, Big Data and intentions to use it for fraud detection using structural equation modeling. Results indicate that awareness of forensic accounting has a positive influence on practitioners' intentions to its use for fraud detection. Big data technologies mediate the relationship between awareness and intentions to use for fraud detection. The results of the study are useful in implementation of Big Data technologies into the forensic accounting domain that can facilitate combating fraud.

KEY WORDS

big data, fraud, forensic accounting, structural equation modeling

JEL CODES

C1, C3, M4, O3

1 INTRODUCTION

In the recent times, financial industry has been tormented by continuous influxes of financial crimes. The industry has witnessed various forms of fraudulent activities in the financial market that inter-alia include insider-trading scandals in mergers and acquisitions (Sharma and Pulliam, 2009), manipulations in the public offer of securities (Hull et al., 2013), the stock options scandals (Janney and Gove, 2017; Jory et al., 2015), rampant frauds in mortgage industry resulting in a major financial crisis of 2007–2008 (Patterson and Koller, 2011), Ponzi

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schemes in major investment funds (Cortés et al., 2016). Nature and forms of these frauds are growing at large pace creating dilemma for the professionals, particularly the auditors of the companies who are bestowed with the responsibility of ensuring fairness, accuracy and transparency.

Fraud, as such, is a complex and elusive concept. It can be defined to include "the obtaining of goods and/or money by deception" or "a human endeavour, involving deception, purposeful intent, intensity of desire, risk of apprehension, violation of trust, rationalization, etc." (Kenny, 1985). Fraud can occur in various ways ranging from misuse of trust or false representations to take an undue advantage or a criminal deception (Gupta and Gupta, 2015) that creates significant implications for stakeholders. Various connotations like violation of Internal Revenue code by publicly traded corporations or misbehaviours of financial market participants to cheat the concerned parties have been quoted (Reurink, 2018). In current times, the frauds are also closely linked to the IT domain given the massive use of IT enables business activities by corporations. In various contexts like curbing frauds risk, corporate governance, corporate surveillance, use of intelligent systems have been suggested by experts and analysts.

Fraudulent activities in the industry can contribute to the collapse of corporations or even be instrumental in a national or global financial crisis as happened in 2007–2008. Most countries were affected directly or indirectly by lack of credit and falling property prices. The imbalances and turbulence in real and national economy are felt most in the emerging economies and it depends on their ability to innovate and complete resistance to fraud (Bănărescu, 2015). The instances of corporate frauds are not confined to an industry or region e.g., Satyam Computers, India in IT, WorldCom, USA in telecommunication, Paramalat, Italy in dairy manufacturing Enron, USA in energy, Punjab National Bank, India in banking etc.

Detection of fraud has become a serious challenge in today's complex business scenario (Abdallah et al., 2016; Mouawi et al., 2019). With the upsurge in the number of frauds in the corporate world, expert systems for efficient fraud detection mechanism has become an imperative. The instances of corporate frauds are not limited, and the focus of the management and auditors is to observe the initial alarming signs and prevent for occurrence at the early stage.

Increasing frauds relating to financials has become a considerable threat among organizations and countries around the globe. An average loss of 5 percent of revenue of an organization every year on account of fraud was anticipated by the Association of Certified Fraud Examiners. According to the findings and estimates of the ACFE report (2014), a typical organization loses 5% of revenues each year to fraud and this potential projected loss amounts to nearly $4 trillion on the global level. The smaller organizations with less than 100 employees face more fraud risks due to financial statement fraud, payroll, and cash larceny schemes than at their larger counterparts. It was also reported that 75% of the cases with small businesses were detected by methods like tip, management review and internal audit. However, the increasing volume of data needs continuous monitoring, identifying inconsistencies in the data set or behavioral patterns of potentially fraudulent activities. These have accentuated scholars as well as investigators to understand the awareness level of the companies about the use of big data techniques for the purpose of prediction, prevention, and detection of fraud.

The information technology has substantially fueled the financial crimes in current times (Krahel and Titera, 2015; Moffitt and Vasarhelyi, 2013; Vasarhelyi et al., 2015). This creates implications for the accountants to cope up by developing advanced technology tools that equip them to prevent and detect frauds and minimize the aftereffects on the stakeholders. Rising white collar crimes have plagued the financial markets all over the world and have drawn attention towards fraud detection through a relatively new field i.e. forensic accounting (Chukwunedu and Okoye, 2012; Morris, 2010).

The use of forensic accounting services has developed as a significant factor in accounting firms (Morris, 2010). Forensic accounting as a field provides a deep insight relating to the frauds that take place along with preventing frauds and taking anti-fraud measures. Forensic accounting includes fraud audit where audit of the books of accounts is done in order to investigate and come out with evidence of the manipulation or fraud committed. However, the discipline of forensic accounting should not be interpreted as solely used for fraud detection work (Williams, 2006). "Forensic accounting is a challenging discipline that substantially interacts with auditing, economics, finance, information systems, and law" (Morris, 2010). The role of forensic accounting has become a vital area in the discipline of accounting, which takes care of examining the fraud, controlling corruption and bribery, extends legal support, looks after expert witnessing and cybersecurity (Hassink et al., 2010; Rezaee and Wang, 2019). It is a discipline that uses skills and techniques of other disciplines like law, accounting, auditing in order to analyze and finding solutions to the problems like damages, encroachment, value maintaining and value-adding for legal purposes (Dong, 2011).

Moffitt and Vasarhelyi (2013), Vasarhelyi et al. (2015) and Appelbaum et al. (2017) are of the opinion that various stakeholders in the accounting domain like practicing accountants, auditors, analysts, researchers etc. will endure advantage if they get more knowledge about big data. They also ascertain that there are audit clients increasingly using big data, which they connect to the necessity for auditors to follow suit. Krahel and Titera (2015) argue that the prescribed principles of accounting and auditing are not in tandem with technological change and still lay emphasis on the old ways of analyzing the data through sampling, accumulation, collection and presentation. Contrarily, through the use of big data, auditors are empowered to scrutinize the manner and process in which data is being generated, including full population testing, thus adding value to the profession of accounting and auditing and to their clienteles (Bhatia and Mittal, 2019). The information literacy created through Big Data enables the professionals to make decisions strategically and managing the risk in advance, moving towards a better future.

It has been widely discussed by the educators and practitioners that Big Data has a significant role in accounting and specifically, forensic accounting. Given the increasing number of business transactions and consequential spurt in accounting entries, the nature of auditor's job in forensic accounting changes dramatically with use of big data. Globally, the education systems have addressed to the demand forensic accounting education by including it in the curriculum of various courses and are making efforts to integrate the big data content with forensic accounting. However, the evidence of the use of Big data techniques to fraud and forensic accounting is very scarce, especially in small organizations. Possibly these firms refrain from the use of modern techniques and technology that are far ahead of those adopted by their client firms (Alles, 2015). This study highlights the importance of Big data and forensic accounting for the practitioners in the business. Secondly, the study presents literature relating to the existing work emphasizing the increasing demand and importance of Big data in forensic accounting due to the rising number of fraud cases in the present times. Finally, the study examines the awareness level of Big Data and its applicability in various sub-domains of fraud and forensic accounting using survey of practitioner accountants in the Delhi-National Capital Region (NCR) region of India. Our study assumes that the awareness of Big data techniques in forensic accounting for the detection of fraud increases the intentions to adopt these technologies by auditors and practitioners. We hypothesize that Big data technologies positively mediate the relationship between awareness and the practitioner's intentions to use forensic accounting techniques in fraud detection.

2 LITERATURE REVIEW

Primarily the management of the organization is responsible for fraud detection while the auditors have a secondary role. However, auditors are expected to carry out sessions and meetings for brainstorming and understanding the business deeply and come out with the possibility of an occasion of fraud. With the introduction of SAS 99, the accountability of auditors was increased and necessitated the auditors to pay attention to the red flags when auditing the accounts of a business. A significant point to note here is that simply the existence of red flags does not ensure the presence of fraud. They are just the hints or indicators of something happening. To be able to take charge of the prevention of fraud, identifying these indicators is a must (Ruankaew, 2013). Existence of just a sole red flag makes auditors alert and sensitive towards the possibility of the presence of a fraud (Krambia-Kapardis, 2002; Hassink et al., 2010) and enables them to reach the root cause of the fraud. Red flags are considered as significant indicators for early fraud detection, but it has been found that they are infrequently used by auditors (Dewi, 2017). These red flags precisely indicate and signify the probable embezzlement and mindset of committing fraud. Red flags are occurrences and circumstances demonstrating opportunity and direction towards potential or actual fraud occurrences. It has been examined time and again throughout the fraud cases occurring across the world that fraud takes place only after it gives some signals. The 2014 ACFE report, conducted on 1483 occupational fraud cases, concluded that at least one red flag was identified in 92% of cases, and two or more in 64% of cases.

Many researchers have discussed the expectations from the auditors, the audit expectation gap (AEG) and their role in fraud detection (Okafor and Otalor, 2013; Ruhnke and Schmidt, 2014; Salehi, 2016; Nickson and Neikirk, 2018). Although, according to IAASB Annual Report (2009), the management of the entity itself is responsible for the fraudulent activities, and the auditor's role is limited and accountable for obtaining reasonable assurance that the financial statements are free from any substantial misstatement.

Now-a-days continuously increasing fraud and the inability of auditors to detect fraud has resulted in an increasing demand for forensic accountants (Rezaee and Burton, 1997). Forensic accountants expand the capability of an auditor to detect and catch fraud and act as a bridge to the audit expectation gap (Chukwunedu and Okoye, 2012).

Due to the inability of the traditional system of database management to manage extensive data formats coming in huge volumes, big data technologies have gained the importance and are transforming the way business practices and procedures take place. With the help of big data technologies, firms are able to go for real-time intelligence extracted from a high volume of data. These advanced processes enable the auditors to do comprehensive analysis in order to bring out meaningful insights from the data and hence make evidence-based decisions. They are equipped to handle diverse and voluminous data with incredible promptness in order to provide significant pieces of information for decision making.

Traditionally, when there were limited resources, it was assumed that the auditor possesses the skills and expertise to detect fraud in the books of a company. But, with the velocity of data that is being generated, it has become impossible for professionals to analyze and extract relevant conclusions without the help of big data technologies. Investment by corporate in big data technologies is increasing year on year (Raguseo, 2018). The capacity and speed of analyzing each and every set of data rather than just using a sampling technique for the data enables the auditors to be more confident in the audit conclusions. Especially the accounting firms are now announcing that big data is becoming a progressively significant part of their assurance policies (Akoglu et al., 2013). The distinctiveness of big data is demonstrated when it discovers unexpected patterns (using the gigantic data set) that are not detectable when small samples are used in typical audits.

Understanding big data only in terms of the size of data is misleading (Mittal, 2020a). "Big data divides the world by intent and timing rather than the type of data. The 'old world' is about transactions, and by the time these transactions are recorded, it is too late to do anything about them: companies are constantly 'managing out of the rear-view mirror'. In the 'new world', companies can instead use new 'signal' data to anticipate what's going to happen and intervene to improve the situation". Big Data has the ability to not only analyze the patterns of what has happened in the past but also to predict future happenings (Mittal, 2020b).

Issa and Kogan (2014) argue that the demand for auditors who possess Big Data knowledge to make professional options is rising. In a recent survey conducted by Rezaee and Wang (2019), authors establish that there is a growing interest in Big data/data analytics and Forensic Accounting in practice and education. The authors suggest that the big data and forensic accounting should be integrated in the business curriculum, as the techniques are important in improving forensic accounting education. Gepp et. al. (2018) highlight the limited practice and use of big data techniques in auditing in comparison to other related fields. It is observed from the literature that Big Data can play an important role in forensic and special purpose fraud audits that can be conducted by auditors and practitioners. However, we find a gap to examine the role of big data on intentions of practitioners to adopt forensic accounting. Our study endeavours to provide a significant information about the accounting practitioners in India using big data for forensic accounting practices, which is presently lacking in most of the previous studies.

3 RESEARCH METHODOLOGY

3.1 Research Model

We propose that intentions to adopt forensic accounting coupled with the availability and knowledge of Big Data technologies influence the awareness of forensic accounting on practitioners' intentions to use forensic accounting techniques in fraud detection. In our model, Big Data technologies play a mediating role among the two construct variables i.e., level of awareness of practitioners' and intentions to use forensic accounting techniques in fraud detection. We have used a non-parametric structural equation modeling (PLS-SEM) to examine the relations between the constructs. The evaluation has been carried out in two stages: a measurement model to establish the construct reliability and validity of the constructs and an assessment of the structural model to impute the relationships between the constructs.

We consider Partial Least Squares (PLS) regression/path analysis as SEM tool which is a superior to OLS regression, canonical correlation for analysis of systems of endogenous and exogenous variables developed by Wold et al. (1984). It has the ability to handle both formative and reflective indicators in contrast to other SEM techniques. The advantage of using PLS is that it does not make the assumption of multivariate normality and has ability to handle multi-collinearity among the independents unlike the SEM techniques of LISEREL and AMOS. Further, PLS has no limitations on sample size than the other SEM techniques (Chin and Newsted, 1999; Chin, 1998; Westland, 2007).

3.2 Hypotheses Development

Although it is difficult to manage the enormous data, big data technologies are making out way for professionals to analyze information and extract hidden facts for detection of business frauds. The availability of smarter technologies is enabling the practitioners to use forensic accounting in fraud detection. Big data technologies, that is, the use of data mining techniques contribute in decision making and detecting fraud by the auditors. Data mining has a significant role when it comes to fraud

detection in financial accounting, because it is often useful to discover and extract the hidden patterns in huge collected data (Ngai et al., 2011). Hence the availability of big data technologies enables the practitioners to detect fraud by using forensic accounting techniques (Gepp et al., 2018; Rezaee and Wang, 2019).

H_1: Knowledge of Big data technologies has an insignificant influence on practitioners' intentions to use forensic accounting techniques in fraud detection.

The current revised standards of accounting and auditing define an enlarged role and responsibility of auditors in detecting fraud, but efficient detection of accounting fraud has forever been a tricky deal for accounting profession. Forensic accounting has come into picture as the internal audit system of an organization is not able to identify accounting frauds efficiently.

Forensic accounting as a discipline is relatively new to the practitioners. However, it has come into the limelight due to the rapid increase in frauds over decades. The role of Forensic accounting becomes vital in discovering the frauds which are challenging to detect through mere internal auditing by employing accounting, auditing, and investigative skills (Morris, 2010). But mere awareness of forensic accounting tools and procedures does not ensure the intentions of practitioners to use forensic accounting for prevention and detection of frauds.

H_2: Awareness of forensic accounting has an insignificant influence on practitioners' intentions to use forensic accounting techniques in fraud detection.

An auditor who understands that its firm is at a threat of financial fraud makes all efforts to detect the fraud in order to save the firm from huge financial losses. Big data technologies play the role of mediator between the mere awareness and actual use of forensic accounting techniques by the practitioners. Practitioners need to adopt the appropriate data mining techniques based on the requirements of accounting fraud detection in order to successfully bridge the gap between knowing forensic accounting and actual intentions of using such techniques towards meaningful steps for fraud detection. A specialized set of tools and techniques (for example Data mining) is used by Big Data technologies with an objective to discover and gather vital information that may help detection of fraud (Morris, 2010; Akoglu et al., 2013). Use of Big Data techniques in scrutinising enormous populations of data provides useful outcomes which can be easily comprehended by auditors, thus bridging the gap between awareness about forensic accounting and actually using the techniques for the purpose of detection of fraud.

H_3: Knowledge of Big data technologies has no mediation effect in the relationship between awareness and practitioners' intentions to use forensic accounting techniques in fraud detection.

3.3 Sample Design and Data Collection

The study adopted a non-probability purposive sampling approach for the survey. A structured questionnaire was developed to collect data for this research. The constructs of awareness, Big data, Perceived intentions to use forensic accounting included a total of 18 question items as depicted in Tab. 1. Section A labeled 'Awareness about Forensic Accounting', section B as 'Big data' and section C as 'Intentions to use forensic accounting' for fraud detections. The respondents submitted their response based on the five-point likert scale (1 – 'strong disagreement' to 5 – 'strong agreement') appropriate for conducting structural equation modeling.

The universe of this research comprises of all accounting practitioners represented by firms registered as "Chartered Accountants (CA)" with a statutory body known as Institute of Chartered Accountants of India (ICAI). The sample represent CA firms registered as individual, LLP partnership firms etc. with ICAI. The survey has been conducted in the National Capital Region (NCR) of India. The sample firms operate on all India basis with clients that include large public enterprises, and firms

Tab. 1: Description of Variables and Summary Statistics

Item Number	Item Description	Mean	SD
A: Awareness of Forensic Accounting			
I (A)	FA can be used for financial statement analysis	4.056	0.860
II (A)	FA can be used in fraud detection programs	3.873	0.877
III (A)	FA can identify misappropriated assets	3.958	0.869
IV (A)	FA improves financial statements' credibility	3.845	1.023
V (A)	FA makes financial data more reliable	3.817	0.946
VI (A)	FA ensures compliance with laws and regulations	3.831	0.956
VII (A)	FA evaluates corporate governance system	3.606	0.853
VIII (A)	FA evaluates internal controls	3.690	0.803
B: Knowledge of Big data technology			
I (B)	BD can analyze data on real time basis	3.690	0.919
II (B)	BD is able to analyze tests and relationships	3.465	0.923
III (B)	BD provides advanced analytics algorithms, data visualization, social networking analytics	3.408	0.821
IV (B)	BD provides high-performance, inexpensive processing power	3.549	0.891
V (B)	BD provides high-velocity data streaming processes	3.845	1.154
C: Intentions to use FA			
I (C)	Practitioners' are willing to use FA	3.789	1.054
II (C)	Practitioners' prioritize need of government compliance	3.718	1.124
III (C)	Practitioners' prioritize risk identification, analysis and more control	3.535	0.983
IV (C)	Practitioners' prioritize the company's image and preventing frauds	3.620	0.851
V (C)	Practitioners' are concerned about the high cost of FA	2.817	1.086

operating on all India basis. The respondents in the sample firms are either partners or senior personnel entrusted with forensic accounting or related activities. From the data base of ICAI and published reports of various consulting agencies, we have arrived at a list of 167 firms having registered office in NCR appropriate for the study. The questionnaire has been executed by mail to accounting practitioners in these sample firms. The practitioners have been asked to opine on the level of awareness, knowledge of Big data technology and its use in forensic accounting practices. In order to ensure high response rate, telephonic conversations, personal visits were conducted. 85 practitioners responded to the survey and finally we arrived at 71 valid responses for the purpose of analysis. The description of variables and summary statistics is given in Tab. 1.

3.4 Construct Validity and Reliability

Tab. 2 present the results of reliability and convergent validity tests. The items with factor loadings greater than 0.6 are considered for the intended factors. The analysis observed one of the factor loadings related to awareness level less than 0.6 and thus was deleted in order to ensure uni-dimensionality of the constructs and improve model fit indices. The internal consistency of the constructs was tested using Cronbach's alpha coefficient. All constructs in this study was observed with high Cronbach's alpha coefficient ≥ 0.80, indicating high internal consistency (Hair et al., 2010).

Tab. 2: Reliability and convergent validity test

Construct	Loadings	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
A: Awareness of Forensic Accounting				
I (A)*	0.544	0.895	0.913	0.604
II (A)	0.630			
III (A)	0.824			
IV (A)	0.869			
V (A)	0.748			
VI (A)	0.903			
VII (A)	0.726			
VIII (A)	0.705			
B: Knowledge of Big data technology				
I (B)	0.850	0.882	0.911	0.671
II (B)	0.764			
III (B)	0.854			
IV (B)	0.824			
V (B)	0.801			
C: Intentions to use FA				
I (C)	0.885	0.849	0.841	0.547
II (C)	0.925			
III (C)	0.788			
IV (C)	0.661			
V (C)*	0.202			

Note: *) items deleted loadings < 0.6

Tab. 3: Correlation Matrix for the assessment of Discriminant Validity

Constructs	A: Awareness of Forensic Accounting	B: Big data technology	C: Intentions to use FA
A: Awareness of Forensic Accounting	0.777		
B: Big data technology	0.665	0.819	
C: Intentions to use FA	0.621	0.740	0.795

We have computed average variance extractions (AVE) for each construct to evident the convergent validity. It was found that the AVE of all constructs were higher than the suggested minimum estimate of 0.50 (Fornell and Larcker, 1981), supporting evidences for convergent validity. Tab. 2 summarizes the standardized factor loadings, Cronbach's Alpha, Composite reliability, and AVE estimates.

Tab. 3 provides a correlation matrix for an assessment of Discriminant validity and was evaluated by comparing AVE for each construct with the squared correlation between that construct and other constructs. AVE for the three constructs (the diagonal values of the matrix) was greater than the squared correlation with all other constructs showing sufficient evidence of Discriminant validity (Fornell and Larcker, 1981; Hair et al., 2010).

4 RESULTS

We have used structural equation modeling (SEM) using SmartPLS 3.2.8 to test the research hypotheses. We advocate the use of SEM because of its capability to answer the set of interrelated research questions using both measurement and structural model. We examine three relations in the SEM model. First, the relation between the awareness of forensic accounting (Independent variable) and the intentions to adopt forensic accounting (Dependent variable). Second, relation seeks to examine the influence of big data technology on intentions to use the forensic accounting as dependent variable. Third, the mediating effect of big data in the first relation has been evaluated in the model.

We started by testing the opinion about the influence of big data technologies on intentions to use forensic accounting for fraud detection. The estimate of the standardized regression weight (β value) from big data to intentions to use FA by practitioners was 0.685, significant at $p < 0.001$. Therefore, H_1 was rejected and indicates the positive impact of big data on intentions to use forensic accounting for fraud detection by practitioners in Delhi-NCR region.

To test the mediating effect and the other hypotheses, the bootstrapping re-sampling method was applied (Shrout and Bolger, 2002). The direct effect of awareness of FA with the presence of big data (the mediating variable) was found insignificant ($\beta = 0.166$, $p > 0.05$), implying that full mediation is possible. The bootstrapping results showed that the standardized indirect effect of awareness on intentions to use FA through big data was 0.455, significant at $p < 0.001$ with confidence intervals between 0.324 and 0.607. Thus, H_3 was rejected and hence confirm that knowledge of big data strongly mediates the relationship between awareness and intentions to use FA for fraud detections in Delhi-NCR. Fig. 1 shows the mediating role of big data (structural model). Tab. 4 provides summary of the tested hypotheses.

The results clearly indicate the significance of knowledge about the big data technology between awareness of FA and intentions to its use in fraud detection. Awareness among practitioners to use FA is important to monitor financial transaction and fraud detection alongwith the knowledge of big data technology as also highlighted by Gepp et al. (2018) and Rezaee and Wang (2019). The mediation of big data in relationship of awareness to use of FA surely will benefit in detection of spurious transactions at a very early stage as confirmed by the outcome of the present study. The results also indicate a huge gap in the knowledge level of accounting practitioners about the big data technology application in financial accounting. We argue that for a major reason for such gap is the absence of technology courses in the programme curriculum of chartered accountancy and lack of initiatives by the ICAI to supplement big data/data analytics knowledge to its member professionals. We find that in various countries like USA, UK, Australia, Singapore etc. the use of data analytics is embedded to the professional accountancy programs like certified information system auditor (CISA), certified fraud examiners (CFE) etc. In addition, a culture should develop at initial stage of the professional programs as to use of information technology.

5 CONCLUSIONS

Since use of big data is among the most important techniques to handle voluminous data, accounting practitioners must take the benefits of it in forensic accounting to detect fraudulent transactions. This study concludes that big data is a significant enabler and could be considered as a key to enhance practices and use of forensic accounting. By using big data techniques models can be build which can identify and spot the risk of occurring of a fraud

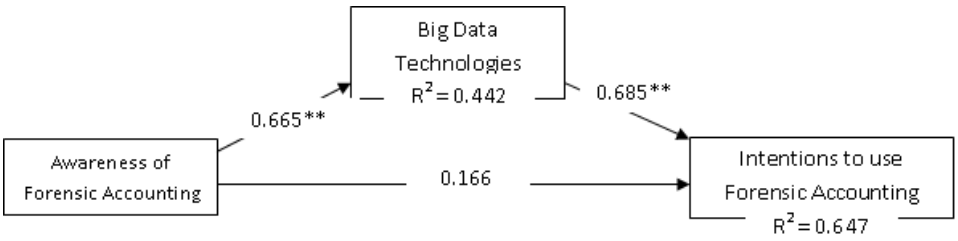

Fig. 1: Awareness of Forensic Accounting – Big data – Intentions to use

Tab. 4: Summary of Results

Hypothesis	Path	Mediation Model	Results
H_1	Big data – Intentions to use FA	0.685 ($p < 0.001$)	Significant
H_2	Awareness of FA – Intentions to use FA	0.166 ($p > 0.05$)	Insignificant
H_3	Awareness of FA – Big Data-Intentions to use FA	0.665 ($p < 0.001$)	Significant

along with designing new innovative techniques for prevention of fraud in the area of financial reporting. Our study has significant implications for Government and other accounting or related professional bodies who should put more efforts on conducting training programs in big data. It is necessary to take steps to make it a part of curriculum at different level of education in accounting practices.

Recently, Ministry of electronics and information technology (MEITY), Government of India and some premier technology institutions of the country like Indian Institute of Information Technology (IIT) have taken initiative to promote the use of big data technology through academic and training programs. However, the clear gap is the inability to link these endeavours to forensic accounting and fraud detection. This calls for joint endeavour between the technology imparting institution and statutory accounting bodies like ICAI, ICWAI etc. so that the emerging problems of knowledge gaps of auditors in country like India can be addressed.

It is accepted that auditors struggle while trying to integrate numerous fragments and pieces of proofs and evidence in certain situations. Big Data techniques become useful here as they are exceptional in integrating the varied bits and pieces of information and converting them into reliable deciding factors in a particular situation. Therefore, use of big data technologies would add value to the profession of audit, research on audit and the practicing audit professionals. Combining diligent analysis with the traditional audit techniques and expert opinion could provide many opportunities to use big data techniques in auditing. We also emphasize the need for further research as to how big data can be integrated with auditing in various context in tune with accounting standards.

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THE PEOPLE SIDE OF SUCCESSFUL BUSINESS TRANSFORMATIONS

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ABSTRACT

Business transformations are critical to making a giant leap to create an outstanding customer experience and dominate the market. This study explores how companies with different Continuous Improvement Maturities manage the people side of a business transformation, focusing on establishing a Continuous Improvement culture. A semi-structured interview with 28 different companies and 30 interview partners from 21 different industries will explore the People Excellence approach's differences in People Engagement, People Enablement, and People Empowerment. The study also investigates the different views on Continuous Improvement Systems and their impact on the organization. The focus on people, culture, and Leadership to achieve significant and sustainable business results from companies with a strong Continuous Improvement System will be evident, compared to companies with no structured Continuous Improvement System or a fragile Continuous Improvement System.

KEY WORDS

leadership, business transformation, engagement, empowerment, enablement

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1 INTRODUCTION

A quote around 500 B.C. from the ancient Greek philosopher Heraclitus "Change is the only constant in life" (Purkey and Siegel, 2003), is still valid in today's business world. We face different fundamental changes that involve and challenge everyone in the organization–transformations. There are some prevalent types of transformations around in the business world like Lean Transformation, Agile Transformation, and lately Digital Transformation. Generally, transformations have five categories–Business process transformation, In-

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formation/data/digital transformation, Organizational transformation, Management transformation, and Cultural transformation (Müller, 2018).

Independently of which transformation type, the success rates of these transformations are surprisingly low. While de la Boutetière rates Digital Transformation success by 20–30% (de la Boutetière et al., 2018), rates Tasler, based on surveys from Mc Kinsey conducted in 2009, generally business transformation success by 30–38% (Tasler, 2017). Another survey from Industry Week and the MPI Census of Manufacturers in 2007 displays that 72.5% of the companies still have gaps to achieve significant Lean Transformations results (MPI Census, 2007).

Given that organizational outcomes are the collective result of individual changes (Hiatt and Creasey, 2012), this research focuses on the people side of the transformations and how successful companies are approaching People Excellence compared to others. The study's focus is Business Transformation with a Continuous Improvement System and involves multiple industries to avoid industry bias. To have a broad input base and to recognize patterns in multiple Continuous Improvement dimensions, the participating companies for the study targeting criteria's like business revenue from $0–250M up to >$50Bn, employee size from 0–1,000 up to >100,000 employees, diverse industries, diverse Continuous Improvement Maturities. This broad input base makes this study relevant for any industry and any company size, who wants to kick off a Continuous Improvement journey or learn the differences from their people approach compared with companies with a strong Continuous Improvement System.

This study aims to identify how companies with different Continuous Improvement (CI) Maturities approach People Excellence for significant business results. To display and understand the different People Excellence approaches of companies, they are separated into three different Continuous Improvement Maturities – No Systematic CI System (NO), Strong CI System (STRONG), and Fragile CI System (FRAGILE). The research focuses on these companies' People Enablement, People Engagement, and People Empowerment activities.

The paper's structure gives in Section 2 a theoretical background and reviews the literature concerning Continuous Improvement with its maturity and People Excellence. Section 3 displays the methodology and the data of this research. Section 4 displays the research results, and section 5 explores the possible further analysis of future research opportunities.

2 THEORETICAL BACKGROUND AND LITERATURE REVIEW

Since Toyota became famous for its Toyota Production System, which was called "Toyota's Secret Weapon in the Global Car Wars" (Womack et al., 1990), numerous companies have tried to copy and paste what Toyota did. When a company starts its Lean journey, in many cases, it also starts to assess its implementation progress and maturity to understand where they are in the journey. There are different models to understand Lean Management implementation maturity, like the Four Levels of Lean Maturity (Panneman, 2017), where four main Lean implementation stages are defined. The most common way in companies is an assessment like Lean Assessments for Job Shops and Small Manufacturers (Kremer and Tapping, 2007). Here, specific methods and principles are evaluated based on the method's or principle's fulfillment implementation. Methods are always easier to evaluate, but it does not reflect the whole picture in a Lean journey. The statement "Do not Just Do lean; Be Lean" (Byrne and Womack, 2013) already explains that the Lean journey is more than only the tools, and Mann describes the importance of creating a Lean culture to

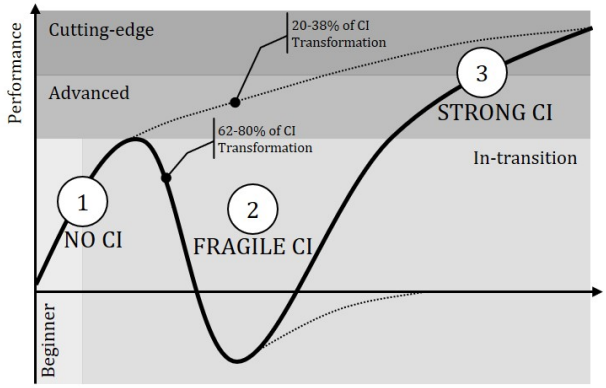

Fig. 1: CI Maturity Model: CI Trust Curve

sustain Lean transformations (Mann, 2015). To measure the cultural changes in a Lean journey, researchers already added cultural aspects in the Lean assessment matrices (Donovan, 2015; Nesensohn et al., 2014; Nightingale and Mize, 2002). A broader and holistic way for companies already on their Lean journey provides the Shingo Model, named after Shigeo Shingo, who worked with Taiichi Ohno in the early stages of the Toyota Production System. In this Maturity Assessment, the evaluation targets multiple dimensions like Guiding Principles, Cultural Enablers, Continuous Improvement, Enterprise Alignment, and Results (Plenert, 2018). To finalize the Shingo assessment, the assessment team also provides additional written, detailed feedback to understand the score's details (Edgeman, 2019).

To have a less complex, high-level, and easy-to-understand maturity model and its impact on performance during a Lean implementation, the "S-Curve Effect of Lean Implementation" is beneficial (Netland and Ferdows, 2016). The S-Curve displays the Lean Maturity in sequential stages like Beginner, In-Transition, Advanced, Cutting-Edge on the x-axis and the Plant Operational Performance on the y-axis, where the operational performance increases in an S-type curve while progressing the sequential implementation stages. For this research, the S-Curve Model was taken as a maturity model and was re-designed based on the learnings from the Lean transformation success rates of several surveys and researches mentioned in the introduction (de la Boutetière et al., 2018; MPI Census, 2007; Tasler, 2017). In the mentioned studies, the success rate was about 20–38%, which would mean 62–80% of the transformations would stick in the "in-transition" stage of the S-Curve (Netland and Ferdows, 2016). To consider the companies stuck in this "in-transition" stage, the researcher has developed the "Continuous Improvement (CI) Trust Curve" with the CI Maturity categories– No Systematic CI System, Fragile CI System, Strong CI System (Fig. 1). This curve is a "Trust Curve" because people believing and trusting in Continuous Improvement will always find a way to establish a sustainable Continuous Improvement System and culture, helping the business overperform. It also highlights the phenomenon that the second trial for kicking off a Continuous Improvement journey is much more challenging than the first trial because people lost trust and faith in the success and have developed a negative view of Lean (Mortson, 2020). Performance always follows trust in the CI System and Leadership in both directions (Tab. 1).

In the meantime, there are very successful companies like Danaher or Honeywell (Begecarslan, 2017) who found their way in the Lean journey and managed to establish an over-performing Continuous Improvement culture. Those companies have understood what Taiichi Ohno, Architect of Toyota Production System (TPS), meant with "… those who decide to implement the Toyota Production System must

Tab. 1: CI Trust Curve Stages and Trust-Performance Relation

Lean Maturity	Performance Stage	Trust-Performance Relation
1 – No Systematic CI System	Beginner, In-Transition	Trust $\geq$ Performance
2 – Fragile CI System	In-transition failed In-transition CI System reviewed	Trust $<$ Performance
3 – Strong CI System	Advanced, Cutting-edge	Trust = Performance

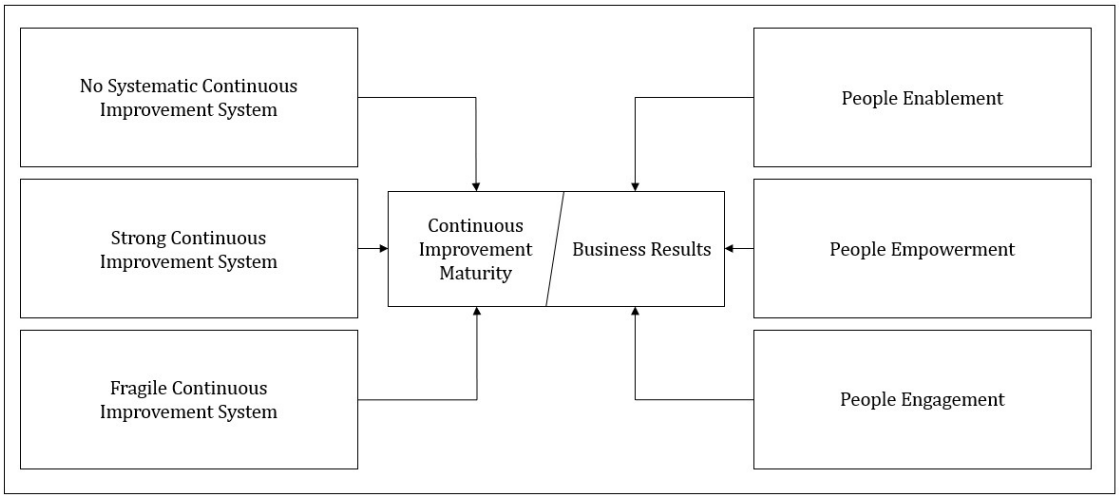

Fig. 2: Expected Relations based on the findings of the survey of literature

be fully committed. If you try to adopt only the 'good parts' you'll fail." (Shinohara, 1988). Fully committed not only means having a holistic system in place and having the discipline to follow the standards. It also means to invest in people because the core of Toyota's philosophy is the belief that people are the greatest asset (Liker, 2020). Their leaders choose to say that they "build people, not just cars" (Liker and Meier, 2006). To achieve People Excellence and with that business results, three dimensions are essential–People Engagement, People Enablement, People Empowerment (Permana et al., 2015). While there are different definitions of People Engagement, most of them are about the employees' strong connection with their work, organization, or colleagues (McPhie, 2008). People Engagement goes beyond simple job satisfaction; it is more about taking pride in the work the people deliver and how and where they do it (McPhie, 2008). In its essence, People Enablement is a holistic approach towards the individual development of the people (Maier, 2019) and helps them think in a process context and deal with changes successfully (Shishkov, 2016). According to Blanchard, People Empowerment provides authority and responsibility to the people to make business decisions and a combination of releasing people's engagement and people's knowledge and experience (Blanchard et al., 1999).

Based on the existing literature and the newly defined CI Maturities, the following basic questionnaire setup was developed (Fig. 2):

1. CI Maturity: questions to verify initial clustering of CI Maturity and display different definitions of a CI System
2. People Engagement: understand how leaders create excitement and engagement for CI
3. People Enablement: understand how companies develop their people in CI
4. People Empowerment: understand how leaders empower people to drive CI

3 METHODOLOGY AND DATA

3.1 Philosophy of Research

The researcher has chosen the Interpretivist Qualitative research philosophy due to the nature of the topic and designed open-ended interview questions for the best interpretation of the answers. These questions enable observations during the semi-structured conversation and create room for debate and new surprising facts or puzzles, connecting people's side of business transformations with strong business results (Saunders et al., 2019).

3.2 Population and Sample Size

This study has targeted 30 top leaders from 21 different industries worldwide to reach a diverse structure of companies. The population is considering the following factors:

1. The industry where the company is operating
2. The size of the company (revenue and number of employees)
3. The hierarchical level of the interview partner (6 General Managers/Directors, 15 Functional Senior Experts/Leaders, 9 VP/SVP/CEO/Lean Authors)
4. The Continuous Improvement Maturity

The sample size was selected based on research-type-related recommendations, where the range of the sample size recommendations varies from 1–50 interviews (Mertens, 2005). To have the best possible selection of interview partners, the study started with talking to 50 different leaders to participate in the study, of which 31 finally participated in the interview process. The results later considered only 30 interviews to have an equal number of interviews for the three selected Continuous Improvement Maturities (Tab. 2).

3.3 Data Collection

Interviews are an essential data collection strategy (DePoy and Gitlin, 2011), so also used as one-to-one interviews in this phenomenological research. These interviews were conducted face-to-face, per video calls or phone calls, given the participants' multi-geographical locations. Interview participants agreed individually for a one-hour time slot. To entirely focus on the interview interaction and facilitate an open discussion, interviewees permitted to record the interviews (Magnusson and Marecek, 2015). An interview guide with five open-ended questions provided a discussion guideline and a comparable qualitative research database.

3.4 Data Analysis

The conducted 30 interviews were transcribed after the complete interview process to have the best view of the entire data set. With the step-by-step Model of summarizing content analysis (Mayring, 2010), this data was classified into clusters of information and finally evolved into a category system for answers to each of the five questions. Due to the nature of the semi-structured interview, the candidates' gave multiple different answer opportunities to the different questions, which leads to different total responses per question. The content summarizing process happened with continuously reviewing the original transcription and the interview's audio record to ensure that the answer's essence is appropriately captured (Mayring, 2010). The relationship of the categorical data is analyzed using Minitab and Excel with the Pearson's chi-squared test and Fischer's exact test, both with a significance level of $\alpha = 0.05$. In order to have the best possible interpretation, the p-values are also calculated in meaningful summarized groups of responses to have the necessary value > 5 per cell. However, due to the low numbers even after summarizing in groups, the primary method used is Fischer's exact test. Another interpretation of the data provides the relative frequency comparison from the displayed contingency tables.

Part of the interview process was explaining and the promise of confidentiality, the participants' and the companies' anonymity. All

Tab. 2: Number of interviews per company size and CI Maturity

Revenue	Employees	No Systematic CI System	Strong CI System	Fragile CI System	# of Total Interviews
0–250 Mio	0–1,000	3	1		4
0–250 Mio	1,000–10,000	1			1
250 Mio–3 Bn	1,000–10,000			2	2
250 Mio–3 Bn	10,000–50,000	2	1		3
3–10 Bn	1,000–10,000	1			1
3–10 Bn	10,000–50,000	1	1	3	5
10–50 Bn	10,000–50,000		1	1	2
10–50 Bn	50,000–100,000	1	1	1	3
10–50 Bn	> 100,000	1	2	1	4
> 50 Bn	> 100,000		2	2	4
n/a	n/a		1		1
Total		10	10	10	30

Tab. 3: Years of CI implementation in Companies

CI Maturity	1–5 Years	6–10 Years	11–15 Years	16–20 Years	21–40 Years	> 40 Years	No CI System	n/a
1 – No	2	3					5	
2 – Strong			4	1	2	2		1
3 – Fragile	3	4	2	1				
Total	5	7	6	2	2	2	5	1

the mentioned specific Production Systems or Business Systems names changed and generalized to "Continuous Improvement System" to ensure the company's anonymity. As also critical facts, opinions, and statements towards an organization's Leadership or culture are part of the expected responses, confidentiality and anonymity were necessary to create an open and secure environment, where participants could expect the respectful and discrete handling of all data (King and Horrocks, 2010).

4 RESULTS

4.1 Continuous Improvement (CI) Maturity

After the pre-categorizing of the companies in the three defined CI Maturities, the companies answered three questions to display how they define their CI System and why it is successful or not. Five (16.6%) responded that they have no CI System in place, and one responded with a "not applicable" as this person is not active in the industry anymore but has worked in one of the most known Lean companies for a long time. The calculated p-value < 0.001 with Fischer's exact test rejects the null hypothesis. That means there is a significant relationship between the CI Maturity and the years a company has a CI System. All "2–Strong" (Strong CI System) respondents have at least 11 years of CI implementation in their companies (Tab. 3).

The question about the description of their present CI System/approach was answered very broadly (Tab. 4). From "not applicable" for some of the cluster "1–NO Systematic CI System" to more visible Tool and System setups, up to culture and value beliefs. The most recognizable relative differences in the answers between the "2–STRONG CI System" companies and the two other type companies

Tab. 4: Description of the companies CI Systems

	1–NO	2–STRONG	3–FRAGILE	Total	Difference 2–STRONG to 1–NO	Difference 2–STRONG to 3–FRAGILE
Tools	4 (30.8%)	2 (6.9%)	7 (33.3%)	13 (20.6%)	−2	−5
Culture		7 (24.1%)	2 (9.5%)	9 (14.3%)	+7	+5
Continuous Improvement	1 (7.7%)	6 (20.7%)	1 (4.8%)	8 (12.7%)	+5	+5
System		2 (6.9%)	6 (28.6%)	8 (12.7%)	+2	−4
Improvement Proposal System	3 (23.1%)		3 (14.3%)	6 (9.5%)	−3	−3
Strategy	1 (7.7%)	3 (10.3%)	1 (4.8%)	5 (7.9%)	+2	+2
n/a	3 (23.1%)			3 (4.8%)	−3	0
People Development	1 (7.7%)	2 (6.9%)		3 (4.8%)	+1	+2
Customers		2 (6.9%)	1 (4.8%)	3 (4.8%)	+2	+1
Standards		2 (6.9%)		2 (3.2%)	+2	+2
Flow		1 (3.4%)		1 (1.6%)	+1	+1
Transparency		1 (3.4%)		1 (1.6%)	+1	+1
Values		1 (3.4%)		1 (1.6%)	+1	+1
Total	13 (100%)	29 (100%)	21 (100%)	63 (100%)		

Tab. 5: CI System success classification of participating companies

	1–NO	2–STRONG	3–FRAGILE	Total
Not successful	8 (80%)		2 (20%)	10 (33.3%)
Partially successful	2 (20%)		5 (50%)	7 (23.3%)
Successful		10 (100%)	3 (30%)	13 (43.3%)
Total	10 (100%)	10 (100%)	10 (100%)	30 (100%)

are “Culture” (“1–NO Systematic CI System” +7, “3–FRAGILE CI System” +5), “Continuous Improvement” (“1–NO Systematic CI System” +5, “3–FRAGILE CI System” +5), and “Tools” (“1–NO Systematic CI System” −2, “3–FRAGILE CI System” −5). The top answers for “3–FRAGILE CI System” are set of “Tools” (33.3% of their responses), “System” (28.6%), and “Improvement proposal System” (14.3%), where employees can bring their input in a (mostly) IT System and get rewarded for their ideas. The top answers for “1–NO Systematic CI System” are similar. Set of “Tools” (30.8%) and “Improvement proposal System” (23.1%). Simultaneously, these two answers do not play a significant role in the “2–STRONG CI System” companies. While “Tools” represents only 6.9% of the responses, “Improvement proposal System” is not mentioned. This result does not mean that these companies do not have an Improvement Proposal System or do not value input from their employees. It is just included in their CI Systems differently and does not play a significant role in describing their CI System. Furthermore, the expectation of the improvement idea proposal from the whole organization is a part of the “Culture” and “Continuous Improvement”, which ranked at the first and second place at “2–STRONG CI System” companies. The p-value < 0.001 is below $\alpha = 0.05$ and states that there is a significant relationship in the responses of the different CI Maturity clusters when they describe their CI System.

When it comes to the perceived success of the existing CI approach in the companies, 100% of the “2–STRONG CI System” companies answered with a clear “Yes” (Tab. 5). 80% of “1–NO Systematic CI System” companies know that their approach is unsuccessful, and 20%

Tab. 6: People Engagement elements for Continuous Improvement

	1–NO	2–STRONG	3–FRAGILE	Total	Difference 2–STRONG to 1–NO	Difference 2–STRONG to 3–FRAGILE
Recognition	2 (9.5%)	7 (21.9%)	6 (24%)	15 (19.2%)	+5	+1
Communication	4 (19%)	4 (12.5%)	3 (12%)	11 (14.1%)	0	+1
Supportive Leadership		7 (21.9%)	2 (8%)	9 (11.5%)	+7	+5
People Involvement	2 (9.5%)	3 (9.4%)	3 (12%)	8 (10.3%)	+1	0
People Development	2 (9.5%)	2 (6.3%)	3 (12%)	7 (9%)	0	−1
Awareness	4 (19%)		1 (4%)	5 (6.4%)	−4	−1
People Empowerment	2 (9.5%)	1 (3.1%)	2 (8%)	5 (6.4%)	−1	−1
Results	1 (4.8%)	1 (3.1%)	2 (8%)	4 (5.1%)	0	−1
Customers		2 (6.3%)	2 (8%)	4 (5.1%)	+2	0
Coaching	1 (4.8%)	1 (3.1%)	1 (4%)	3 (3.8%)	0	0
No Structure	2 (9.5%)			2 (2.6%)	−2	0
Sustainment		2 (6.3%)		2 (2.6%)	+2	+2
Job Rotation	1 (4.8%)			1 (1.3%)	−1	0
Conceptional Simplification of Lean		1 (3.1%)		1 (1.3%)	+1	+1
Target Setting		1 (3.1%)		1 (1.3%)	+1	+1
Total	21 (100%)	32 (100%)	25 (100%)	78 (100%)		

believe it is partially successful. Interesting responses came from the "3–FRAGILE CI System" companies in every possible answer opportunity. 50% answered that their CI approach is partially successful, whereas 20% said it is unsuccessful. The remaining 30% believe that their CI approach is successful. They justified their answers, why they believe their CI System is robust, with having "Employee Engagement", "Financial Results", "Implementation Speed", sound "Share price" development, and "Teamwork" (Tab. 9 in Annex). The p-value < 0.0001 indicates strong evidence against the null hypothesis and, with that, a strong relationship between CI Maturity and the perceived success of a company.

Generally looking into the detailed answers to why the respondents have rated their CI Systems success the way they did, it is evident that the top four responses from the "2–STRONG CI System" companies who believe in the success of their CI System (72% from the "2–STRONG CI System" responses) are result related (Tab. 9 in Annex). The main relative differences in the answers between the "2–STRONG CI System" companies and the two other type companies are "Financial Results" ("1–NO Systematic CI System" +7, "3–FRAGILE CI System" +6), "Daily Improvements" ("1–NO Systematic CI System" +5, "3–FRAGILE CI System" +5), and "Operational Performance" ("1–NO Systematic CI System" +4, "3–FRAGILE CI System" +4). The top three responses from "1–NO Systematic CI System" companies with perceived limited to no success with their CI System are "Lack of CI Knowledge", "No Results", and "No Continuity" (46.2% from the "1–NO Systematic CI System" responses). "3–FRAGILE CI System" companies have no significant reasons for their answers, rather than widespread reasons.

4.2 People Engagement

People Engagement is a comprehensive definition. How the respective companies' leaders make sure that the employees are excited about Continuous Improvement helps to understand what the companies are doing to engage their people. The top three answers were "Recognition", "Communication", "Supportive Leadership", and made up 44.9% of

Tab. 7: People Development elements

	1–NO	2–STRONG	3–FRAGILE	Total	Difference 2–STRONG to 1–NO	Difference 2–STRONG to 3–FRAGILE
Method/Soft Skill Training	1 (7.1%)	2 (10.5%)	8 (40%)	11 (20.8%)	+1	−6
No structure	6 (42.9%)			6 (11.3%)	−6	0
Internal Training Academy	1 (7.1%)	3 (15.8%)	1 (5%)	5 (9.4%)	+2	+2
Coaching/Mentoring		2 (10.5%)	3 (15%)	5 (9.4%)	+2	−1
Kaizen	2 (14.3%)	2 (10.5%)		4 (7.5%)	0	+2
Immersion Training		3 (15.8%)	1 (5%)	4 (7.5%)	+3	+2
Lean Expert Program	1 (7.1%)		1 (5%)	2 (3.8%)	−1	−1
70-20-10 Rule (on the job-training-coaching)		2 (10.5%)		2 (3.8%)	+2	+2
On the Job		2 (10.5%)		2 (3.8%)	+2	+2
Leadership Program		1 (5.3%)	1 (5%)	2 (3.8%)	+1	0
KPI-driven learnings			2 (10%)	2 (3.8%)	0	−2
Benchmarks	1 (7.1%)			1 (1.9%)	−1	0
Fairs	1 (7.1%)			1 (1.9%)	−1	0
High Potential Programs	1 (7.1%)			1 (1.9%)	−1	0
Daily Study Meetings		1 (5.3%)		1 (1.9%)	+1	+1
Out-of-comfort-zone responsibilities		1 (5.3%)		1 (1.9%)	+1	+1
70-20-10 Rule (on the job-peers-trainings)			1 (5%)	1 (1.9%)	0	−1
Empowerment			1 (5%)	1 (1.9%)	0	−1
Improvement Proposal System			1 (5%)	1 (1.9%)	0	−1
Total	14 (100%)	19 (100%)	20 (100%)	53 (100%)		

all responses (Tab. 6). The highest relative differences in the answers between the "2–STRONG CI System" companies and the two other type companies are "Supportive Leadership" ("1–NO Systematic CI System" +7, "3–FRAGILE CI System" +5), "Recognition" ("1–NO Systematic CI System" +5, "3–FRAGILE CI System" +1), and "Awareness" ("1–NO Systematic CI System" −4, "3–FRAGILE CI System" −1). While "2–STRONG CI System" companies rated "Recognition" (21.9%) and "Supportive Leadership" (21.9%) as their top two activities to engage people, "1–NO Systematic CI System" companies mentioned "Communication" (19%) and "Awareness" (19%) as their top two contributors. The top answer from the "3–FRAGILE CI System" companies was "Recognition" (24%), followed by "Communication" (12%), "People Involvement" (12%), and "People Development" (12%).

Recognition was for both Strong and Fragile CI System companies as one of the top answers, but having a closer look at the details shows that handling recognition is different. In Fragile CI System companies, 50% of the answers related to recognition are monetary. In contrast, in Strong CI System companies, 85.7% of the answers are related to lifting people up with increasing their visibility for their efforts. The remaining 14.3% was a combination of personal recognition and a small gift. What also became apparent in this section is that the three dimensions of people excellence – people engagement, people enablement, and people empowerment – are interrelated with each other as they are in every maturity type of company response.

The fact that "Awareness" was not mentioned in the "2–STRONG CI System" companies and is displayed as the third most prominent difference in the responses comes with the years

Tab. 8: People Empowerment elements

	1–NO	2–STRONG	3–FRAGILE	Total	Difference 2–STRONG to 1–NO	Difference 2–STRONG to 3–FRAGILE
Provide Authority	2 (16.7%)	4 (21.1%)	2 (13.3%)	8 (17.4%)	+2	+2
Supportive Leadership	2 (16.7%)	3 (15.8%)	3 (20%)	8 (17.4%)	+1	0
Provide Resources	2 (16.7%)	2 (10.5%)	2 (13.3%)	6 (13%)	0	0
Clear Targets	2 (16.7%)	1 (5.3%)	3 (20%)	6 (13%)	−1	−2
People Engagement	1 (8.3%)	1 (5.3%)	1 (6.7%)	3 (6.5%)	0	0
n/a	1 (8.3%)		2 (13.3%)	3 (6.5%)	−1	−2
Management Alignment	2 (16.7%)			2 (4.3%)	−2	0
Coaching/Mentoring		2 (10.5%)		2 (4.3%)	+2	+2
Sustainment of Improvements			2 (13.3%)	2 (4.3%)	0	−2
Allow Creativity		1 (5.3%)		1 (2.2%)	+1	+1
CI Framework		1 (5.3%)		1 (2.2%)	+1	+1
Failure Culture		1 (5.3%)		1 (2.2%)	+1	+1
Increase Employee Satisfaction		1 (5.3%)		1 (2.2%)	+1	+1
Increase Lean Experience		1 (5.3%)		1 (2.2%)	+1	+1
Job Rotation		1 (5.3%)		1 (2.2%)	+1	+1
Total	12 (100%)	19 (100%)	15 (100%)	46 (100%)		

the companies are already in the CI journey. Creating awareness is usually part of the change management process and happens either at the beginning of the CI journey or if a company tries to re-launch its CI program.

Regarding the relationship of the CI Maturity with the People Engagement elements, the probability value of Fischer's exact test is $p = 0.619$, and with that significantly higher than $\alpha = 0.05$. It fails to reject the null hypothesis, which means no significant relationship exists between the different companies related to People Engagement elements.

4.3 People Enablement

For People Enablement, the question was about how the companies develop their people in Continuous Improvement. The top three answers from all companies were individual "Method/Soft Skill Trainings" (20.8%), "Internal Training Academy" (9.4%), and "Coaching/Mentoring" (9.4%), which makes up 39.6% of all responses (Tab. 7). The most visible relative differences in the answers between the "2–STRONG CI System" companies and the two other type companies are "No Structure" ("1–NO Systematic CI System" −6), "Method/Soft Skill Training" ("1–NO Systematic CI System" +1, "3–FRAGILE CI System" −6), and "Immersion Training" ("1–NO Systematic CI System" +3, "3–FRAGILE CI System" +2). Six "1–NO Systematic CI System" companies mentioned that they have no structure to develop their employees in Continuous Improvement (42.9% of their total responses). To gain a top-level overview, "Coaching/Mentoring" and "70-20-10 Rule (on the job-training-coaching)" with its coaching element are considered as combined. With that, the top three responses for the "2–STRONG CI System" companies would be "Coaching/Mentoring incl. 70-20-10 Rule (on the job-training-coaching)" (21.1%), "Internal Training Academy" (15.8%), and "Immersion Training" (15.8%). The "3–FRAGILE CI System" companies have rated specific "Method/Soft Skill Training" (40%), "Coaching/Mentoring" (15%), and "KPI-driven learnings" (10%) as their top three activities. A big emphasis is on "Method/Soft Skill Training",

which eight out of ten of these companies use to develop their people in Continuous Improvement. In comparison, only two of the "2–STRONG CI System" companies and one of "1–NO Systematic CI System" companies are using standalone "Method/Soft Skill Training".

The p-value of the company CI Maturity relationship with the People Development elements is $p = 0.001$ and significantly lower than $\alpha = 0.05$. Therefore, it confirms the alternative hypothesis, which means a strong relationship between the CI Maturity and the People Development elements.

4.4 People Empowerment

The respondents' answers to how they make sure that the responsible people drive Continuous Improvement can confirm Blanchard's definition of people empowerment (Blanchard et al., 1999), with some additional directions. The top 4 answers were "Provide Authority", "Supportive Leadership", "Provide Resources", and "Clear Targets", which together represent 60.9% of all responses (Tab. 8). The highest relative differences in the answers between the "2–STRONG CI System" companies and the two other type companies are "Provide Authority" ("1–NO Systematic CI System" +2, "3–FRAGILE CI System" +2) and "Coaching/Mentoring" ("1–NO Systematic CI System" +2, "3–FRAGILE CI System" +2). While "1–NO Systematic CI System" has no significant-top approach for People Empowerment, "2–STRONG CI System" companies rely on "Provide Authority" (21.1%) and "Supportive Leadership" (15.8%) as their top two activities for empowerment. "3–FRAGILE CI System" companies in comparison are also utilizing "Supportive Leadership" (20%) for People Empowerment and working on "Clear Targets" (20%) for the people.

Blanchard's definition of People Empowerment impact–providing authority and responsibility to make decisions and releasing People's Engagement, knowledge, and experience–is still valid today. In addition, the respondents also added alignment (Management and target alignment), framework, and supportive Leadership, showing interest and following up on improvement sustainment.

The null hypothesis that no relationship exists in the People Development approach in the different companies cannot be rejected as $p = 0.503$ is higher than $\alpha = 0.05$. This means there is no significant relationship between the CI Maturity and the People Empowerment elements.

5 DISCUSSION

The study demonstrates that companies with a strong CI System are more concerned about People Excellence and how they can support their people as part of the transformation. To achieve that, successful companies approach people's side of transformations in a more structured and holistic way. The fact that around 70% of the companies fail–or become fragile–to transform their business highlights the importance of working on the companies with a fragile CI System to become a strong performing CI culture, rather than having only a good set of CI tools.

In the Continuous Improvement Maturity section, it became visible that the company size is not an influencing factor, whether a Continuous Improvement System is strong or not. E.g., companies with a strong CI System could be found in companies from \$0–250M up to >\$50Bn, but also companies with no structured CI System from \$0–250M up to \$10–50Bn.

The research findings of how leaders describe their CI System showed a clear relationship between the CI Maturity and how the leaders see their CI System. The focus of more mature companies is driven through the culture, values, and development of their people. This is in line with the current literature about the importance of culture and people's capability development (Byrne and Womack, 2013; Liker and Meier, 2006; Mann, 2015). The research findings that the companies with a strong

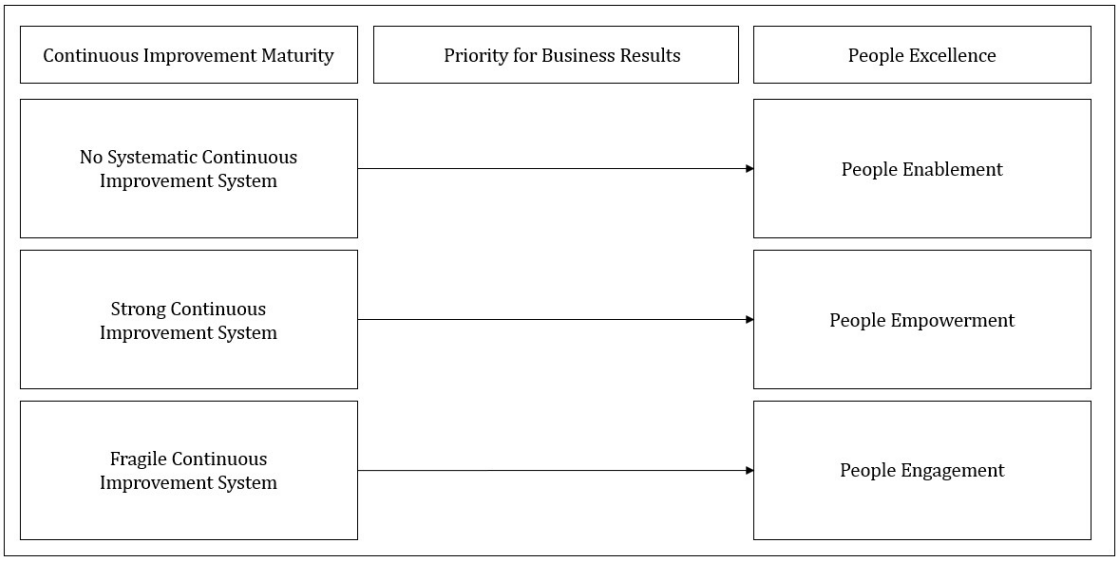

Fig. 3: CI Maturity focus on People Excellence based on research findings

CI System have a CI journey of at least 11 years behind them shows a CI System's long-term setup and that it should be considered a marathon rather than a sprint and supports existing literature (Asefeso, 2013; Liker, 2020).

The most demanding companies to transform are 30% of the companies with a fragile CI System who believe they are successful. They believe their success is because of their current CI approach, or they believe they are successful even without focusing on a CI System–because the causality or the coincidence of their success related to the CI System is not clear. This gap creates a question about the effectiveness of these companies' People Enablement methods and whether they should reconsider their people's development processes. However, since trust in the CI System is essential for its performance, these companies' priority would be to focus on People Engagement to get over the trust valley in the CI Trust Curve. The companies with no holistic CI System should focus not only on the CI System setup but also on the answer showing the most significant gap in a structured People Enablement approach. Since the People Enablement also influences People Engagement, this focus area would be a good starting point for the companies with no holistic CI System. Strong CI companies are already focusing on all three elements of People Excellence intensively. However, People Empowerment provides authority and responsibility to the people to make business decisions and release people's engagement, knowledge, and experience. Therefore, strong CI companies' priority should focus on People Empowerment while pushing the limits with Breakthrough Thinking (Fig. 3).

The research findings support the definitions of Permana related to People Excellence and build on it with the focus on Continuous Improvement (Permana et al., 2015). However, based on the research findings, the statistical relationship between CI Maturity and People Excellence is only on the People Enablement dimension. This finding also contrasts with existing literature about CI Transformations and their success factors (DeLuzio, 2020; Leuschel, 2019; Liker, 2020; Liker and Convis, 2012).

The research findings aligned with the People Empowerment definition of Blanchard and added some more details into the definition to be more specific about the People Empowerment content based on CI Transformations (Blanchard et al., 1999).

The research findings contrast with the S-Curve Model from Netland and Ferdows because this research did not show a logical

increase in performance over time (Netland and Ferdows, 2016). Nevertheless, the S-Curve Model was valuable research and served as a basis for developing the CI Trust Curve and included the transformation success rates and findings from researched sources (de la Boutetière et al., 2018; Mortson, 2020; MPI Census, 2007; Tasler, 2017).

Cultural differences limit the study results even within one company with sites in different world regions, which could not be extensively researched due to the sample size. The sample size per industry with 1–4 interviews per industry is small and creates another limitation, which would open possibilities for further research, e.g., more in-depth analysis for a particular industry if more specific guardrails are needed. Further research of the detailed Leadership involvement in the Continuous Improvement process, including strategic and operational alignment of the companies with different CI Maturities, would bring valuable information for establishing a strong performing CI organization. A financial analysis of the CI Trust Curve based on companies in the given Maturity phases would help confirm the Model based on hard facts. Further research for a practical and easy-to-use CI Maturity Assessment would help practitioners identify the current CI Maturity of their organization.

6 CONCLUSIONS

The research's general purpose was to identify how companies with different Continuous Improvement (CI) Maturities approach People Excellence for significant business results. The goal was also to explore the different views on Continuous Improvement Systems and their impact on the organization. The interview process displayed that leaders from different CI Maturity companies mean different things even when they talk about the same element. It starts with their description of the CI Systems and also includes single elements of the People Excellence. There are different gaps in the People Excellence areas based on the CI Maturity of the organization. Focusing on them individually will help leaders inspire their people to achieve significant business results in the CI journey.

Based on these conclusions, practitioners should consider evaluating their organization's CI Maturity first before designing a Lean Roll-Out Plan or setting up their Change Management program.

The study has provided insights to understand how the companies with the different Continuous Improvement Maturities understand Continuous Improvement as a system, the approaches for People Engagement, People Enablement, and People Empowerment to utilize Continuous Improvement with People Excellence to achieve sustainable results. The S-Curve Model has been reviewed and adapted based on the existing literature and the interview responses. The defined CI Maturity phases helped find suitable action areas in People Excellence and described how trust in a CI System correlates with business performance. This paper has provided arguments, interviewing two famous Lean Authors in the field of Lean Leadership and 28 top leaders, that the focus on people pays off not only in creating a unique Continuous Improvement culture but also in achieving outstanding financial and operational results for their company.

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8 ANNEX

Tab. 9: Reasons for success classification

CI Successful	Reasons for classification	1–NO	2–STRONG	3–FRAGILE	Total
Not successful	Lack of CI Knowledge	3 (23.1%)			3 (6%)
Not successful	No Results	2 (15.4%)			2 (4%)
Not successful	No Continuity	1 (7.7%)		1 (8.3%)	2 (4%)
Not successful	Lack of Management Focus	1 (7.7%)			1 (2%)
Not successful	No Drive to Change	1 (7.7%)			1 (2%)
Not successful	No System	1 (7.7%)			1 (2%)
Not successful	Only Tool Level	1 (7.7%)			1 (2%)
Not successful	System change – Too early in journey			1 (8.3%)	1 (2%)
Partially	Huge Effort	1 (7.7%)		1 (8.3%)	2 (4%)
Partially	Benchmark	1 (7.7%)			1 (2%)
Partially	Transparency	1 (7.7%)			1 (2%)
Partially	Limited Financial Results			1 (8.3%)	1 (2%)
Partially	Management attention			1 (8.3%)	1 (2%)
Partially	Only Tool Level			1 (8.3%)	1 (2%)
Partially	System change – Too early in journey			1 (8.3%)	1 (2%)
Partially	System satisfaction			1 (8.3%)	1 (2%)
Successful	Financial Results		7 (28%)	1 (8.3%)	8 (16%)
Successful	Daily Improvements		5 (20%)		5 (10%)
Successful	Operational Performance		4 (16%)		4 (8%)
Successful	Share price		2 (8%)	1 (8.3%)	3 (6%)
Successful	Teamwork		1 (4%)	1 (8.3%)	2 (4%)
Successful	Benchmark		1 (4%)		1 (2%)
Successful	Customers		1 (4%)		1 (2%)
Successful	Employee Retention		1 (4%)		1 (2%)
Successful	Flow		1 (4%)		1 (2%)
Successful	Leadership involvement		1 (4%)		1 (2%)
Successful	Strategy		1 (4%)		1 (2%)
Successful	Employee Engagement			1 (8.3%)	1 (2%)
Successful	Implementation speed			1 (8.3%)	1 (2%)
Total		13 (100%)	25 (100%)	13 (100%)	51 (100%)

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AGRICULTURAL FINANCING, AGRICULTURAL OUTPUT GROWTH AND EMPLOYMENT GENERATION IN NIGERIA

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ABSTRACT

This study investigates the impact of agricultural financing and agricultural output growth on employment generation in Nigeria from 1981 to 2017. The study adopts the framework of the Auto Regressive Distributed Lag (ARDL) Model for analysis. The empirical results show that while agricultural financing increases employment generation in both the short run and long run, the lag of agricultural output growth increases employment generation mainly in the short run. Other variables found to have significant effect on employment generation were price and agricultural output while labor force population, wages and aggregate expenditure were insignificant. The study concludes that policy makers should endeavor to see that every fund allocated for a specific agricultural schemes and interventions should be fully utilized for its purpose. To increase employment opportunities, there should be careful monitoring of the implementation of each scheme and policy to realize their specific objectives.

KEY WORDS

agricultural financing, agricultural output, growth, employment

JEL CODES

E24, J21, J43, O13, Q13, Q14

1 INTRODUCTION

Agriculture is the science of cultivation of soil for crops and the rearing of animals. Agriculture is as old as man himself as it was the first occupation of mankind. Even with the evolvement of modern civilization, it still remains an essential part of the growth and development of any extant economy (Anthony-Orji et al., 2020; Orji et al., 2019 and Ogbuabor and Nwosu, 2017). In Nigeria, the agricultural sector is a major sector that drives economic development and industrialization because of its importance in the provision of food for the increasing popu-

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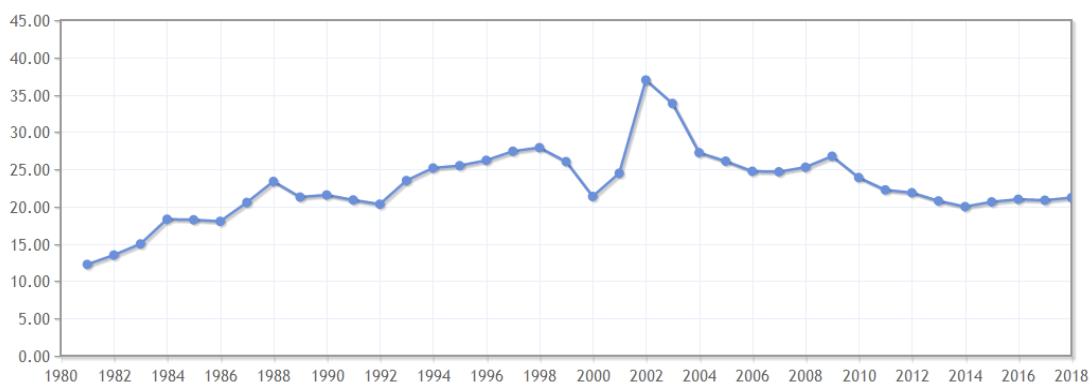

Fig. 1: Agriculture, value added (% of GDP) in Nigeria (1981–2018)
Note: The Y-axis represents agricultural value added as a percentage of GDP, X-axis represents the years.
(World Bank national accounts data, 2020)

lation, the supply of raw material to the growing industrial sector, generation of foreign exchange earnings, creation of employment opportunities, and provision of market for the product of the industrial sector (World Bank, 2016). Nigeria is endowed with large expanse of arable land and favourable climate for agriculture. As at 1990 the estimated arable land was 81 million hectares out of the Nigerian total land of 91 hectares of which 18 million hectares of this land was classified as permanent pasture for livestock production. This enables the production of a wide variety of crops, livestock, forestry and fishery products (Ewetan et al., 2017).

The 1962–1968 development plan was the first national plan of Nigeria post-independence and among its many objectives, the introduction of modern agricultural methods, agricultural extension services and the supply of better farm implements were greatly emphasized. This national plan was to a large extent achieved and Nigeria became the leading producer of export crops such as cocoa which was produced in the western region, palm oil which was largely produced in the southern region and groundnut which was produced majorly in the northern region. According to the Central Bank of Nigeria (CBN) reports, in the 1960's, agriculture contributed about 60 percent to the Gross Domestic Product (GDP) of the nation (CBN, 2016). The National Bureau of Statistics (NBS) reported that agriculture was the most important sector in terms of its contribution to the to the country's output, employment and foreign exchange earnings (NBS, 2014). However the success of the sector was short-lived and its share of contribution to the GDP of Nigeria declined drastically to 25 percent between 1975 and 1979 and later rose up to 38 percent in 2002 but later fell again to 20 percent in 2010. There hasn't been a significant change in agriculture's share to the GDP since then. This fall in agricultural production was owed greatly to the oil boom the economy experienced in the 1970's. Fig. 1 shows the contribution of the agriculture to the GDP between 1980 and 2018. The Y axis is the percentage contribution of agriculture to GDP while the X axis is the years.

The 1970's brought about the emergence of the oil industry as the main driver of economic growth and since then, agricultural production has been progressively declining in terms of its annual contribution to Nigeria's GDP. The Nigerian economy became over-dependent on the oil sector and this caused the decline in the revenue generated by the agricultural sector overtime. The Nigerian government has recognized how detrimental the over dependence on only one sector can be to the economy and has recently started to seek for diversification of the economy through the development of other productive sectors aside from the oil sector. The government has brought into cognisance the importance and prospects of the agricultural sector and it is one the major

sectors it seeks to develop. There are other sources of generating employment and economic growth but only a few can be compared with agriculture in its ability to reduce poverty and enhance economic growth especially at the early stages of development. For example in Zambia and Nigeria, mineral wealth has not provided a platform for wide range of employment opportunities, poverty reduction and economic growth as agriculture has proven to have done. Without the increasing income and affordable food that a dynamic agricultural sector provides, economic transformation will be slow and economies will remain trapped in a cycle of low growth and poverty (Department for International Development, 2005).

However, it is a known fact that for the successful development of any sector, adequate financing is essential. Credit plays an essential role in the development of the agricultural sector of economy. The agricultural sector depends more on credit as a source of finance compared to any other sector in the economy due to the seasonal variation in the returns of farmers and a changing trend from subsistence to commercial farming (Abedullah et al., 2009). The provision of suitable financial policies and enabling institutional finance for both subsistence and commercial agriculture has prospects of enhancing agricultural development, hence, increasing the contribution of the sector in the generation of employment, foreign exchange earnings and increasing the income of economic agents engaged in agricultural practices (Olomola, 2010).

Since the 1970's the government has established and implemented several agricultural financing policies, some of the early agricultural policies established include, National Accelerated Food Production Program established in 1972, Agricultural Development Program Established in 1975 and Operation Feed the Nation established in 1976 among many others. A lot of these policies didn't last long to achieve its set objectives. Over the years, inadequate finance has been identified to be a major limiting factor to the development of the agricultural sector in most developing countries including Nigeria (Orji et al., 2014, 2020).

The use of crude and obsolete tools, poor agricultural infrastructure such as poor transport facilities has been an obvious characteristic of the sector. These appalling characteristics are attributed to the lack of financial resources needed to acquire modern and improved farm implements, new farming methods and enhance the infrastructural facilities. The government sees this limitation and has since the 1970's introduced and implemented various agricultural financing policies in order to achieve an effective system of sustainable agricultural financing schemes, programs and institutions that can provide credit facilities to agricultural producers, processors and marketers at all level (Eze et al., 2010). Even with all these policies and strategies of the government and other institutions to broaden the framework of sustainable growth, the performance of the agricultural sector is still suboptimal.

Agriculture in Nigeria is dominated by small scale farmers and it is largely subsistent with low production capacity, stagnancy and over 90 percent of agricultural output is accounted for by farmers with less than two hectares of land available for crop production (Federal Ministry of Agriculture and Rural Development, 2008). Many of the policies have been ineffective either because of poor management or macroeconomic policies affecting exchange rates, inflation and cost of capital has drowned its impact. Against this background, the objective of this study is to estimate the impact of agricultural financing and agricultural output growth on employment generation in Nigeria.

The rest of the paper is structured as follows; section 2 focuses on the review of empirical literature, while section 3 dwells on the methodology. The results are presented and discussed in section 4, while section 5 concludes the study and makes some vital policy recommendations.

2 REVIEW OF EMPIRICAL LITERATURE

Majority of the existing literature on agricultural financing in Nigeria investigated its effect on agricultural productivity or economic growth as a whole. However there are very few empirical evidences on the impact of agricultural financing and agricultural output growth on employment generation, the few literatures that exist in Nigeria about the agricultural sector and employment growth were based on theory, logic and descriptive statistics at best. However, some researchers have examined the relationship between agriculture and employment in some other countries using mostly descriptive statistics. For example, Chandio et al. (2016) examined the impact of formal credit on agricultural output in Pakistan. The researchers used the ordinary least square method to estimate the impact and their result showed that formal credit had a positive significant relationship with agricultural output.

Briones (2013) did a study on the trends and patterns of agricultural growth, employment and inclusive growth in the Philippines, evidence from the study indicated that agricultural growth leads to non-agricultural growth because it is significantly connected with downstream manufacturing, contributes meaningfully towards the reduction of poverty and has a positive impact on the employment of unskilled labor. In another study, Gelan and Seifu (2016) examined the determinants of employment generation through urban agriculture using Bishoftu area of Oromia Region, Ethiopia as a case study. Data was sourced by both primary and secondary means. They applied both descriptive and multiple regression techniques to analyze the data, the results revealed that both small and micro enterprise farming and household level farming contributed significantly to employment generation in the region but the small and micro enterprise farming created more jobs. The researchers also found that the agricultural sector indirectly plays a positive role to the development of other sectors such as industries, trade, hotel and cafeterias through provision of inputs and raw materials and serves as an alternative sources of energy (Biogas) thereby creating even more jobs. In an earlier study, Hayami et al. (1987) examined how agricultural processing and marketing affected employment generation and income using the case of soybean in Indonesia. The study cite for the research survey was an upland village in the Garut District in West Java. The researchers first estimated the income and employment generated through soybeans production then later estimated the additional income and employment generated that came from the processing the already produced soybean and marketing them to consumers. The estimation result showed that the processing and marketing of farm products played a significantly important role in generating income and employment in local communities in Indonesia.

Many scholarly works on Agricultural financing in Nigeria and some other developing economies are of the conclusion that Agricultural financing is positively related with agricultural output growth and economic growth. For instance, Obudah and Tombofa (2016), in their study on the effect of agricultural financing on output growth and macroeconomic growth in Nigeria collected data from CBN Bulletin and used the ordinary least squares method, cointegration and error correction technique to do the analysis. Their result showed that there existed a positive relationship between agricultural credit and agricultural output. They also found that agricultural credit has a positive effect on the real GDP over the period of study. They asserted that failure of borrowers to pay back credit had caused a reduction in lenders confidence and this is a serious limitation to the financing of the agricultural sector in Nigeria.

In a similar study, Egwu (2016) investigated the impact of agricultural financing on agricultural output, economic growth and poverty alleviation in Nigeria with the use of the ordinary least square regression technique. The study result revealed that the Credit Guarantee Scheme Fund Loan and the commercial banks credit to Nigeria's Agricultural sector has significantly impacted on agricultural output positively thereby reduced the poverty rate

and stimulated the economic growth within the study period. The result also predicts that in the long run, farmers should be able to apply their own funds for agricultural development even without loans from the Guarantee Scheme Fund. Udoka et al. (2016) got a similar result in the study of the effects of commercial banks' credit on agricultural output in Nigeria. The researchers sourced data from the central bank of Nigeria statistical bulletin and employed the ordinary least square regression technique for their analysis. Their results showed that, an increase in agricultural credit guarantee scheme fund, commercial banks' credit to the agricultural sector and government expenditure on agriculture could lead to higher agricultural production in Nigeria, however, the result showed a negative relationship between interest rate and agricultural production in Nigeria this negative relationship is due to the fact that an increase in the rate of interest charged farmers for funds borrowed discouraged many farmers from borrowing for agricultural purposes and this led to a reduction in agricultural investment. In a state specific study, Lawal and Abdullahi (2011) studied the impact of informal agricultural financing on agricultural production in the rural economy of Kwara State, Nigeria. Their source of data was mainly primary and was collected using structured questionnaire from sampled farmers in Kwara State who were participating in periodic savings, rotating savings and money lending. The researchers used ordinary least square regression technique to do the analysis and found that these three informal financing schemes have positive impact on agricultural production in Kwara State, though it was only rotating savings that had a statistical significance.

In another recent study, Olowofeso et al. (2017) investigated the relationship between agricultural sector financing and agricultural output growth using the non-linear autoregressive distributed lag (NARDL) model. Their findings showed no evidence of asymmetry in the impact of agricultural sector credit on agricultural output growth in the short run but indicated different long run stability relationships between agricultural sector credit and output growth in the agricultural sector. Ahungwa et al. (2014) also studied the pattern and contribution of agriculture to the Gross Domestic Product of Nigeria within the time span of 1960–2012. Data was collected from CBN statistical bulletin, among others. The trend analysis revealed that the share of agriculture to total GDP maintained a clear dominance over other sectors between 1960 and 1975, though it exhibited a downward trend. Further analysis from 1976 to 1989 showed a fluctuating trend, intertwining with the industrial sector. The regression analysis results showed that agriculture has a positive and significant relationship with GDP. Iganiga and Unemhilin (2011), investigated the effect of Federal government agricultural expenditure on agricultural output in Nigeria. They employed co-integration and error correction methodology to determine the nature of the relationship and the results showed that a positive relationship exists between government capital expenditure and agricultural output, however, it was also noted by the researchers that with a one-year lag period, the result shows that the impact of government expenditure on agriculture is not instantaneous. The results revealed negative effects from total credit to agriculture and population growth rate, this negative effect confirmed that it is not enough to give out credit facilities for agricultural practices without proper monitoring it. Nwankwo (2013) examined how the Nigerian Agricultural Co-operative and Rural Development bank as an agricultural financial institution have impacted in the economic growth of Nigeria. Using the least square regression technique, the finding revealed that there is a positively significant relationship between agricultural finance and Economic growth but the rate of loan repayment has over the years had a significant negative effect on agricultural production.

Conclusively, the bulk of existing literature on agricultural financing in Nigeria focused on the effects of agricultural financing or agricultural credit on economic growth as a whole or on agricultural productivity only. There is a dearth of empirical evidence on the impact of agricultural financing on the different

important components of the macro economy such as employment generation. There are also little or no such empirical evidences that show the impact of agricultural output growth has on employment generation in Nigeria. This is the gap this current study intends to fill.

3 METHODOLOGY

3.1 Theoretical Framework

This research work will be an extension of the Classical and Keynesian framework of employment. The Classical theory posits that the level of employment depends on real wage rate while Keynesian theory of employment expresses the level of employment in the short-run as a function aggregate effective demand for commodities.

The classical theory hold that real effective wage is a cost of labor, and an increase in real wage signifies an increase in the cost of labor, which in turn reduces the profitability of investment. This on the other hand will leads to a reduction in the level of employment generated by firms. The classical theory of employment's basic view is that the perfectly free market economy is self-regulating, if prices and wages are flexible, a free market economy will always operate at full employment level. In the labour market, employment for labour is determined by the interaction between the demand and supply for labour, where workers constantly supply labour and employers demand labour. The flexibility of price and wages makes the supply for labour to be always equal to its demand. This can be stated mathematically as:

$$E = f\left(\frac{w}{p}\right), \tag{1}$$

where E is the variable for employment, w is wage, p is the price level and $\frac{w}{p}$ is the real wage rate.

The Keynesian theory on the other hand holds that increase in effective demand will increase employment and a decrease in effective demand will bring about a reduction in employment level. According to the theory, effective demand is equal to the expenditure on consumption and investment which is equivalent to the national input and national output. However investment and consumption expenditure through the market forces alone cannot bring about equilibrium employment, the government needs to take necessary action in order to reduce unemployment, this leads to the inclusion of government expenditure as another component of effective demand aside from consumption and investment expenditure.

When the government intervenes by increasing its expenditure, income increases and the higher level of income will induce demand, to meet the new higher demand, production and output has to increase and for production to increase there will be a need to employ more workers (Mankiw, 2009).

Equation 1 assumes that wage and effective demand are positively related to employment and price is negatively related to employment. This model will be the bedrock for addressing the objectives. The times series data for this study spanned from 1981 to 2017 and the data was obtained from Central Bank of Nigeria statistical bulletin, world data index (2017) and the National Manpower Board.

3.2 Model Specification

The Auto Regressive Distributed Lag (ARDL) bounds test approach will be used to examine the impact of agricultural financing and agricultural output growth on employment generation in Nigeria.

The ARDL model was developed by Pesaran and Shin (1998) and Pesaran et al. (2001). The model is a dynamic model developed to test for the presence of long run relationship between variables. Analyzing the impact of a macroeconomic variable on another macroeconomic variable requires analyzing long-run relationships. The ARDL model incorporates both the lags of the dependent variable and the lags of the independent variables as part of the

regressors. The basic feature of a distributed lag model is that the effects of the independent variables on the dependent variable occur over time and not all at once. The ARDL model is useful especially when the variables are not are not of the same order of integration and it is also flexible with small sample study. The generalized ARDL (p, q) model is specified as:

$$Y_t = \alpha_{0i} + \sum_{t=1}^{p} \beta_i Y_{t-1} + \sum_{t=0}^{q} \delta_i X_{t-1} + \epsilon_{it}, \quad (2)$$

where Y_t is the dependent variable and the variables in X_t are independent variables and are allowed to be purely $I(0)$ or $I(1)$ or cointegrated; β and δ are coefficients; α is the constant; $i = 1, \ldots, k$; p is the optimal lag order for the dependent variable while q is the optimal lag order for the exogenous variables. The lag lengths of p, q may not necessarily be the same; ϵ_{it} is the white noise error term. In this model, the dependent variable is a function of its lagged values, the current and lagged values of other exogenous variables in the model. The researchers' decision to use the ARDL bounds testing approach rather than other available econometrics models is because the ARDL bounds testing approach has both long-run and short-run dynamics and can be used irrespective of the order of integration of the series. The ARDL bounds testing approach has also been empirically proven to be superior with consistent results for small samples. (Wooldridge, 2013).

The model that will be used to examine the impact of agricultural financing and agricultural output growth on employment generation in Nigeria will take the form below. The model will be specified with agricultural financing and agricultural output growth as explanatory variables alongside other control variables using the ARDL bounds testing approach. When applying the ARDL approach, the long run and short run models are specified as shown below:

$$\begin{aligned}
\Delta \ln \mathrm{EMP}_t = {} & \alpha_0 + \beta_1 \ln \mathrm{EMP}_{t-1} + \\
& + \beta_2 \ln \mathrm{AGFN}_{t-1} + \\
& + \beta_3 \ln \mathrm{AOG}_{t-1} + \\
& + \beta_4 \ln \mathrm{AO}_{t-1} + \\
& + \beta_5 \ln \mathrm{LFP}_{t-1} + \\
& + \beta_6 \ln \mathrm{WG}_{t-1} + \\
& + \beta_7 \ln \mathrm{PR}_{t-1} + \\
& + \beta_8 \ln \mathrm{AGEX}_{t-1} + \\
& + \sum_{t=1}^{p} \alpha_1 \Delta \ln \mathrm{EMP}_{t-1} + \\
& + \sum_{t=0}^{q_1} \alpha_2 \Delta \ln \mathrm{AGFN}_{t-1} + \\
& + \sum_{t=0}^{q_2} \alpha_3 \Delta \ln \mathrm{AOG}_{t-1} + \\
& + \sum_{t=0}^{q_3} \alpha_4 \Delta \ln \mathrm{AO}_{t-1} + \\
& + \sum_{t=0}^{q_4} \alpha_5 \Delta \ln \mathrm{LFP}_{t-1} + \\
& + \sum_{t=0}^{q_5} \alpha_6 \Delta \ln \mathrm{WG}_{t-1} + \\
& + \sum_{t=0}^{q_6} \alpha_7 \Delta \ln \mathrm{PR}_{t-1} + \\
& + \sum_{t=0}^{q_7} \alpha_8 \Delta \ln \mathrm{AGEX}_{t-1} + \\
& + \Psi \mathrm{ECM}_{t-1} + \epsilon_t, \quad (3)
\end{aligned}$$

where ln refers to natural logarithm, Δ is the difference operator and ECM_{t-1} is the one period lagged error correction term. Ψ is a coefficient that measures the speed of adjustment between the long run and short run disequilibrium and shows how fast equilibrium is restored in the event of shocks to the system The expression with summation sign k represents the short-run dynamics of the model, while the coefficients β_k represents long-run relationship and E_t is the serially uncorrelated white-noise error term with zero mean and constant variance, α_0 is the constant term and $k = 1, \ldots, n$.

The hypothesis for the bounds test for cointegration is based on the F-statistic with non-standard asymptotic distribution under the null hypothesis that there is no long run relationship among the variables. The null hypothesis is tested using the joint significance test below:

$$\begin{aligned}
H_0 : \; & \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \\
& = \beta_6 = \beta_7 = \beta_8 = 0
\end{aligned}$$

$$H_1 : \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \neq \beta_6 \neq \beta_7 \neq \beta_8 \neq 0$$

The null hypothesis is saying that the coefficients of the long run equation are all equal to zero, and by that it implies that there is no co-integration against the alternative that these coefficients are not equal to zero. Pesaran et al. (2001) developed two bounds test of critical values, the lower bounds assumes that all regressors are $I(0)$ and the upper bounds assumes that all regressors are $I(1)$. If the null hypothesis is unable to be rejected, it means that the computed F-statistic for any chosen level of significance lies below the lower bound, then we can only specify the short run model which in this case denotes no co-integration but if we reject the null hypothesis in favor of the alternative hypothesis which means that the F-statistic lies above the upper bound, then we go ahead to specify an error correction model (ECM). However, if the F-statistic lies between the lower and the upper bounds then the inference will be inconclusive.

If there is a long run relationship among the variables of this study, the long run elasticity will be estimated with the equation specified below:

$$\begin{aligned}\ln \mathrm{EMP}_t = \; & \alpha_0 + \\ & + \sum_{t=1}^{p} \theta_1 \ln \mathrm{EMP}_{t-1} + \\ & + \sum_{t=0}^{q_1} \theta \ln \mathrm{AGFN}_{t-1} + \\ & + \sum_{t=0}^{q_2} \theta \ln \mathrm{AOG}_{t-1} + \\ & + \sum_{t=0}^{q_3} \theta \ln \mathrm{AO}_{t-1} + \\ & + \sum_{t=0}^{q_4} \theta \ln \mathrm{LFP}_{t-1} + \\ & + \sum_{t=0}^{q_5} \theta \ln \mathrm{WG}_{t-1} + \\ & + \sum_{t=0}^{q_6} \theta \ln \mathrm{PR}_{t-1} + \\ & + \sum_{t=0}^{q_7} \theta \ln \mathrm{AGEX}_{t-1} + \epsilon_t. \end{aligned} \tag{4}$$

Equation 4 above represents the long run relationship. All symbols are as defined in equation 3 and the θ's are the long run coefficients.

3.2.1 The Variables

EMP indicates employment level and it is the proportion of the labor force population who are willing and able to work and get work at the prevailing wage rate. In Nigeria, it is measured by the proportion of the population that worked productively for at least 40 hours in the past week. EMP is the dependent variable because the objective of the study is to find the impact of certain economic variables on employment generation.

AGFN refers to Agricultural Financing it is measured by government's expenditure on funding agriculture and agricultural activities. It is an independent variable in the model because the objective of the paper is to estimate the impact of agricultural financing on employment generation. The increase in this variable is expected to have a positive effect on employment generation and so the coefficient of AGFN is expected to be positive.

AO refers to Agricultural Output. It is the quantity of all from agricultural practices which includes all forms of crop cultivation and animal rearing at any given point in time.

AOG refers to Agricultural Output Growth. It is the annual increase in the total agricultural output in the country. This is included as an exogenous variable in the model because one objective of the study is to investigate the impact agricultural output growth on the dependent variable which is employment generation. An increase in agricultural output in the country is expected to increase employment in that country and so the coefficient of AGOG is expected to be positive.

AGEX refers to Aggregate Expenditure. It is the sum total of all expenditures incurred on consumer goods, planned investments and government expenditures undertaken in the economy. In the Keynes theory of employment which is one of the basic theoretical framework used as an underpinning for this study postulates that the level of employment

in an economy depends on the effective demand. By effective demand, Keynes meant the total demand for goods and services at the different levels of employment. The sum of consumption expenditure, investment expenditure and government expenditure constitute effective demand, in other words, the aggregate expenditure in an economy is the effective demand in that economy according to Keynes. Abdullah et al. (2011) and Abdelkader et al. (2017) studied the impact of public expenditure on employment in few countries in Asia and in Algeria. The two results showed that public expenditure in both regions was positively significant to employment generation. An increase in aggregate expenditure is means that there is an increase in the demand for goods and services and this is expected to increase the employment level. The coefficient of the variable AGEX is then expected to be positive.

WG is the wages. Wage is the cost of labor, it is the payment earned for work or services rendered. According to the Classicists, whose theory is bedrock of this study, employment is determined by the demand and supply of labor and this demand and supply of labour depends on the real wage rate. So, by increasing the wage rate, cost of production will reduce and this will lead to a decrease in the prices of products, this decrease in prices will cause the demand for product to rise, leading to an increase in the employment of labor and ultimately full employment will be reached. According to the theoretical framework of this study, the coefficient of WG is expected to be positive.

LFP is the Labor Force Population. It is the proportion of a country's total population ages 15–64 excluding stay-at-home parents, full time students, retired persons, the handicapped and those unable to work or not interested in working. A paper by Bloom and McKenna (2015) explained that the increase in global labor force population without a corresponding increase the number of jobs created will cause an increase in unemployment rate. The coefficient of LFP may be either positive or negative.

PR refers to Price Level and it is the average of all prices goods and services produced currently in an economy. According to the classicists' model of employment, the level of employment is determined by the demand and supply for labor which depends on the real wage rate. The real wage rate here is the ratio of money wage and price level. A fall in price level will lead to an increase in the real wage rate and subsequently an increase in employment level. The coefficient of PR is expected to be negative.

3.3 Model Justification

The ARDL bounds test procedure was developed by Pesaran et al. (2001) and it is useful when empirically analyzing the long-run relationships and the dynamic interaction among economic variables. For times series data with small and finite data size like the case of this present study, the ARDL bounds testing is more efficient when compared to other methods. It has been empirically proven that the results are consistent and the estimates of the long-run model are unbiased (Harris and Sollis, 2003). This testing procedure is simple and in contrary to other multivariate cointegration techniques such as Johansen and Juselius (1990), it allows the cointegration relationship to be tested using Ordinary Least Squares (OLS) procedure once the lag order of the variables of interest have been identified (Oteng-Abayie and Frimpong, 2006). The model is also preferred by the researchers because it can be applied regardless of the order of integration of variables, it eliminates the problem of the order of integration that is common with the Johansen likelihood approach, whether the variables are purely integrated of order one $I(1)$ or order zero $I(0)$, fractionally integrated or even mutually integrated, this testing approach can still be applied. The ARDL bounds testing approach is simple to implement and interpret because it involves just a single- equation set up. In the ARDL bounds testing approach, different variables can be assigned different lags as they enter the model and the t-statistics are valid even when some of the regressors are endogenous (Pesaran et al., 2001).

The models were estimated using the Eviews 9.0 software package because of its efficiency

and effectiveness in analyzing times series data using the ARDL model.

3.4 Pre-Estimation and Post-Estimation Hypothesis

Unit Root Test

H_0: the variables are non-stationary.

Decision Rule: reject H_0 if the absolute value of $\text{ADF}_{\text{cal}} > \text{ADF}_{\text{tab}}$.

Breusch-Godfrey Serial Correlation LM Test

H_0: there is no serial correlation.

Decision Rule: reject H_0 if the $F_{\text{cal}} > F_{\text{tab}}$, otherwise, do not reject. Or reject H_0 if the P-value is less than 0.05.

Note that the F_{cal} is the computed F statistic, while F_{tab} is the level of significance or critical values.

4 RESULTS AND DISCUSSION

4.1 Unit Root Test

The unit root test is carried out to examine the order of integration of the variables. As it is generally known that variables that are not integrated of order zero will lead to imprecise result if used for estimation and therefore cannot be used to estimate short-run analysis. For the purpose of this research study, the Augmented Dickey-Fuller (ADF) test and the Phillip-Perron (PP) test for unit root was used to test if the time series is stationary or not at the chosen level of significance.

The results in the Tab. 1 indicates that $\text{ADF}_{\text{cal}} < \text{ADF}_{\text{tab}}$ at levels form both with trend and without trend meaning that agricultural output (AO), employment (EMP), agricultural finance (AGFN), aggregate expenditure (AGEX) and labor force (LF) variables were non-stationary at levels. But the ADF cal> ADF tabat level for agricultural output growth (AOG) and wage (WG), showing that this variable is stationary at level. Moreover, the $\text{ADF}_{\text{cal}} > \text{ADF}_{\text{tab}}$ for AO, EMP, AGFN, AGEX and LFshowing that though these variables were not stationary at the level, they were stationary at their first difference which is a necessary condition to proceed with the regression. Thus, the variables were integrated of order zero $I(0)$ and one $I(1)$.

The Phillip-Perron (PP) unit root test in Tab. 2 shows that the variables AO and WG were stationary at level, that is, they are integrated of order zero – $I(0)$, whereas AGEX, AGFN, AO, EMP and LF were stationary after first differencing, which means they are integrated of order one – $I(1)$. The combination of $I(1)$ and $I(0)$ variables making it possible for the researcher to proceed with the cointegration and bound test approach.

Tab. 1: Result of Augmented Dickey-Fuller unit root test of the variables

	Level Form		First Difference		
Variables	**5% critical value**	**ADF test statistics**	**5% critical value**	**ADF test statistics**	**Order of integration**
AGEX	−2.945842	−1.598240	−2.948404	−5.143602	$I(1)$
AGFN	−2.945842	−2.661838	−2.951125	−7.100106	$I(1)$
AOG	−3.540328	−4.795090	–	–	$I(0)$
AO	−2.945842	8.287824	−3.544284	−4.821754	$I(1)$
EMP	−3.548490	−0.827744	−2.948404	−6.308979	$I(1)$
LF	−3.540328	0.477181	−3.544284	−4.714395	$I(1)$
WG	−3.552973	3.677762	–	–	$I(0)$

Source: Eviews 9 Output for the Result of Augmented Dickey-Fuller unit root test of the variables

4.2 Lag Length Selection Criteria using Akaike Information Criterion

The lag length for the autoregressive distributed lag model of objective one and two was done using Akaike Information. Since the study used Eviews 9 which gives chance for automatic selection of lag lengths, the variables selected maximum lag lengths of 2. At the end of evaluation, the study produced ARDL presented in Fig. 2.

The Autoregressive Distributed Lag (ARDL) model selection is presented in Fig. 2. The result of the lag length selection showed that after 20 evaluations, the system automatically selected ARDL $(2, 0, 2, 2, 2, 0, 2, 2)$.

Tab. 2: Result of Philips-Perron unit root test of the variables

	Level Form		First Difference		
Variables	**5% critical value**	**PP test statistics**	**5% critical value**	**PP test statistics**	**Order of integration**
AGEX	−2.945842	−1.826927	−2.948404	−5.144728	$I(1)$
AGFN	−2.945842	−2.496547	−2.948404	−18.863670	$I(1)$
AOG	−2.945842	−4.645456	–	–	$I(0)$
AO	−2.945842	7.470031	−3.544284	−4.748836	$I(1)$
EMP	−2.945842	−2.320790	−2.948404	−5.304766	$I(1)$
LF	−2.945842	1.606316	−2.948404	−4.442421	$I(1)$
WG	−2.945842	−2.994143	–	–	$I(0)$

Source: Eviews 9 Output for the Result of Philips-Perron unit root test of the variables

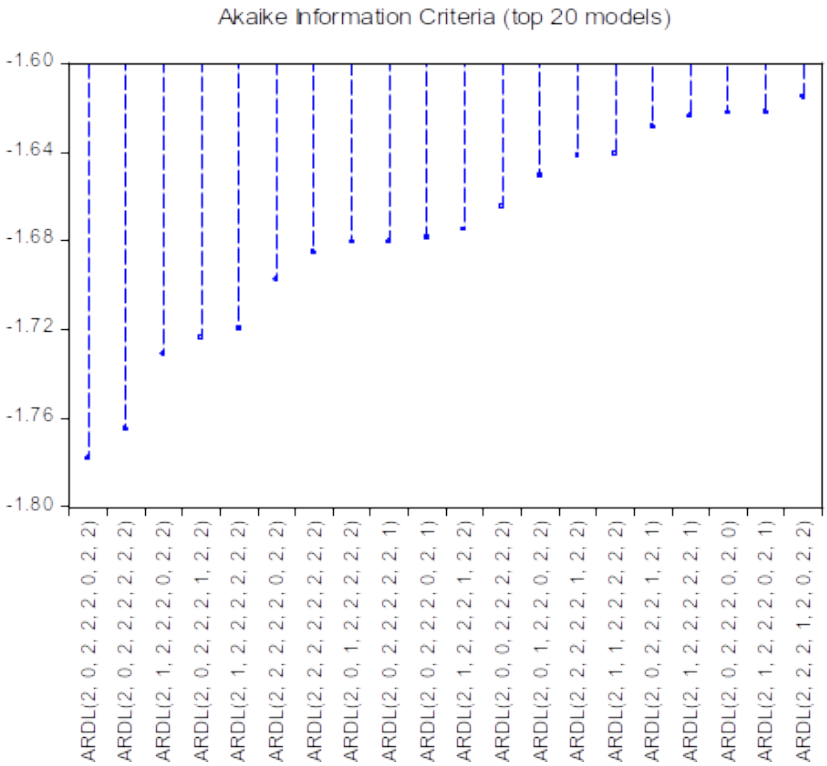

Fig. 2: Graph of lag ARDL lag length selection based on Akaike Information Criterion
Source: Eviews 9 Output for model selection based on Akaike Information Criteria

Tab. 3: Result of ARDL Cointegration and Long-run Form (dependent variable: EMP)

Cointegrating Form

Variable	Coef.	Std. error	*t*-statistic	Prob.
D(EMP(−1))	−1.050075	0.104999	−10.000767	0.0000
D(AO)	0.000416	0.000034	12.127873	0.0000
D(AOG)	−0.420065	0.100640	−4.173952	0.0008
D(AOG(−1))	0.162786	0.093229	1.746098	0.1012
D(AGFN)	0.000204	0.001664	0.122858	0.9039
D(AGFN(−1))	−0.004924	0.001902	−2.588947	0.0205
D(AGEX)	0.000000	0.000000	0.725201	0.4795
D(AGEX(−1))	0.000001	0.000000	2.706654	0.0162
D(LF)	0.000000	0.000000	4.271568	0.0007
D(PR)	−0.068499	0.007454	−9.190099	0.0000
D(PR(−1))	0.040143	0.011245	3.569844	0.0028
D(WG)	−0.000002	0.000003	−0.762021	0.4579
D(WG(−1))	−0.000004	0.000002	−1.596797	0.1312
ECM(−1)	−0.287844	0.068209	−4.220018	0.0007

ECM = EMP−(0.0014·AO−2.5299·AOG+0.0131·AGFN−0.0000·AGEX+0.0000·LF−0.2741·PR+0.0000·WG+47.8290)

Long Run Coefficients

Variable	Coef.	Std. error	*t*-statistic	Prob.
AO	0.001446	0.000324	4.469113	0.0005
AOG	−2.529894	0.826775	−3.059953	0.0079
AGFN	0.013126	0.014514	0.904366	0.3801
AGEX	−0.000004	0.000001	−3.972934	0.0012
LF	0.000000	0.000000	5.325788	0.0001
PR	−0.274078	0.055540	−4.934784	0.0002
WG	0.000016	0.000014	1.178424	0.2570
C	47.828957	1.401911	34.116968	0.0000

Source: Eviews 9 Output for the result of the short run and long run model

4.3 Cointegration and Bounds Test

In order to test for the existence of long run relationship among the variables, the study used Bound test approach. This is because some of the variables in the model are integrated of order one while some or at least one of the variables is integrated of order zero. This result is presented in Tab. 4. The null hypothesis for this test is that no long run relationship exists and the decision is to reject the null hypothesis if the value of F-statistic from the bound test conducted is greater than the upper bound value of Pesaran test statistic.

Tab. 4: Result of bounds test (cointegration of the variables)

F-statistic	10.26539

Critical Value Bounds

Significance	0 Bound	1 Bound	Decision
10%	2.03	3.13	Cointegrated
5%	2.32	3.50	Cointegrated
2.5%	2.60	3.84	Cointegrated
1%	2.96	4.26	Cointegrated

Source: Eviews 9 Output for the Result of bounds test (cointegration of the variables)

The result of bound test presented in Tab. 4 shows that the value of F-statistic lies above the upper bound value of Pesaran test statistic. This is an indication that the null hypothesis that there is no long run association among the variables in the model is to be rejected. Therefore, there exists long run relationship among the variables in the model.

4.4 Post Estimation Test

The post estimation test that will be analyzed in this section includes the Breusch-Godfrey Serial Correlation LM test, white Heteroskedasticity test and other diagnostic tests such as dynamic stability Cusum test and specification error test will be conducted in this study so as to prevent mis-specification errors.

4.4.1 Breusch-Godfrey Serial Correlation LM Test

This test employed the Breusch-Godfrey Serial Correlation LM Test to examine the tendency of serial correlation in the error term. The result is presented below.

The result presented above shows that the probability of the F-statistics is greater than 0.05 (5%). Also, the observations times R-squared is less than the chi-square P-value. Hence, we accept the H_0 and conclude that the model has no serial correlation.

4.4.2 Diagnostic Test

Stability of the short run model was tested using CUSUM test. The idea behind this test is to reject the hypothesis of model stability if the blue line lies significantly outside the dotted red lines otherwise, the model is said to be stable. The null hypothesis for the test is that the model is stable. The result of this test is presented in Fig. 3.

The stability result as presented in the diagram above shows that the blue line lies between the dotted red lines which implies that the model is dynamically stable.

4.5 Interpretation of Long-Run and Short-Run Results

Tab. 3 shows the regression results for equation 3, the first column of the cointegrating form of the result presented above shows that an increase in the employment level of the previous year by one percent will cause the level of employment in the current year to decrease by 1.05 percentage point. The coefficient of Agricultural Financing (AGFN) in the short run is 0.000204, −0.004924 in the first-year lag and 0.013126 in the long run with t-values of 0.1228, −2.5889 and 0.9043 pectively. This result shows that the effect of agricultural financing on employment generation in both the short run and long run is positive but statistically insignificant. However, it is significant after one period lag in the short run. This result agrees with the findings of Ogbalubi and Wokocha (2013) that examined agricultural development and employment generation in Nigeria. The researchers concluded that even though various policies have been made towards food security and provision of agricultural raw materials to the manufacturing sector so as to create more employment opportunities and income, the results from these policies are yet to be discovered.

Agricultural Output Growth (AOG) has a coefficient of −0.420065 in the short run, 0.162786 in lag one and −2.529894 in the long run. The p-values were 0.0079 in the long run, 0.0008 in the short run and 0.1012 in lag one. In the long run and short run, the coefficients were negative and significant and this implies that an increase in agricultural output growth in Nigeria will cause a fall in employment generation. This negative relationship in both the short run and long run conforms to the findings of Ajakaiye et al. (2016) that examined the relationship that existed between growth and employment in Nigeria using the Shapley decomposition approach alongside the economic estimation of

Tab. 5: Breusch-Godfrey Serial Correlation LM Test

F-statistic	0.128923	Prob. $F(2,13)$	0.8802
Obs*R-squared	0.680700	Prob. Chi-Square(2)	0.7115

Source: Eviews 9 Output for Breusch-Godfrey Serial Correlation LM Test

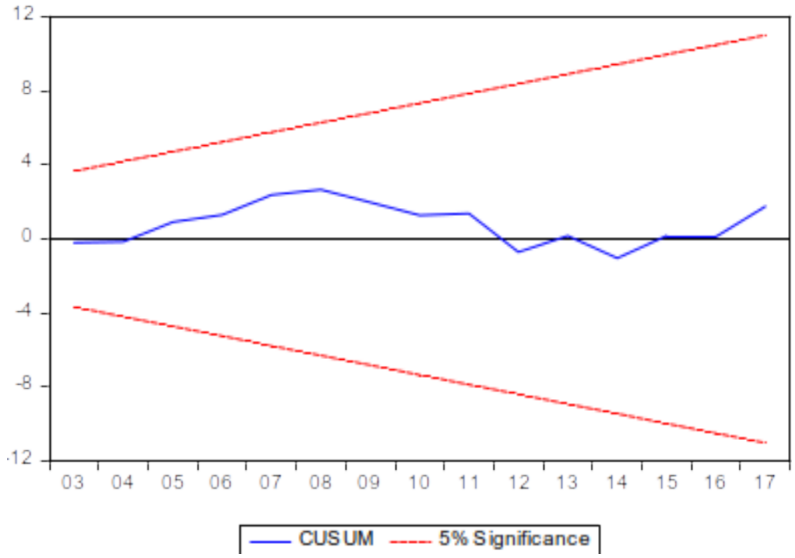

Fig. 3: CUSUM test
Source: Eviews 9 Output

the country's employment intensity of growth. The findings showed that Nigeria experienced steady rate of economic growth and within the same study period, unemployment was on the rise in Nigeria. Also, in Côte d'Ivoire, N'Zué (2001) examined employment and economic growth using the Engle-Granger co-integration test with data from 1975 to 1995, the result showed that economic growth and employment were negatively related during the time period of the study, implying that there was a jobless growth in Côte d'Ivoire which also confirms the result for Nigeria. Donnellan and Hanrahan (2016) also used the eurostat data to compare the performances of the primary agriculture and food processing of different European Union member states. Their findings showed that the agriculture and food processing sector have experienced output growth across the European Union, however even with this growth, employment has continued to decline in the sector.

For Agricultural Output (AO), the coefficient in the long run was 0.001446 with t-value of 4.4691 while in the short run the coefficient was 0.000416 with t-value of 12.1278. This result implies that the relationship that exists between agricultural output and employment generation in the long run and short run is positive and highly significant because of the positive coefficients and significant t-values (greater than 2 in absolute values. The findings of Hayami et al. (1987) conform to this result. They examined how agricultural processing and marketing affected employment generation and income using the case of soybean in Indonesia. The estimation result of their work showed that the processing and marketing of farm products played a significantly important role in generating income and employment in local communities in Indonesia.

Aggregate Expenditure (AGEX) had a short run coefficient of 0.000000 and a p-value of 0.4795 indicating that the relationship between aggregate expenditure and employment generation in the short run is positive and insignificant whereas in the long run the relationship that exists is negative and significant given the negative coefficient of -0.000004 and a t-value of -3.9729. The aggregate expenditure of the previous year had a positive significant relationship with the employment generation of the current year as indicated by the lagged coefficient and p-value of aggregate expenditure. The positive relationship in the short run conforms partially to Keynes theory of employment, even though it is statistically insignificant.

In the short run, Prices (PR) has a negative coefficient of −0.068499 which indicates a negative relationship and the t-value of −9.1900 implies that the negative relationship that exists between price and employment generation in the short run is significant, similarly, in the long run, there also is a significantly negative relationship between price and employment generation which was indicated by the negative coefficient and the p-value of 3.5698. This validates the classical theory of employment which postulates that the increase in general price level of commodities overtime will cause a reduction in the level of employment generated.

The result showed that wages had a positive but insignificant relationship with employment generation in the long run, but in the short run the coefficient was negative (−0.000002). This negative relationship in the short run conforms to the classical theory of employment that premises that an increase in real wage which translates to an increase in the cost of labor will cause employers of labor to demand less labor.

5 CONCLUSIONS

In this study, the impact of government's agricultural financing and agricultural output growth on employment generation in Nigeria was estimated. The results from the estimation showed that, government's agricultural financing had a positive and insignificant relationship with employment generation in the long-run, the relationship was also insignificant and positive in the short-run while agricultural output growth only had a short-run insignificantly positive relationship with employment generation but the relationship was significant and negative in the long-run.

From the previous discussions, there is scarcity of conclusive literature on the impact of agricultural financing on employment generation in Nigeria. However, in this study it was found that government's agricultural financing has an insignificant positive impact employment generation in the long-run but has no significant impact in the short run while the lag of agricultural output growth has a positive impact on employment generation in the short run and a negative impact in the longrun. The labor force population and aggregate expenditure both have positive impact on employment generation in the long-run while wage has a positive impact on employment generation in both the short-run and long-run. However, price had a negative impact on employment generation in the short-run but insignificant in the long-run.

5.1 Policy Recommendations

As Nigeria attempts to diversify its economy in order to curb the appalling unemployment situations it is facing, it is imperative for policy makers in charge of finance to adequately provide finance for agricultural practices especially now that agriculture is seen as an important sector in reviving the economy. The following policy recommendations should therefore be considered. First, policy makers should endeavor to ensure that every fund allocated for a specific agricultural scheme and policy should be fully utilized for its purpose. To increase employment opportunities, there should be careful monitoring of the implementation of each scheme and policy to realize its specific policy objectives. Second, the agricultural financing model of the Central Bank should be re-evaluated to ensure that the targeted population of farmers actually gets the required funding to boost agricultural output. Third, there is need to educate more farmers on the need for mechanized farming. This will help reduce the belief that make people think that agriculture is a seasonal job. This will also help to provide more employment opportunities for skilled and technical workers in the agricultural sector.

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FLIGHT DELAY CAUSES AT SELECTED VISEGRAD GROUP INTERNATIONAL AIRPORTS

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ABSTRACT

The aim of this article is to analyse the flight delay causes at base airports (Prague, Brno, Ostrava, Budapest, Bratislava, Katowice, and Warsaw), with a special focus on a selected airline company operating in the central European region. To process the data, methods of multivariable statistics, namely tests of independence in contingency tables, the Kruskal-Wallis testing, cluster analysis, and correspondence analysis were used. Apparently, both charter and scheduled flights have the same percentage of delayed flights, delays occur most frequently in June, and Boeing 737-800 reported delays more frequently than Airbus A320. The research has shown that the highest number of delayed flights occurs in Budapest, the lowest number in Katowice. During the night, short delays occur most often, long delays most frequently arise in the evening. The most common cause for longer delays is technical maintenance or an aircraft defect and previously delayed flights. The flight dispatch by supplier companies is the source accounting only for rather short delays. Overall, the delayed flights frequency increases with the size of the city and the airport.

KEY WORDS

correspondence analysis, delay causes, international airports, Pearson's chi-squared test, dendrogram, Kruskal-Wallis test

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1 INTRODUCTION

The passengers are sometimes, in cases of very significant flight delays, entitled to financial compensation under certain conditions. This concerns rather high amounts of money which may represent a considerable expense for airline companies. It is therefore necessary to try and

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eliminate the delays, especially the long ones, so that airlines would not be obliged to pay financial compensations to passengers. At the same time, elimination of delays would improve customer experience, as nobody enjoys long waiting times at airports. Rights of passengers in the air transport are stipulated in Regulation (EC) No. 261/2004 of the European Parliament and of the Council; for more details see European Consumer Centre Czech Republic (2020).

The principal objective of this work is to evaluate and assess the delay-caused problems at selected airports in the countries of the Visegrad Group. Airports have been selected based on the results of cluster analysis and internal information of the airline. These are the so-called Base Airports – airports that serve as an airline's home base with full facilities and personnel. In the first step, all flights at selected airports were analysed: this included differences between charter and scheduled flights, delays at specific airports, delays of different aircraft, and times of delays. Statistical hypothesis testing and the Kruskal-Wallis test proved useful in the identification of statistically significant differences. In the second step, the focus was on selected airports and delayed flights. This entailed a detailed (correspondence) analysis of delays – considering their length, time of occurrence, reasons and so on.

This study evaluates the causes of flight delays at base international airports (Prague, Brno, Ostrava, Budapest, Bratislava, Katowice, and Warsaw) used by a selected airline company operating in the Czech Republic. The causes of delays were classified based on the codes of IATA (The International Air Transport Association), adapted for the specific needs of this company; see Tab. 1. The dependences of delay causes on other factors were examined by means of independence test in contingency tables. Correspondence analysis was employed in order to display the results graphically.

According to the authors Wang et al. (2019), delays in air travel cause economic losses for airlines and reduce the quality of travel. The analysis of the causes of delays is performed here by the methods of statistical physics. A delay represents an issue that affects both passengers and the airport staff, this issue being addressed, for example, by Wu and Truong (2014), Zámková et al. (2018). They came up with a comparison of the IATA delay data system with the coding system developed by the authors themselves. The article by Skorupski and Wierzbińska (2015) deals with the difficulties encountered due to late check-ins and looks for an optimal time limit after which it is appropriate to stop waiting for the latecomers. The authors Jiang and Ren (2018) propose a model that can effectively describe the behaviour of passengers at various delays. The author Stone (2018) found that flight delays or cancellations have a negative impact, especially on passengers at small airports (locals and tourists), who then have to travel to the transfer airport instead of departing from these small airports. This further increases the impact of these passengers on the entire travel itinerary. According to Forbes et al. (2015), it would be advisable for airlines to release information on delayed flights with a delay of more than 15 minutes. Further research focused on the modelling of the course and propagation of delays during subsequent flights, see, for example, Campanelli et al. (2014), Rebollo and Balakrishnan (2014). Optimization of delays is seen as a solution in articles by AhmadBeygi et al. (2008), Wang et al. (2020), Wu et al. (2016) and Belkoura et al. (2016). The authors of the article Wu and Law (2019) developed a model describing the propagation of delays to subsequent flights using the Bayesian network. The authors Pamplona et al. (2018) propose procedures for optimal air traffic control to predict delays. In doing so, they use neural network methods. Research of authors Serhan et al. (2018) studies the effectiveness of incorporating airline and passenger delay cost into an integrated airport surface and terminal airspace traffic management system. Problems with lost luggage are discussed in the article by Alsyouf et al. (2015).

The research by Zámková et al. (2017) looked into different delay-causing factors at European airports during the summer season in 2008–2014. The conclusion? Delays occur in approx. 50% of all flights and are most often caused by

Tab. 1: Airlines delay codes

Code	Explanation
AIC	Operational reasons of airline
PB	Delay caused by passenger and baggage handling
ARH	Delay caused by suppliers – handling, fuelling, catering
TAE	Delay caused by technical maintenance or aircraft defect
FOC	Delay caused by operational requirements and crew duty norms
ATFMR	Delay caused by air traffic control
AGA	Delay caused by airport restriction
R	Reactionary codes – delay caused by delay of previous flight
MISC	Specific delay, not matching any of the above

Source: Eurocontrol (2020)

the aircraft's delay on the previous flights. Plus, the later in the day, the more delays caused by this reason occur. Compared to the above-mentioned paper by Zámková et al. (2017), the current research uses more recent data (2015) only from major Visegrad Group airports, allowing for the generalization of results to fit the airports in Central Europe.

This paper starts with an analysis of all flights operated by the selected airline in the given period and selected V4 destinations, regarding: Total number of delayed flights, number of delayed flights considering the flight type, aircraft type, and the time period (summer season of 2015). Next, statistical testing (including the Kruskal-Wallis non-parametric test for abnormalities in the distribution of the random variable) allowed for the assessment of statistically significant differences between the groups. This was followed by cluster analysis, pinpointing the similarities in V4 departure destinations, and explaining the selection process. From there on, only the selected airports have been under a more detailed review considering the delay causes (correspondence maps and column relative frequencies).

2 METHODOLOGY AND DATA

Primary data cover the peak season of the selected airline (from 1st June 2015 to 30th September 2015) and include information on the length of delay as well as the delay causes. The data were obtained from an internal database of the observed airline. A substantial part of the data is categorial or suitable for categorizing. The processed data included the following information: departure date, aircraft type, flight type (charter, scheduled, etc.), place of departure, departure time, length of delay, and cause of delay.

The character of analysed data has determined the use of the corresponding independence tests. Řezanková (1997) claims that contingency tables of the $r \times c$ (where r is the number of rows, while c of columns) most often require the use the Pearson's chi-square test. For more information, see Hindls et al. (2003), Hendl (2006), Agresti (1990), Anděl (2005).

Correspondence analysis is an effective tool enabling the display and summary of a set of data in two-dimensional graphic form. It decomposes the chi-squared statistic into orthogonal factors. The distance existing between the single points is called the chi-squared distance. The interval between i-th and i'-th row is

$$D(i,i') = \sqrt{\sum_{j=1}^{c} \frac{(r_{ij} - r_{i'j})^2}{c_j}}, \qquad (1)$$

where r_{ij} represents the components of row profiles matrix $\mathbf{R}$ and weights c_j correspond to the components of column loadings vector c^{T}. This analysis serves to reduce the multidimensional

space of row and column profiles and to save the original data information to the highest extent possible, see Hebák et al. (2007). The total variance of the data matrix may be measured by the inertia, see e.g. Greenacre (1984). The processing of the data was carried out in the Unistat and Statistica software.

The cluster analysis allows the input data matrix set of object to be distributed into several clusters, for more details see Hendl (2006). The aim is to achieve a situation where the objects within a cluster are similar to each other as much as possible and objects from different clusters are similar to each other as little as possible. We are using the distance measure to evaluate the degree of the objects' similarity. Euclidean distance can be used for quantitative variables

$$D_E\left(x_i, x_{i'}\right) = \sqrt{\sum_{i=1}^{p} \left(x_{ij} - x_{i'j}\right)^2}. \qquad (2)$$

The most common procedure of the cluster analysis is a hierarchical clustering, i.e. creating a hierarchical sequence of decompositions, for more details see Hebák (2007). Hierarchical clustering result is best viewed as a tree diagram, dendrogram. Distances between clusters are derived from the distances between objects. There are several agglomerative procedures, e.g. Ward method based on Ward's criterion of decomposition quality, in detail see Hebák (2007).

The Kruskal-Wallis test by ranks is a nonparametric method for testing whether samples originate from the same distribution. It is used for comparing two or more independent samples of equal or different sample sizes. It extends the Mann-Whitney U test when there are only two groups. Null hypothesis assumes that the mean ranks of the groups are the same. It can be used as an alternative to the parametric one-way analysis of variance (ANOVA) when the population cannot be assumed to be normally distributed. For more details see Anděl (2005), Hendl (2006).

3 RESULTS

The frequency table below indicates that the lowest number of delayed flights occurs at the airport in Katowice (17.52%). The base aircraft is not so busy in Katowice (the total number of operated flights is lower), therefore the probability of delay occurrence is lower, and if delays occur, it is easier to take care of the issue. The worst situation as for delays is at the airport in Budapest where the airline has only one base aircraft which is moreover very busy (45.06%). In general, airports in smaller cities with lower traffic intensity have fewer delayed flights, see Tab. 2.

Tab. 3 lists flight delays according to the flight type. Ferry flights seem to be most frequently delayed, however, the number of such flights is very limited. Charter and scheduled flights are interestingly delayed just as often (charter 30.4% and scheduled 32.4%).

Tab. 4 illustrates the fact that delays occur most frequently in June, probably due to the start of the peak season, and in September, at the end of summer, apparently marked by longer technical checks preventing further complications.

Boeings 737-800 tend to be delayed more often than Airbuses A320 (Tab. 5). On two occasions, a replacement aircraft needed to be used (due to some type of emergency) in order to cover two flights (SUB), both of those flights were delayed, for obvious reasons. See graphic representation in Fig. 1–4. The outliers in Fig. 1–4 clearly indicate that monitored data are not normally distributed. Hence the application of the Kruskal-Wallis rank sum test (see the results in Tab. 6). See Tab. 7 for Dunn's nonparametric comparison for post hoc Kruskal-Wallis testing (only statistically significant at 5% level). The post hoc analysis confirmed statistically significant differences between Boeing 737-800 and Airbus A320 (p-value 0.025), with the Boeings being more

Tab. 2: Relative frequencies – Selected airports and delayed flights

Airport	Country	Code	All flights	Delayed flights	Percentage
Brno	Czech Republic	BRQ	783	201	25.67%
Bratislava	Slovak Republic	BTS	1151	312	27.11%
Budapest	Hungary	BUD	344	155	45.06%
Katowice	Poland	KTW	411	72	17.52%
Ostrava	Czech Republic	OSR	728	177	24.31%
Prague	Czech Republic	PRG	4266	1512	35.44%
Warsaw	Poland	WAW	846	262	30.97%
Total			8529	2691	31.55%

Source: internal database of the observed airline

frequently delayed. Statistically significant differences are conclusive between the Prague and Bratislava Airport (p-value 0.005), and Bratislava and Warsaw Airport (p-value 0.023) – probably due to the greater overall workload of the airports in Prague and Warsaw. There is a statistically significant difference between August and June – June, when the traffic tends to begin to increase, reporting more delays.

Tab. 3: Relative frequencies – Selected flight types and delayed flights

Flight type	All flights	Delayed flights	Percentage
C (charter flight)	5040	1532	30.40%
J (scheduled flight)	3127	1014	32.43%
P (empty leg)	355	140	39.40%
T (ferry flight)	7	5	71.43%
Total	8529	2691	31.55%

Source: internal database of the observed airline

Tab. 4: Relative frequencies – Months and delayed flights

Month	All flights	Delayed flights	Percentage
June	2004	709	35.38%
July	2329	710	30.49%
August	2294	667	28.64%
September	1902	605	31.81%
Total	8529	2691	31.55%

Source: internal database of the observed airline

The selection process: only the so called "Base Airports" with complete airline's facilities have been selected (according to the internal airline info), while also considering the fact that of all delayed flights, 90% occur at the selected airports. The remaining 10% of delays occurred at the remaining V4 airports (Czech Republic, Slovak Republic, Poland, Hungary).

Tab. 5: Relative frequencies – Aircrafts and delayed flights

Aircraft	All flights	Delayed flights	Percentage
319	202	39	19.31%
320	1871	438	23.41%
680	137	29	21.17%
700	596	137	22.99%
800	5721	2046	35.76%
SUB	2	2	100.00%
Total	8529	2691	31.55%

Source: internal database of the observed airline

Tab. 6: Kruskal-Wallis rank sum test

Factor	Test statistic	Df	p-value
Flight type	7.967	3	0.047
Aircraft type	16.579	5	0.005
Airport	25.975	6	< 0.001
Month	14.193	3	0.003

Source: internal database of the observed airline

Tab. 7: Dunn's nonparametric comparison for post hoc Kruskal-Wallis testing (only statistical significant at 5% level)

Flight type	–
Aircraft type	320-800 with p-value 0.025
Airport	BTS-PRG with p-vaue 0.005 BTS-WAW with p-value 0.023
Month	August-June with p-value 0.001

Source: internal database of the observed airline

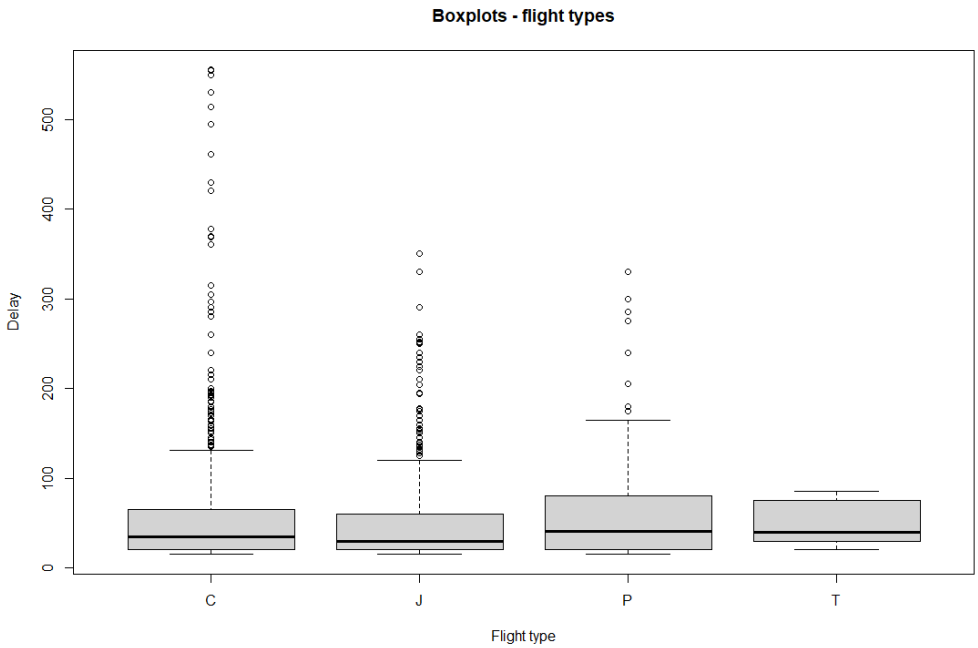

Fig. 1: Box plots – Delay & Flight type

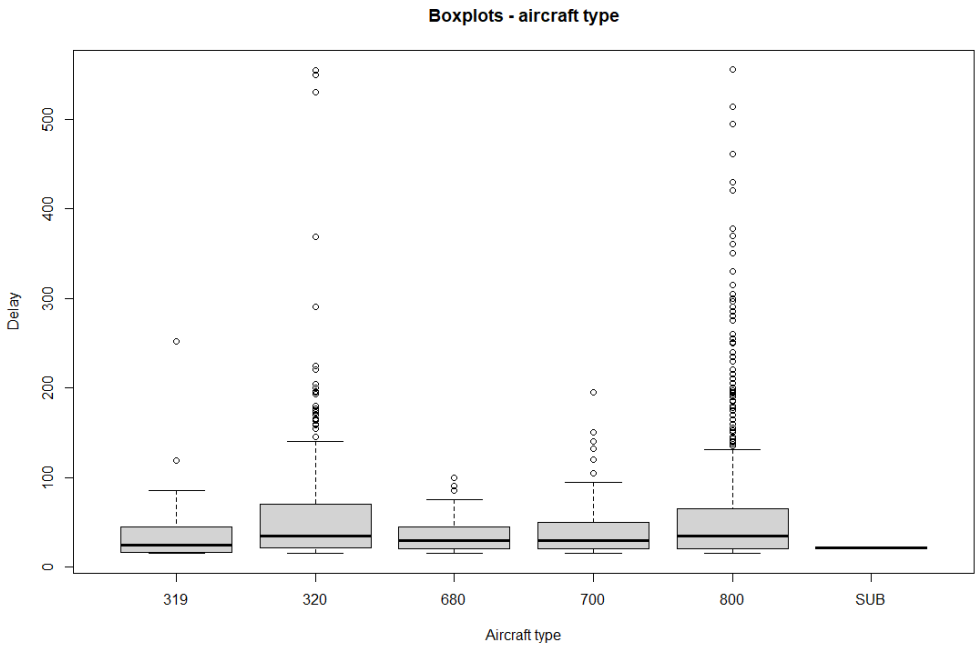

Fig. 2: Box plots – Delay & Aircraft type

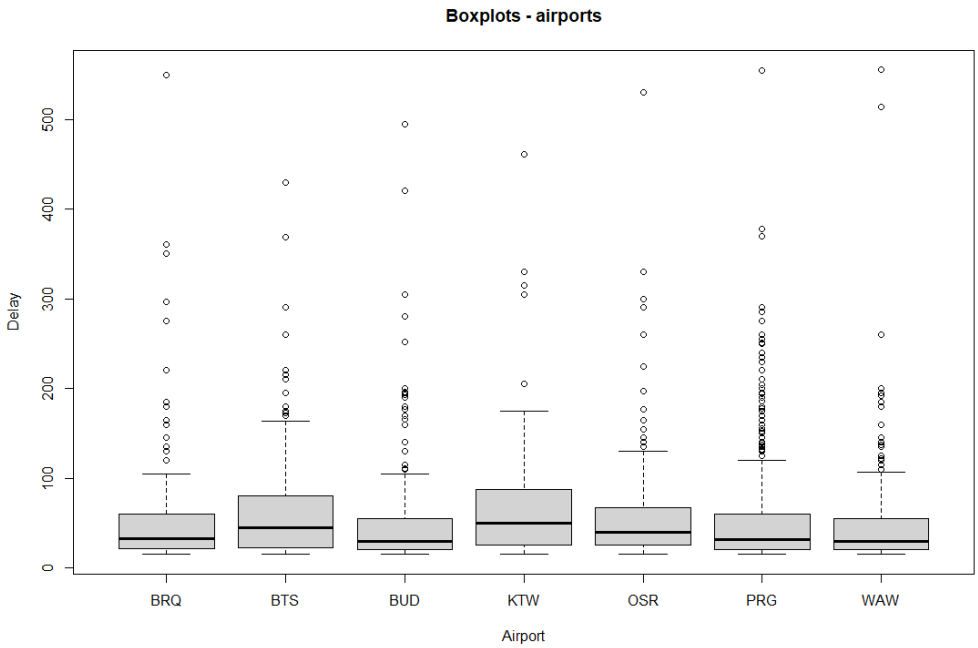

Fig. 3: Box plots – Delay & Airport

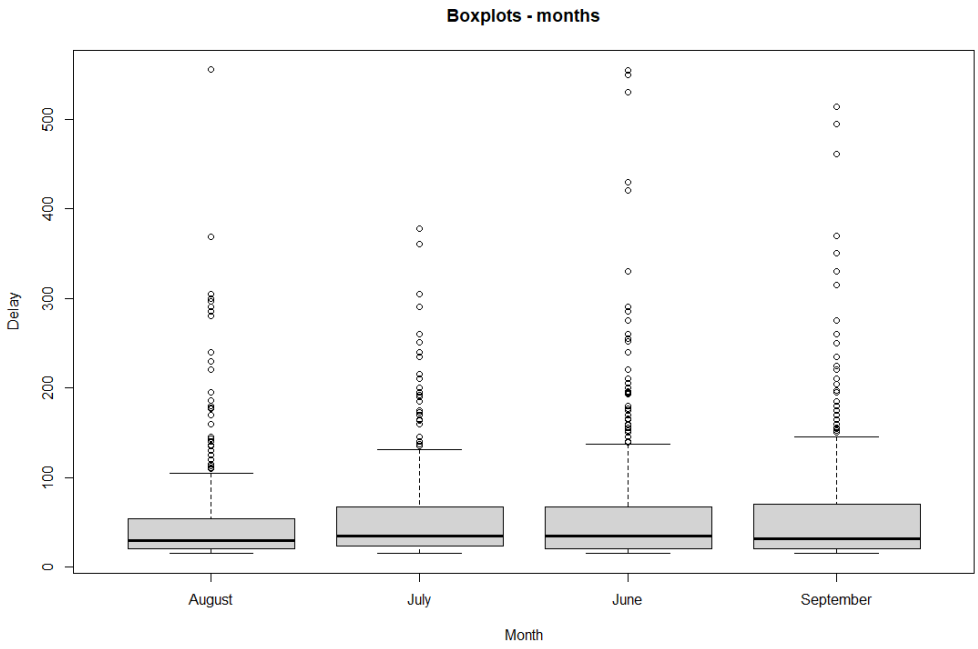

Fig. 4: Box plots – Delay & Month

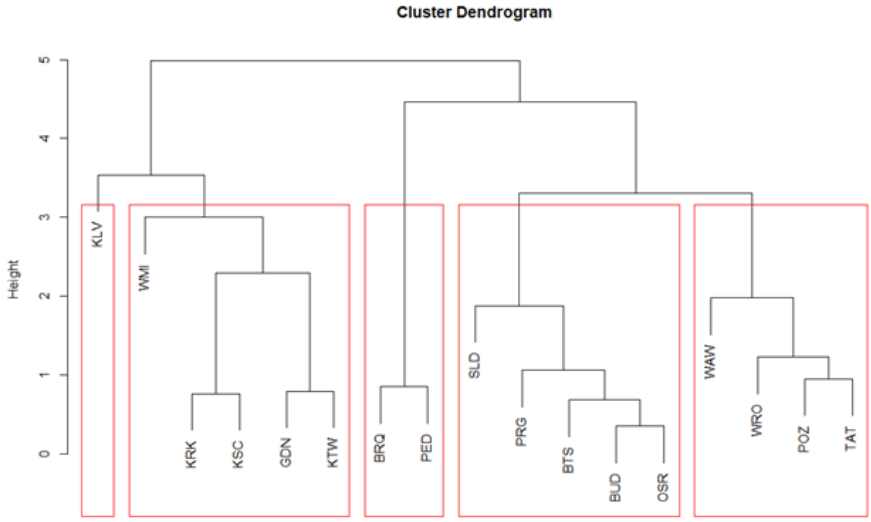

Fig. 5: Cluster dendrogram, standardized, Ward's Method

Tab. 8: Contingency table – Length of delay and airport

Column relative frequencies	PRG	BRQ	KTW	BUD	BTS	WAW	OSR
00:15–00:30	44.27%	43.98%	29.69%	45.07%	38.80%	48.28%	40.21%
00:31–01:00	28.78%	32.87%	25.00%	28.87%	23.66%	27.97%	30.93%
01:01–01:30	14.00%	11.57%	21.88%	7.04%	15.46%	8.43%	11.34%
01:31–02:00	6.64%	5.09%	4.69%	5.63%	10.41%	5.36%	6.70%
02:01 and more	6.32%	6.48%	18.75%	13.38%	11.67%	9.96%	10.82%

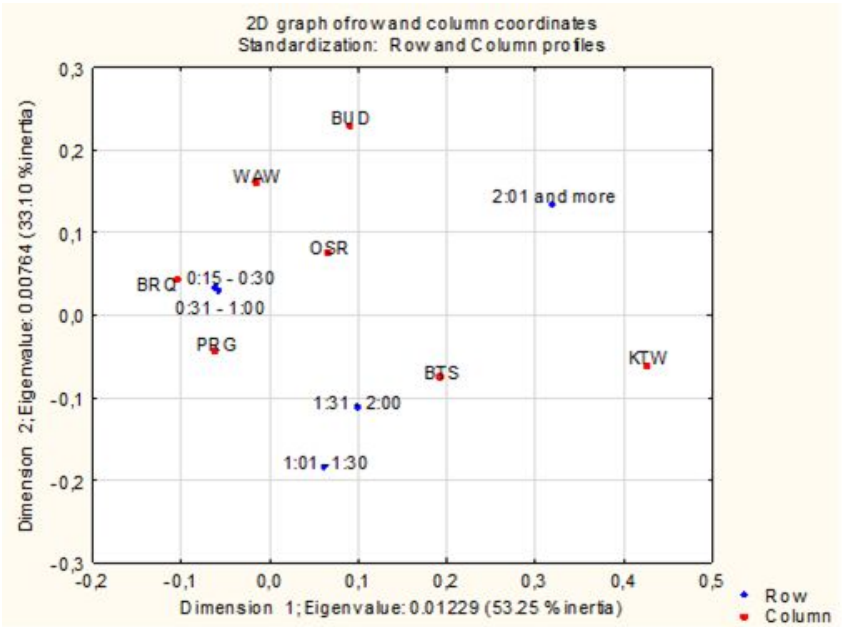

Fig. 6: Correspondence maps – Length of delay and airport

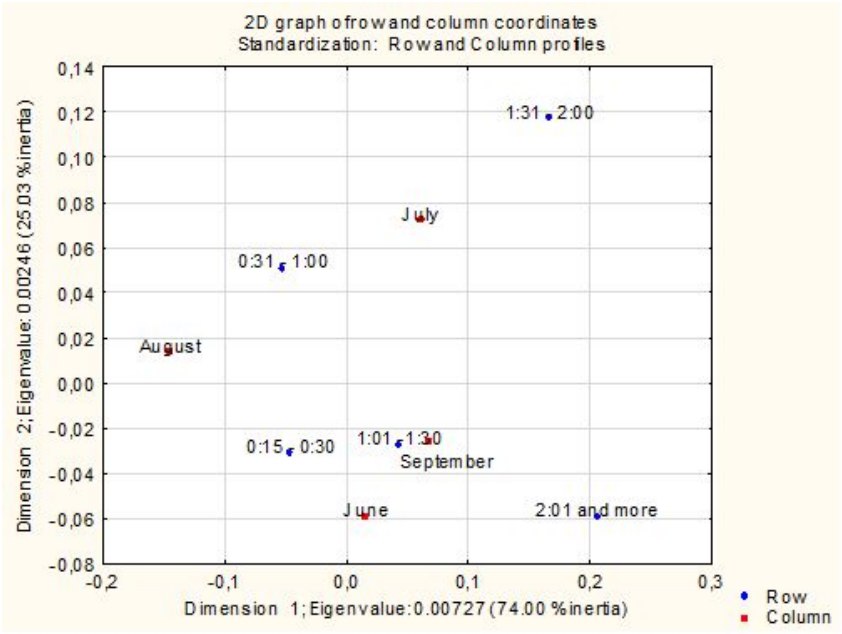

Fig. 7: Correspondence maps – Length of delay and selected time period

Fig. 5 illustrates the fact that all of the selected airports are part of the same dendrogram branch (with the exception of Katowice, which may be caused by the lower number of flights departing from this destination).

Now, let us focus on individual airports and the lengths of delays. Short delays under 30 minutes are less frequent at the Katowice airport and most frequent at the Warsaw airport. At other airports, short delays occur approximately in 40% of delayed flights. There are no significant differences in longer delays (under one hour); in total this length of delay concerns about 25–30% delayed flights. Delays longer than 1 hour are most frequent at the Katowice airport; see Tab. 8. The Katowice airport has the lowest total number of flight delays; nevertheless, if delays occur, they are usually longer than 1 hour. This airport has only poor technical support available; for that reason, it would be advisable to expand technical background facilities.

The correspondence map shows that the Katowice airport is situated close to long delays over 2 hours i.e. that is where long delays occur most often. It is also obvious that medium length delays between 1 and 2 hours are very frequent at the Bratislava airport; a similar result is apparent also from the higher values of relevant column frequencies. Short delays under one hour often occur at the Brno and Prague airports, see Fig. 6. Especially at the Prague airport it would be feasible to optimize and reduce delays by rearranging the timetable since there is a considerably large base aircraft.

Tab. 9: Contingency table – Length of delay and selected time period

Column relative frequencies	September	July	June	August
00:15–00:30	42.51%	40.08%	44.72%	46.31%
00:31–01:00	26.89%	29.40%	26.25%	31.42%
01:01–01:30	13.37%	13.08%	13.89%	11.95%
01:31–02:00	7.09%	8.72%	6.11%	5.01%
02:01 and more	10.14%	8.72%	9.03%	5.31%

The table of column relative frequencies clearly shows that differences in the length of delay in individual months are not significant. The only conclusion is that longer delays over one hour occur least frequently in August, while when it comes to shorter delays, it is the other way round; see Tab. 9.

Tab. 10: Contingency table – Length of delay and daytime

Column relative frequencies	00:01–06:00	06:01–12:00	12:01–18:00	18:01–24:00
00:15–00:30	54.13%	42.94%	40.59%	38.40%
00:31–01:00	23.70%	28.93%	30.10%	29.43%
01:01–01:30	8.26%	13.51%	14.25%	14.96%
01:31–02:00	4.35%	6.96%	6.84%	8.73%
02:01 and more	9.57%	7.66%	8.21%	8.48%

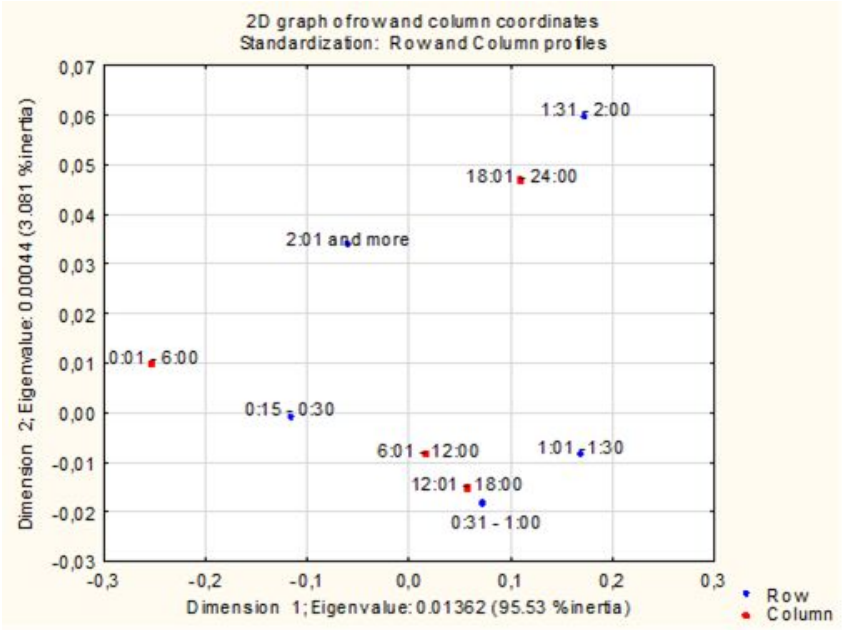

Fig. 8: Correspondence maps – Length of delay and daytime

The correspondence map states that the occurrence of delays under 1.5 hours is generally less frequent; in the graph, the points representing these values are situated aside; see Fig. 7.

The column relative frequencies tell us that short delays under 30 minutes take place most often at night and least often in the evenings. Clearly, there are longer idle times between individual flights during the night and therefore there is enough time for maintenance, and delays get shorter. Simultaneously, at night the capacity of the airspace is not limited – there is lower total number of flights. Conversely, longer delays under 2 hours are least frequent at night-time. Generally, we can say that during the day the differences in delays are minimal, see Tab. 10.

The correspondence map shows that in the evenings long delays over 1.5 hours are frequent. Short delays under 30 minutes occur most often at night-time and quite frequently also in the afternoon, see Fig. 8. One of the possible causes is the fact that most airplanes take off from their home airports in the morning and thus there is zero delay propagation.

During the night, delays occur most often at Polish airports (Warsaw, Katowice); at night the traffic intensity is higher, plus there is a problematic logistics of spare part distribution due to the insufficient technical base, mentioned above. Night delays occur least frequently at the Brno, Budapest, and Ostrava airports. At Polish airports, delays in the mornings and afternoons are least frequent. In the afternoon, the worst situation is in Ostrava and in Brno in

Tab. 11: Contingency table – Daytime and airport

Column relative frequencies	PRG	BRQ	KTW	BUD	BTS	WAW	OSR
00:01–06:00	16.21%	4.63%	40.63%	2.82%	19.87%	37.93%	4.64%
06:01–12:00	37.76%	49.54%	26.56%	39.44%	28.08%	24.90%	40.21%
12:01–18:00	32.62%	42.59%	14.06%	35.92%	26.18%	16.86%	50.00%
18:01–24:00	13.41%	3.24%	18.75%	21.83%	25.87%	20.31%	5.15%

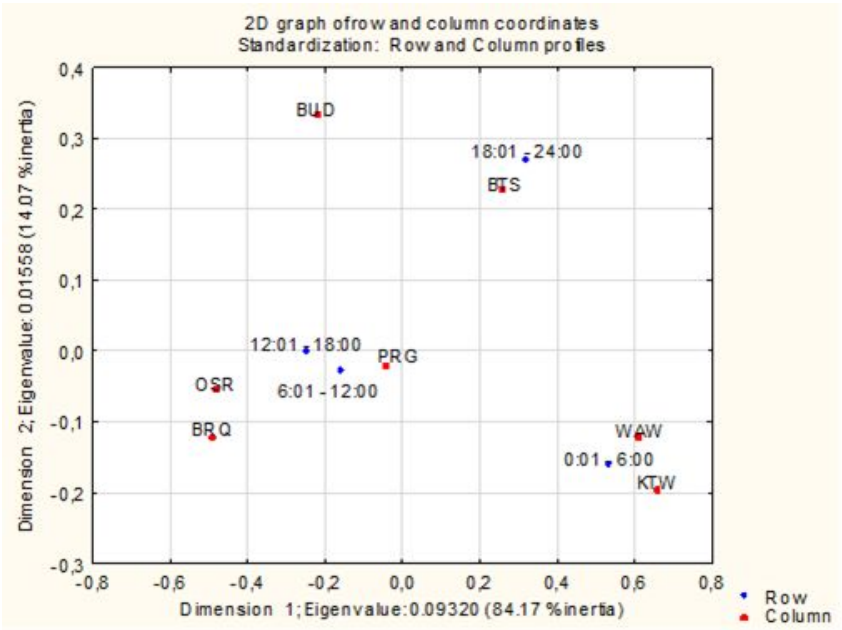

Fig. 9: Correspondence maps – Daytime and airport

the morning. In Ostrava, there is only one base aircraft available and delays tend to propagate in the afternoon. On the other hand, the best situation in Brno and Ostrava is in the evenings, see Tab. 11. Especially at these airports, the traffic intensity decreases in the evenings, in Ostrava also at nights. At the same time, the idle times between departures are longer and therefore the delay optimization gets easier.

The correspondence map brings similar results, i.e. the most common occurrence of delays at Polish airports is at night, in the evenings in Bratislava, and during the day at the Czech airports in Prague, Brno, and Ostrava. In Budapest, delays occurrence is spread relatively equally during the day, therefore Budapest is approximately equally distant from the delay values during the day in the graph, see Fig. 9.

Delays caused by operational reasons of the airline prevail significantly at the airport in Prague and are infrequent at other airports. Note that a frequent reason of delays in Prague is waiting for transit passengers due to the fact that high number of flights operated by this airline company is connected to a previous flight there. Plus, with regard to passengers and their luggage, delays caused during aircraft handling by suppliers are generally very rare at all airports. Delays caused by technical maintenance or aircraft defect occur most often at Polish airports in Warsaw and Katowice. This fact may be caused by insufficient service base at these airports. The best situation in this regard is at the airports in Brno and Ostrava; they have good technical support and high-quality logistics of spare components. Delays caused by air traffic control occur more often at the airports in Warsaw and Budapest where the air traffic intensity is generally high. Delays caused by airport restrictions are most frequent

Tab. 12: Contingency table – Causes of delay and airport

Column relative frequencies	PRG	BRQ	KTW	BUD	BTS	WAW	OSR
AIC	19.79%	2.78%	1.56%	1.41%	4.10%	0.77%	0.52%
PB	2.41%	0.00%	3.13%	1.41%	0.95%	1.15%	1.55%
ARH	1.63%	0.00%	0.00%	1.41%	4.42%	2.30%	0.00%
TAE	10.03%	3.24%	29.69%	13.38%	16.09%	21.84%	4.64%
FOC	7.36%	4.63%	9.38%	5.63%	10.73%	9.58%	2.58%
ATFMR	8.92%	8.33%	7.81%	14.79%	5.68%	13.03%	8.25%
AGA	5.99%	0.46%	1.56%	4.23%	0.32%	7.66%	1.03%
R	41.47%	76.39%	43.75%	54.23%	55.21%	36.78%	80.93%
MISC	2.41%	4.17%	3.13%	3.52%	2.52%	6.90%	0.52%

in Warsaw, Prague, and Budapest. The delays are probably caused due to the full utilisation of the capacity of these airports. Problems caused by delayed previous flights occur generally the most often, most of all at the airports in Brno and Ostrava, quite often also at the airports in Budapest and Bratislava; see Tab. 12. These airports do not have other airplanes available to enable delay optimization. Due to low frequency values in the contingency table, it was not possible to carry out Pearson's chi-squared test or correspondence analysis.

Tab. 13: Contingency table – Causes of delay and selected time period

Column relative frequencies	September	July	June	August
AIC	18.04%	9.85%	9.31%	11.80%
PB	1.77%	0.98%	2.08%	2.51%
ARH	1.45%	1.41%	2.22%	1.77%
TAE	9.66%	14.91%	10.83%	10.62%
FOC	6.76%	6.47%	8.75%	7.37%
ATFMR	9.82%	9.42%	7.50%	9.88%
AGA	3.38%	3.38%	5.83%	5.31%
R	46.86%	51.76%	48.89%	47.79%
MISC	2.25%	1.83%	4.58%	2.95%

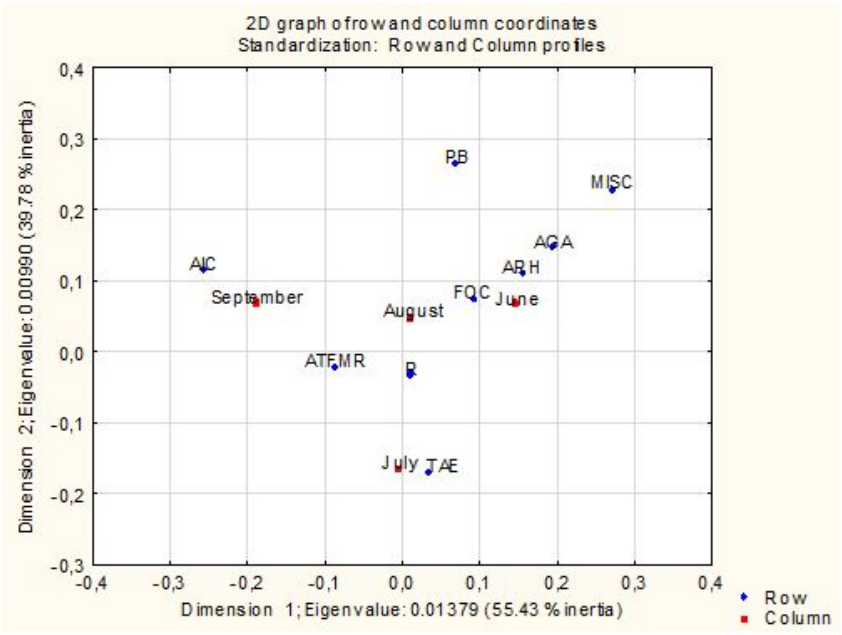

Fig. 10: Correspondence maps – Causes of delay and selected time period

The table of column relative frequencies shows that delays caused by operational reasons of the airline prevail in the month of September. Plus, it shows that delays associated with passengers and their baggage and delays caused by supplier companies during aircraft handling are very rare during the reference period. Delays caused by technical maintenance or aircraft defect are most frequent in July. As July is usually considered to be the peak season, more problems occur, and more frequent maintenance is necessary. Delays caused by operational control and crew duty norms do not differ significantly during the period under review and fluctuate around 7%. Delays caused by air traffic control do not change significantly either and they reach approx. 9%. Problems caused by propagation of delays occur most often in July; see Tab. 13. In July, there is slightly higher delay probability due to overloaded airports.

The correspondence map shows that propagation of delays is situated in the middle of the graph and is approximately equally distant from all time periods. This is the most frequent delay reason, and it does not change significantly during the period under review. The results are similar to those in the contingency table; it is therefore evident that the delay caused by operational reasons of the airline prevails in the month of September. Delays caused by technical maintenance or aircraft defect are most frequent in July; see Fig. 10.

Tab. 14: Contingency table – Airport and selected time period

Column relative frequencies	September	July	June	August
PRG	57.33%	48.95%	58.75%	60.32%
BRQ	8.53%	8.86%	6.11%	8.26%
KTW	2.42%	1.97%	3.19%	1.77%
BUD	4.19%	5.63%	4.44%	6.49%
BTS	9.18%	16.03%	11.39%	9.44%
WAW	10.79%	9.85%	10.28%	7.37%
OSR	7.57%	8.72%	5.83%	6.34%

In Prague, delays occur least often in July. In Bratislava, delays occur most often in July. Generally, we can say that the differences in delays at individual airports do not change significantly during the reference period; see Tab. 14.

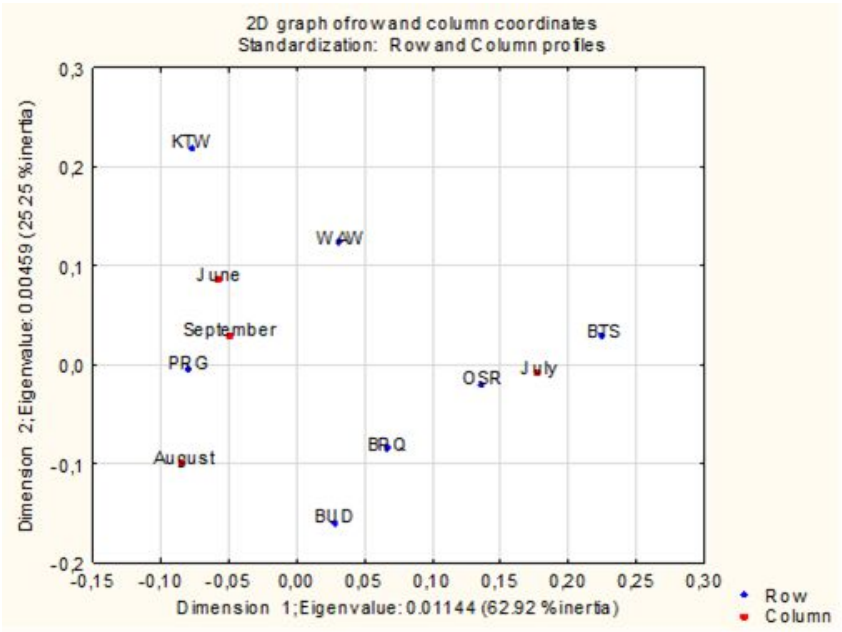

Fig. 11: Correspondence maps – Airport and selected time period

Tab. 15: Contingency table – Causes of delay and daytime

Column relative frequencies	00:01–06:00	06:01–12:00	12:01–18:00	18:01–24:00
AIC	1.74%	16.63%	13.91%	8.48%
PB	2.17%	1.51%	0.80%	4.49%
ARH	3.70%	1.21%	1.25%	1.75%
TAE	25.87%	9.68%	6.27%	11.47%
FOC	19.35%	6.15%	3.65%	4.74%
ATFMR	18.04%	7.86%	4.79%	11.47%
AGA	8.48%	3.83%	2.85%	5.24%
R	14.57%	51.31%	64.42%	48.38%
MISC	6.09%	1.81%	2.05%	3.99%

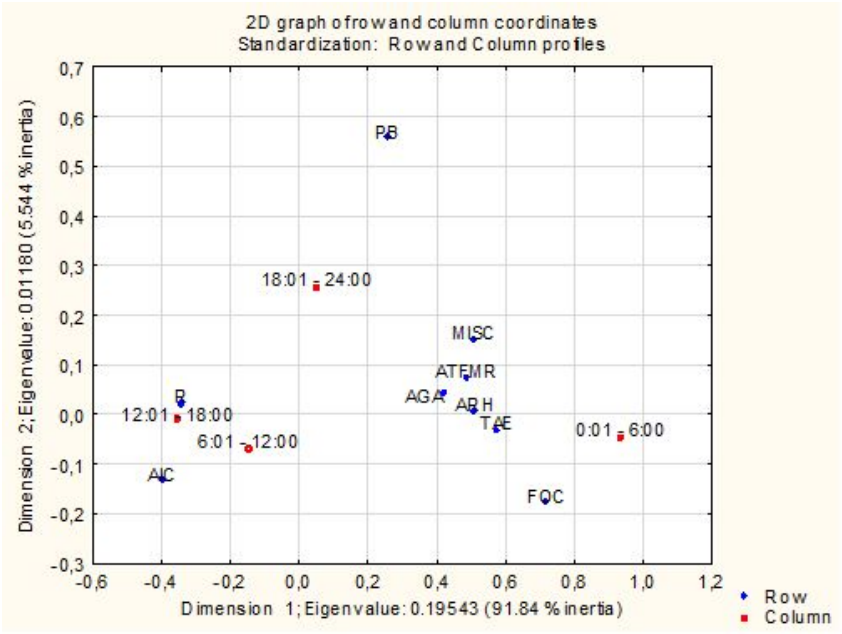

Fig. 12: Correspondence maps – Causes of delay and daytime

The graph is an indication of the fact that at the airports in Ostrava and Bratislava delays arise often in July when the air traffic intensity is reaching its peak. Conversely, in Prague the delays are least frequent in July; see Fig. 11.

Column relative frequencies prove that delays caused by operational reasons prevail during the day and occur very rarely at night. In daytime, problems tend to occur e.g. during aircraft transfers in the ramp area. In night hours there are generally fewer flights and therefore also fewer problems e.g. with transiting passengers. It is furthermore evident that delays due to passengers and their baggage caused during aircraft handling by suppliers are very rare during the day. Delays caused by technical maintenance or aircraft defect and delays caused by operational requirements and crew duty norms are most common at night. Delays caused by the air traffic control most often happen at night at 00:01–06:00 am and also in the evening at 06:01–12:00 pm. Delays caused by airport restrictions are most frequent at night. This can be attributed to lower number of operational staff at the airports at night. Problems caused by previous flight delays occur least at night and most often in the afternoon. Fewer planes generally fly

Tab. 16: Contingency table – Length of delay and causes of delay

Column relative frequencies	AIC	PB	ARH	TAE	FOC	ATFMR	AGA	R	MISC
00:15–00:30	35.26%	64.00%	87.23%	36.08%	57.71%	67.07%	70.73%	34.53%	63.75%
00:31–01:00	27.66%	32.00%	6.38%	23.10%	18.91%	21.29%	22.76%	34.53%	18.75%
01:01 and more	37.08%	4.00%	6.38%	40.82%	23.38%	11.65%	6.50%	30.94%	17.50%

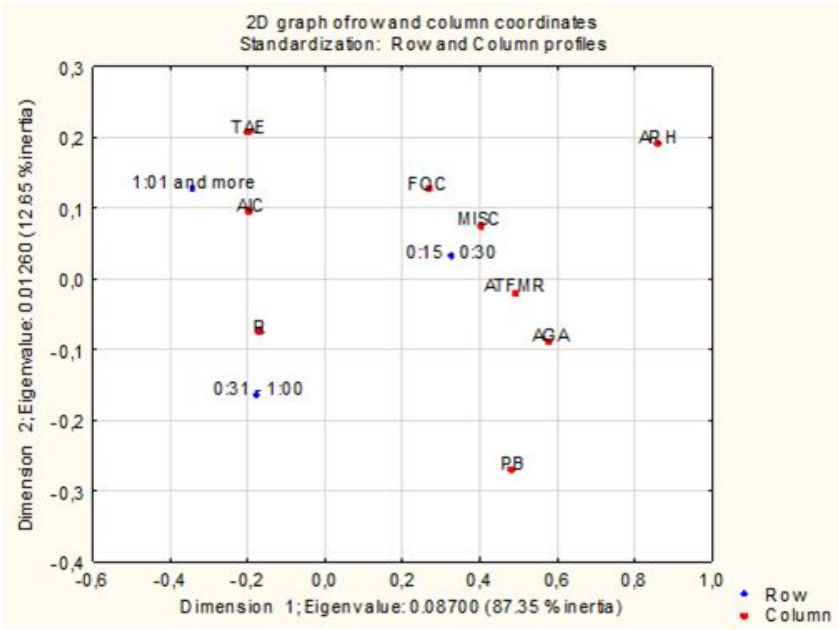

Fig. 13: Correspondence maps – Length of delay and causes of delay

at night; therefore, this delay cause is rather scarce. Most flights take place in the afternoon hours, which is probably why this cause is the most common in the afternoon hours; see Tab. 15. The analysis confirms the dependence of delay length on the time of the day when most airplanes take off from their home airports in the morning and get delayed only due to the following flights in the course of the day.

The correspondence map shows that in the daytime delays most frequently appear due to operational reasons of the airline and due to the propagation of delays; see Fig. 12. Short delays are least often caused by operational reasons of the airline, technical maintenance or aircraft defects, and delayed previous flights. Other causes are very frequent. Regarding longer delays (under one hour), the least common causes are problems caused by suppliers. On the other hand, delayed previous flights and problems with passengers and their baggage are highly frequent causes. As for the causes of the longest delays (more than one hour) – operational reasons of the airline, technical maintenance or aircraft defect, and delayed previous flights prevail. Problems with passengers and their baggage, problems caused during the aircraft handling by suppliers and destination airport restrictions represent the least common causes of these delays; see Tab. 16.

The correspondence map supports the results of the contingency table: operational reasons of the airline and technical maintenance or aircraft defects predominate with regard to the longest delays (over one hour). At 00:31–01:00 am, delayed previous flights are frequently the reason for another delay; see Fig. 13.

4 DISCUSSION AND CONCLUSIONS

The principal objective of this paper was to evaluate and assess the delay-caused problems at selected airports in the V4 countries. The cluster analysis paired with internal information from the airline allowed for the selection of the "Base Airports". At first, all flights at the selected airports were taken into consideration, which led to the conclusion that: scheduled flights are delayed (approx.) just as much as chartered flights; delays occur most frequently in June; and Boeing 737-800 reported delays more frequently than Airbus A320. The Kruskal-Walis test allowed for the identification of statistically significant differences between individual categories. Further analysis of selected airports revealed additional interesting facts.

As for the frequency of delays, the airport in Katowice reports the best results, while the highest number of delayed flights occurs at the airport in Budapest. A possible solution of the situation in Budapest could be adding another aircraft to the base. In general, we may conclude that the frequency of delayed flights increases with the size of the city and the airport. Although there are generally fewer delayed flights in Katowice, the delays are often longer than one hour. Our recommendation would be to work on the technical support in Katowice, since long delays arising at this airport are usually caused by technical maintenance or aircraft defects (as demonstrated by the follow-up analysis of individual delay causes). The analysis further revealed advantages at the Brno and Ostrava airports where the technical support runs smoothly. In Prague and Brno, short delays under one hour occur often. Especially in Prague, the situation is satisfactory thanks to the higher number of available aircraft. Short delays under 30 minutes occur most often at night and least often in the evenings. Fewer flights are operated at night and thus there is more time for aircraft maintenance between individual flights. Conversely, long delays over 1.5 hours are frequent in the evenings due to high intensity of air traffic. Most aircrafts take off from their home airports in the mornings therefore only short delays under 30 minutes often occur at night and in the afternoon. During the day delays tend to propagate, as shown in the analysis of delay causes by daytime, while apparently problems caused by delayed previous flights occur least frequently at night and most frequently in the afternoon. An analysis of the propagation of delays to subsequent flights is provided in the article by Campanelli et al. (2014) which focuses on the airline systems behaving in a nonlinear way that is difficult to predict. Models for delay prediction in air transport are introduced as well in an article by Rebollo and Balakrishnan (2014).

Delays caused due to operational reasons of the airline dominate significantly at the Prague airport, as they are rare elsewhere. In Prague there are many connecting flights operated by the airline under review and it is often necessary to wait for transiting passengers. Delays caused by air traffic control and airport restrictions are more often reported from the airports in Warsaw, Prague, and Budapest due to significant traffic intensity. Problems caused by delayed previous flights generally occur more often at the airports in Brno, Ostrava, Budapest, and Bratislava, where there is no aircraft available to optimize possible delays.

Delays caused by technical maintenance or aircraft defects are most frequent in July, as there are generally most flights in July, and that is when technical problems are encountered more often, and more frequent maintenance is necessary. Propagation of delays occurs most frequently again in July. Delays caused by operational reasons of the airline are frequent during the day. There is generally a high number of flights during the day and there are problems e.g. with transiting passengers and aircraft transfers in the ramp area. Delays caused by technical maintenance or aircraft defects and delays caused by operational requirement and crew duty norms are most common at night. Service inspections are usually done at night as there is lower flight demand which allows time and space for more demanding service operations. If there is a crew member absence, it is difficult to find a replacement at night.

Optimization of delays emerging due to aircraft and crew scheduling has been addressed by AhmadBeygi et al. (2008). Delays caused by air traffic control occur most often at night and also in the evening. The reason behind this may be the fact that the times 04:00–06:00 am and 06:00–09:00 pm are the busiest for the airport airspace capacities. Flight optimization options of the air traffic control have been covered in the works of Wu et al. (2016) and Belkoura et al. (2016). Delays caused by airport restrictions appear most frequently at night when airport staff is limited.

Our analysis has proven that delays triggered in association with passengers and their baggage are not a common problem at the airports under review; the articles by Huang et al. (2016) and Abdelghany et al. (2006) deal with the question of how to solve the possible problems in this area.

Zámková et al. (2017) proved that the most frequent cause of delay is the propagation of delays, which tends to increase during the day. According to our analysis of home base V4 airports, the longest delays (two hours or more) occur at night and again, the delay propagation is to blame. Furthermore, both charter and scheduled flights apparently have the same percentage of delayed flights, delays occur most frequently in June, and Boeing 737-800 reports delays more frequently than Airbus A320. The longest delays (over 2 hours) were reported from Katowice and Budapest.

All tested dependences have appeared to be statistically dependent (p-value under 0.001). The findings of this research have been consulted with an expert working in the aircraft company.

The majority of our findings may be generalised and applied to smaller airlines operating at the airports of the Visegrad Group. However, airlines today have completely different concerns, considering the consequences of the ongoing Covid-19 pandemic. Still, it is our belief, that everything will be back to normal soon before long and the travel industry will return to its pre-covid state. When this happens, airlines will once again strive to eliminate flight delays, and this study may provide some useful insights, helping with the adoption of strategic measures to curb the number and length of their delays.

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THE SIGNIFICANCE OF CSR DURING THE COVID-19 PANDEMIC IN THE LUXURY FASHION INDUSTRY – A FRONT-LINE CASE STUDY

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ABSTRACT

COVID-19 has dramatically changed the economic scenery. Despite the austerity measures and decreasing resources, it might lead to an increase of the significance of Corporate Social Responsibility (CSR) as the key for sustainable growth and prosperity. The luxury fashion industry is known for its lavish commitment to CSR as expressed by owners and top management. However, the bottom perception is unclear. A longitudinal front-line case study of the perception of the significance of CSR by the low management and customers allows for filling in this vacuum and to comparatively assess the annual evolution from December 2019 to November 2020. The holistic Meta-Analysis using informal open-interview and mystery shopping techniques and the investigative questionnaire with the Pearson Chi-squared test reveals a fragmented and only slightly raised significance of the CSR by the low management and customers. This disappointing finding has inherent limitations and calls for further studies.

KEY WORDS

corporate social responsibility (CSR), luxury fashion, case study

JEL CODES

D01, I31, K20, L21, M14, M53, Q01

1 INTRODUCTION

The roots of the modern concept of sustainability goes back to the Universal Declaration of Human Rights by the United Nations Assembly in 1948 ("UDHR"). Although the general tenor of the UDHR proclaims individual rights, the UDHR includes indices for individual duties, see Art. 29, and the concept of sustainability is getting ready to be matched by the responsibility towards the community, i.e. the future Corporate Social Responsibility ("CSR"). Following the UDHR, both sustainability and CSR are reflections of the need for value judgments about

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justice in the distribution and use of resources (Marinova and Raven, 2006) in the context of human rights. Progressively, the three pillars structure of sustainability has been developed – economic (profit), environmental (planet), and social (people) pillars in order to reconcile available resources and needs of the increasing world population (Meadows et al., 1972). The United Nations has kept the leading role in the entire process, see the 1987 Brundtland Report and the United Nations Agenda 2030 from 2015 which brought 17 Sustainable Development Goals ("SDGs") and 169 associated targets (MacGregor Pelikánová, 2018). Undoubtedly, a state's led drive for sustainability is futile without the engagement of all actors, including businesses via their CSR, while using a multi-stakeholder and cross-partnership model (MacGregor Pelikánová, 2019a; van Tulder et al., 2016; van Tulder and Keen, 2018). CSR includes both (i) systematic and visionary features and is designed for soft law and self-regulation and (ii) corporate responsibility, with rather normative and moral features and designed for national law regulation (Bansal and Song, 2017). In sum, sustainability means that stakeholders with sufficient resources (Kolk and van Tulder, 2010) are not only economic, but as well social and political actors (Bunn, 2004) and consequently will embrace the CSR. It is not only about prima facia profitability based on classical investment analysis, but it is about real profitability based on the cost-benefit analysis which is able to take into account both internal and external negative and positive effects (Kovács et al., 2016). Only a genuine and deep pro-CSR attitude on all managerial levels can lead to the very desired "more sophisticated form of capitalism" (Porter and Kramer, 2011).

Naturally, sustainability is rather in the reach of international law, see the position of the United Nations, while CSR belongs clearly in the sphere of regional and national laws. Regarding the EU law and the law of EU member states, although the mandatory CSR law provisions have been emerging in the last decade (MacGregor Pelikánová and MacGregor, 2017), still the majority of CSR aspects is not regulated and it is up to the discretion of businesses how they will proceed (MacGregor Pelikánová, 2019b). Although it is suggested that CSR decisions belong to long-term strategic choices and so are determined by the owners and/or top management of businesses, the role of middle-management and low management and customers should not be underestimated (MacGregor et al., 2020a, 2020b). CSR needs to be projected in management and be embedded into the organizational characteristics (Kantorová and Bachmann, 2018). This is manifest especially in certain industries, such as, for example, the luxury fashion industry, where the key values and competitive advantage determinants are linked to their luxury brands (MacGregor Pelikánová and MacGregor, 2019; MacGregor Pelikánová, 2019c).

The luxury fashion industry is put under the microscope due to its inherent features and particularities, including the proclaimed availability of resources, as the platform par excellence to demonstrate the dramatic potential of CSR to, through shared values (Chandler, 2017; Ujwary-Gil, 2017), achieve or lead to fantastic financial and even non-financial results (MacGregor Pelikánová and MacGregor, 2020). In addition, it represents an interesting mixed products field, combining (hopefully) luxury goods with luxury services, which can be pretty challenging in the central European setting (Žižka, 2012).

Since the evolution goes from the CSR cultural reluctance over to the CSR cultural grasp to a CSR cultural embedment (Olšanová et al., 2018), exactly the CSR cultural embedment should be noticeable at all managerial levels within the luxury fashion industry. The lavish and ostensible exclusive style (Han et al., 2010) should be eternal and overcome all crises. Prior studies and publications reveal the interest of top management of these businesses to engage even deeply in CSR and this in the context of the COVID-19 pandemic (MacGregor et al., 2020a, 2020b). Now it is time to take a 2nd step and to check the bottom perception. A longitudinal front-line case study of the perception of the significance of CSR by the low management and customers allows for filling in this vacuum and to comparatively

assess the annual evolution from December 2019 to November 2020. Namely, what about the current COVID-19 pandemic perception, how it has impacted the CSR trends and especially how it has changed the CSR attitude by front-line employees and customers? This leads to the need to explore the theoretical framework, including the statement of pertinent problems (2) and to conduct a research, including primary data research to be yielded with respect to both low management (front-line employees) and customers, and processed the resulting data by Meta-Analysis, simplified Dephi method and Pearson Chi-squared test (3). These highly relevant and appropriate methods lead to academically robust results, backed by holistic and critical argumentations (4), and culminate in the discussion and conclusions (5).

2 THEORETICAL FRAMEWORK

Modern management focuses on the entrepreneurship and innovations and it is well established that education and economic growth are related (Kocourek and Nedomlelová, 2018) as well as that innovations linked to marketing are indispensable for business success in the 21st century (Drucker, 2015). The drive for a competitive advantage with a competitive target and the determination in "capturing the core and broadening without diluting" (Moon et al., 2014) should match up with the three pillars sustainability, its 17 SDGs and all 6 CSR categories (Balcerzak and MacGregor Pelikánová, 2020; MacGregor Pelikánová and MacGregor, 2020). The luxury fashion industry, with its commitment to the exclusive scarcity and fancy inventions, should be fully compatible with that and lead to the satisfaction of all stakeholders – from customers (Olšanová et al., 2018) to investors. Indeed, the luxury fashion industry needs to overcome the traditional contradiction (Kapferer, 2010) and achieve the synergetic reconciliation of the true concept of luxury, originally associated with hedonism and prestige, with the concept of sustainability, originally associated with ethics, moderation and perhaps even altruism (Davies et al., 2012; Diallo et al., 2020). This implies that the luxury fashion industry needs to effectively and efficiently reflect all sides and shades of the sustainability and CSR and such a task is a true challenge (MacGregor Pelikánová et al., 2021).

Indeed, CSR entails various types of social responsibility (Schüz, 2012): economic, legal, ethical, etc. (Sroka and Szántó, 2018) and is centered on the eternal metaphysical dilemma about what is right – morally and/or legally (MacGregor Pelikánová, 2019b). Consequently, only certain segments and aspects of CSR are covered by the law and made enforceable, i.e. it became a liability (Schüz, 2012). Namely, the EU law, via Art. 19a of Directive 2013/34, requires only large businesses to include in their management report a non-financial statement, aka CSR statement, about environmental, social and employee matters, respect for human rights, anti-corruption and bribery matters (Pakšiová and Lovciová, 2019). Since the EU prefers a spontaneous evolution towards sustainability and CSR, it does not want to overregulate (MacGregor Pelikánová and MacGregor, 2020). As a result, the EU law does not further specify or develop this legal duty and basically leaves the CSR drive to be strongly determined and led by businesses themselves (European Commission, 2020a). Therefore, it is up to each business how genuinely, deeply and extensively it will engage in CSR (Arminen et al., 2018) and to what extent it will take advantage of that (MacGregor et al., 2020a). Arguably, there are eight ways leading to the sustainable corporate growth and one of them is about the achievement of an excellent reputation for social responsibility (Čech et al., 2018).

Ideally, the pro-CSR attitude should contribute to the competitive advantage, to an increase in the effectiveness and efficiency at all managerial and strategic levels, and to the improvement of the image of the business in the eyes of the public-at-large (MacGregor et al., 2020b). Businesses should not be reduced

merely to be dividend generators (Berman et al., 1999), instead, following the stakeholder theory, they should achieve a multi-spectral win-win under the auspices of value creation (Chandler, 2017; Ujwary-Gil, 2017). This victory should extend from sustainable and good financial performances (Rowley and Berman, 2000) over to an increase in market share (Ting et al., 2019) to the social, environmental and other achievements. Conversely, if the CSR is rejected or poorly selected or wrongly implemented, then it is a waste (Barnett, 2007) and an obstacle in achieving a competitive advantage (Scherer and Palazzo, 2011). This reflects traditional theories, which are suspicious regarding non-financial goals and which underline the issue of possible agency conflicts between managers, shareholders, environmental activists, etc. (Kovács et al., 2016). Arguably, even a correctly selected CSR can be futile, if it is not endorsed by all levels of management, i.e. the discrepancies in the CSR-attitude undermines the CSR potential to improve financial and even non-financial performance (Rodríguez-Fernández, 2016). Plus, even a well selected and homogenously applied CSR is prone to be futile, if not properly communicated at large to all stakeholders (Turcu, 2015).

Socially responsible business practices should be an integral part of the sustainable corporate growth strategy of luxury businesses (Čech et al., 2018, 2019). This has been demonstrated via several empirical and case studies (Cerchia and Piccolo, 2019), which underlined the pivotal role of top management linking the reputation of luxury brands, reactively or proactively, with the CSR initiatives (Batat, 2019; Diallo et al., 2020). The top management got the message and thus attempts to provide customers with "a sustainable as well as a socially responsible luxury experience" (Batat, 2019) via both formal and informal channels (MacGregor Pelikánová et al., 2021). Since still not all consumers regard sustainability as an intrinsic element of a luxury product (Achabou and Dekhili, 2013; Davies et al., 2012; Kapferer and Michaut, 2015; Ki and Kim, 2016), the top management engages in endeavors showing that sustainability and luxury are related. In short, luxury brands seek to convey images of good product quality, which last longer than non-luxury brands, and thus might be considered more sustainable (Diallo et al., 2020; Ki and Kim, 2016; MacGregor Pelikánová et al., 2021). However, the role of middle and low-management as well as various pools of customers should not be underestimated and this especially considering the still prevailing brick and mortar business mode in the luxury fashion industry (MacGregor et al., 2020a). Plainly, middle and low management represents a larger, and thus potentially more heterogenous group than top management, and consumers represent an even much larger and diversified group. Therefore, members of these groups arguably differ dramatically regarding their inclination for long term orientation as "the fostering of virtues oriented towards future rewards, in particular, perseverance and thrift" (Hofstede, 2001) and the implied pragmatic, future-oriented perspective (Hofstede, 2001) towards hard work, planning, and perseverance (Bearden et al., 2006) as well high ethical values (Nevins et al., 2007) and sustainability (Diallo et al., 2020; MacGregor Pelikánová et al., 2021).

The CSR system is not self-sustaining and its implementation is neither automatic nor certain to lead to illustriously ethical behavior, i.e. the CSR of the business demands engagement at levels. Arguably, there is a lack of consistency between managerial levels (MacGregor Pelikánová and MacGregor, 2020). Nevertheless, until 2019, this discrepancy had not played any significant role and everything looked "fashionably pink", regardless whether funny fur or free fur (MacGregor et al., 2020b). Then, after the still peaceful and, for the "crown", aka royal luxury fashion industry, the prosperous Christmas of 2019, abruptly hit the COVID-19 pandemic. All citizens of Europe, with millions of confirmed cases, and thousands of deaths, were affected, and witnessed a resultant dramatic economic decline. The coronavirus gets its name due the outer peripheral, crown-like, consisting of the embedded envelope protein and allegedly emerged around 2002 in human beings (Abdul-Rasool and Fielding, 2010). Its version in 2012 got the name MERS, while in 2019 appeared the version SARS Covid 2,

which causes the disease called COVID-19 (Manojkrishnan and Aravind, 2020). Pursuant to the International Monetary Fund (IMF) and the World Bank, the COVID-19 pandemic has brought a global economic downturn which has not been experienced in at least seven decades, namely the global economy is to shrink by 5.2% in 2020 (World Bank, 2020). The impact on the EU was even worse than the global data. Indeed, the reoccurring and increasing trend of COVID-19 cases in the EU as well as the dynamics of the 1st and 2nd waves are worrisome (Kufel, 2020), while the EU economy experiences a deep recession and is to shrink by 8.7% in 2020 (European Commission, 2020b). The President of the European Commission, Ursula von der Leyen, proclaimed that "We must not hold on to yesterday's economy as we rebuild" (European Commission, 2020c). In addition to supporting smart, sustainable and inclusive growth, there is a proposition that CSR should be an instrument addressing the pandemic COVID-19 as not a threat, but rather as an opportunity (European Union External Action, 2020; Turečková and Nevima, 2020). Accordingly, the answer to such an event as COVID-19 is a commitment to accountability by all stakeholders and the EU leaders, and top institutions hope that Europeans, especially European businesses, will follow this call and engage in appropriate convergence patterns leading to the sustainable entrepreneurship (Belz and Binder, 2017). Consequently, all levels of management, as well as other internal stakeholders, should fully take advantage of the CSR potential for marketing as well as other business conduct aspects (Floridi, 2016; Lii and Lee, 2012).

Since one of the strongest CSR proponents has been the fashion industry and perhaps its only flaw was the above-mentioned shortcomings on the local front-line management level, the longitudinal holistic comparison via a case study seems highly appropriate. Indeed, what message about the impact of COVID-19 on the CSR attitude of front-line employees and customers can be extracted from the luxury fashion industry? The literature review provided above suggests purchasing decisions should be positively influenced by the business's CSR (H_1) and endorsed values (H_2), regardless of external factors such as COVID-19 (H_3). However, these are mere assumptions which need to be verified. Indeed, the complex problem of the CSR significance for various stakeholders and of the impact of COVID-19 on CSR attitudes in the luxury fashion industry leads to many questions. Even partial answers to some of them could bring forth useful and pragmatic information able to move CSR to a higher level and perhaps even to make the EU truly competitive in the global setting. Prior studies and publications by the authors provided a promissory message based on the attitude of top management (MacGregor et al., 2020a, 2020b), so what about the message based on the attitude of low-level management and customers?

3 METHODOLOGY AND DATA

The selection of data and methods was implied by the statement of a problem and its principal and auxiliary questions and hypotheses as indicated above. The format of a case study involving front-line employees of luxury fashion businesses and their customers allows for identifying their attitude to 6 principal CSR categories, and value, and to see its evolution during the COVID-19 pandemic. Further, this facilitates the empirical comparison of such data yielded via open-interviews and mystery shopping techniques regarding front-line employees of all top 10 luxury fashion businesses with data yielded via investigative questionnaire exploration regarding 50 customers of these businesses. The inherent differences in these two groups of respondents (front-line employees v. customers) and the divergence of the feasibility of getting information from them led to a distinct methodological approach to each of these groups. The unifying points were whether they focus on CSR (H_1), on values (H_2) and

change due to COVID-19 (H_3) and this in dependency relationship to their age.

3.1 Methodology and Data Regarding Managerial Perception

In order to address the impact of COVID-19 on the CSR attitude in the luxury fashion industry as presented by its front-line management, the most logical and academically robust approach is to perform a case study before and during COVID-19 and to empirically compare the primary data yielded via open-interviews and mystery shopping techniques. The processing of such longitudinal data is to be done by holistic Meta-Analysis (Glass, 1976; Schmidt and Hunter, 2014), and while preferring modern qualitative methods (Silverman, 2013) over conventional quantitative methods. The goal is to see a CSR and value attitude and their changes during the COVID-19 pandemic as it is proposed by a small, but highly homogeneous sample which, due to its belonging to the CSR flagship industry, luxury fashion, has a relevancy for many other sectors and industries.

The employed case study format for this sample allows for the investigation of representative data (Yin, 2008), namely five of all 10 top ten luxury fashion businesses located in Prague's "Luxury Fashion Street, aka Prague's 5th Avenue," and this before the COVID-19 pandemic (December 2019) and during the COVID-19 pandemic (August 2020). The selection of this highly homogenous sample reflects the critically important role of competitors for businesses, especially in this extremely narrow segment – top luxury fashion (MacGregor Pelikánová and MacGregor, 2020). Tab. 1 identifies businesses involved in the case study.

The case study involving these ten businesses was performed in Prague in December, 2019 and in August, 2020, i.e. in the month preceding the first concerns about the COVID-19 pandemic and in the month of transition between the 1st and 2nd wave of the COVID-19 pandemic. The premises of these top luxury fashion businesses were physically visited by the Authors, who engaged in open interviews and mystery shopping techniques in order to extract the CSR (H_1) and value attitude (H_2) and their changes (H_3) as directly presented or indirectly implied by front-line management. The preselected shopping subject matters were leather handbags and purses and the entire shopping experience was centered about the following four open-ended questions:

a) What is the competitive advantage of your product, i.e. in what area is your product better than products of the competition, especially the other four businesses?
b) What is the meaning of your brand?
c) Do you focus on sustainability and, if yes, how?
d) What is the impact of COVID-19 on your business.

These four questions were raised during informal interviews to get direct answers and the products, premises and behavior of front-line management were observed so as to get indirect answers, aka mystery shopping suggestions. The interviews aimed to induce additional explanations and to provide sufficient opportunities to observe the interrogated persons as well as the entire setting. The information yielded directly and indirectly by these four questions was categorized based on the six well established CSR categories:

1. environment protection (Krause, 2015),
2. employee matters (Křečková Kroupová, 2015),
3. social matters and community concerns (Polcyn et al., 2019),
4. respect for human rights (MacGregor Pelikánová, 2019a),
5. anti-corruption and bribery matters (Sroka and Szántó, 2018) and
6. R&D activities (MacGregor Pelikánová, 2019c).

These six CSR categories reflect as well the famous six social initiatives: cause-promotion, cause-related marketing, social marketing, corporate philanthropy, employee voluntary work and socially responsible business practices (Čech et al., 2018). The qualitative content analysis (Krippendorff, 2013; Kuckartz, 2014;

Tab. 1: Ten top luxury fashion businesses – their origin, address, business revenue (2019), employees

Group (Revenue 2019)	Business	Origin	Address	Employees
LVMH (EUR 54 bill.)	Louis Vuitton	1854 Paris	3	DŠ, PV
LVMH (EUR 54 bill.)	Christian Dior	1946 Paris	4	EF, LŘ
LVMH (EUR 54 bill.)	Fendi	1925 Rome	12	DF
LVMH (EUR 54 bill.)	Bulgari	1884 Epirus	13	VM
Kering (EUR 16 bill.)	Gucci	1921 Florence	9	MR, LH
Kering (EUR 16 bill.)	Bottega Veneta	1966 Vicence	14	VA
Prada (EUR 3.2 bill.)	Prada	1913 Milano	16	MK, ER
Dolce Gabanna (EUR 1.3 bill.)	Dolce Gabanna	1985 Milano	28	MM
Tod's (EUR 1 bill.)	Tod's	1920 St. Elpidio	13	MA
Furla (EUR 0.5 bill.)	Furla	1927 Bologna	8	MF

Note: based on Bloomberg and www pages of these business

Vourvachis and Woodward, 2015) and techniques are used along with the teleological interpretation were used to achieve proper categorization as well ranking via a simplified internal Delphi-Method (MacGregor Pelikánová, 2019a; Okoli and Pawlowski, 2004). Namely, each author independently categorized the fresh data, both either explicitly stated during interviews or implied by mystery shopping observation, and ranked it by using the scale (+) or (++) or (+++), i.e. a basic, general, abstract and not verifiable CSR commitment was ranked (+), while a genuine, concrete and verifiable CSR commitment was ranked (+++). To raise authenticity, quoting was included. Authors compared their results and readjusted them to achieve a consensus opening the door for glossing, Socratic questioning (Areeda, 1996). Such data was a foundation for a dual comparison – managerial attitude to CSR and values in December 2019 v. August 2020 and managerial v. customers attitude to CSR and values.

3.2 Methodology and Data Regarding Customers' Perception

The customers attitude to CSR and values was yielded via investigative questionnaire targeting the experimental documentation of preference and behavioral patterns of a highly relevant homogenous group of respondents. Namely, all respondents were women between 35 and 50 years of age, living in Prague and financially sufficiently stable, i.e. legitimate clients able to purchase products, especially leather handbags, from the top 10 luxury fashion businesses located in Pařížská street in Prague.

The questionnaire consisted of 2 sets of questions. The 1st set included 8 binary questions calling for yes-no answers and the 2nd set included 12 differentiation questions calling for absolute yes-rather yes-do not know-rather no-absolutely no answers. The given assignment allowing the experimental documentation was as follows "You have received a non-transferable voucher in the amount CZK100 thousand for the purchase of a leather bag by Christian Dior, Louis Vuitton, Gucci, Prada or Dolce Gabanna in Pařížská street during the next 24 hours. Shops are open and you will either use this voucher or it will lapse. Based on these facts reply to the following 8 + 12 questions." Tab. 2 and 3 represent a simplified version of the investigative questionnaire, which was distributed in November 2020 both as an email attachment and via link survio.com to 50 pre-selected respondents satisfying the given criteria (35–50 years, Prague, finances).

These binary questions were the pre-cursors for differentiation questions focusing particularly on the six well established CSR categories.

In total, 48 of the 50 pre-selected respondents duly and timely completed and returned questionnaires. This quantitative search via questionnaire was further processed by the

Tab. 2: Simplified version of the investigative questionnaire – binary questions (YES – NO)

Questions
1. I know the mentioned TMs and am sure which bag I will pick up.
2. I will visit at least 3 shops and will select the bag accordingly.
3. During the choice, I will consider the quality and design.
4. During the choice, I will reflect the values declared by the business.
5. During the choice, I will reflect the CSR of the business.
6. During the choice, I will reflect on the customer care and own experience.
7. My choice will be influenced by the inconsistency and scandals of the business.
8. My choice is the same as it was in 2019, i.e. before the COVID-19 pandemic.

Tab. 3: Simplified version of the investigative questionnaire – differentiation questions (absolutely yes …)

Questions How important is it for your decision whether the business does ...
0. Fight against COVID-19
1a. Environment protection (animal protection and welfare)
1b. Environment protection (rain forest protection)
1c. Environment protection (recycling)
1d. Environment protection (energetic passivity)
2a. Employees (positive and knowledgeable employees)
2b. Employees (nice working environment)
3a. Social (local and regional charity and other projects)
3b. Social (charity and other projects out of the EU)
4. Global protection of human rights
5. Fight against corruption, bribery and illegality
6. R&D

assessment through categorical data method, i.e. by a test of statistical significance performed on categorical data aka data that can be placed into nominal categories (Franke et al., 2012). The software Statistika and the method of quantitative signs of the Pearson Chi-squared test were employed to analyze two dependencies and a statistical analysis of the table frequency. For each of the 3 hypotheses, this was done by the contingency table 2×2 to observe the dependency between two quantitative values. The level of significance was set as $\alpha = 0.05$. The requirements for the use of the Pearson Chi-squared test were satisfied ($n > 40$). The template for the contingency was as indicated in Tab. 4, while Sign A is the age (split 35–42 years and 43–50 years), Sign B is the confirmation/rejection of the given hypothesis (B1 yes, B2 no) and the n is the total number of respondents returning questionnaire ($n = 48$).

The equation for this formula regarding the quantitative signs of dependency of the Pearson Chi-squared test was as follows:

$$\chi^2 = \frac{n \cdot (ad - bc)^2}{(a+b) \cdot (c+d) \cdot (a+c) \cdot (b-d)}$$

and the three hypotheses were as follows:

- H_1 – My choice is influenced by the CSR of the business and this depends upon my age.
- H_2 – My choice is influenced by the values shared by the business and this depends upon my age.
- H_3 – My decision is the same now (November 2020) as it was in 2019 (before the COVID-19) and this depends upon my age.

Tab. 4: The template for the contingency table

Sign A	Sign B1 (yes)	Sign B2 (no)	Addition
A1 (# of 35–42 years)	a	b	$a+b$
A2 (# of 43–50 years)	c	d	$c+d$
Total	$a+c$	$b+d$	n

4 RESULTS

The dual and longitudinal research of the managerial and customers' attitude brought very colorful results offering an interesting critical comparison and perhaps bringing more questions than answers along with a worrisome message.

4.1 Managerial Attitude

The first empirical field search via a case study entailing mystery shopping and front-line employee's interviews took place in December 2019. The leitmotif was to obtain information about a luxury leather bag, A4 format, and about CSR in general. Tab. 5 summarizes the data extracted from these shop visits and informal interviews with open ended questions, i.e. how front-line employees present their business and its CSR and values, as processed by the simplified Delphi-method.

Manifestly, internal stakeholder's attitudes differ and front-line employees from various businesses demonstrate various attitudes to CSR categories. The shop observation as well as interviews point to a general preference for environment matters, especially animal welfare (expect Dolce Gabanna), and no interest by strongly advanced SDGs – Human Rights and Anti-Corruption. Sadly, even R&D gets but very little interest. Regarding holding group consistency, Kering is much better than LVMH. The international v. national dimensions are as well noticeable (LVMH, Kerring v. Prada, Tod's and especially Dolce Gabanna).

The second empirical field search took place in August 2020 and had similar features as the search in December 2019 and it added a deeper focus on the CSR, value and the COVID-19 pandemic. Due to business operation restrictions, re-emerging COVID-19 issues and the manner of the performance of the field search, only 5 out of 10 businesses could be analyzed. Tab. 6 and 7 summarize the results as adjusted by the simplified Delphi-method.

Manifestly, the differences persist and the general trend is rather for more CSR and values (Christian Dior) than less (Dolce Gabanna). However, it is questionable if this rather positive evolution is due to an elimination of inappropriate employees (EF from Christian Dior) due to the COVID-19 pandemic than the pandemic itself. In this respect, it is highly relevant to observe the reaction to the COVID-19 pandemic in August 2020 (where no compulsory measures were imposed by the law), see Tab. 7.

All five businesses had disinfection liquids available at the door, but only in LV were the clients required to use them. Christian Dior seems to maintain the same portfolio of products and a usual increase in prices, but obviously COVID-19 has led to dramatic changes in customer care. The arrogant and supercilious attitude was abandoned and a general interest in CSR seems to have improved. The reduction of staff was obvious at LV and led to poor customer care, namely, despite there being but few customers, for over ten minutes no sales clerk was available. In Gucci, the staff admitted that, due to COVID-19 there was a reduction in product selection and an increased drive for online shopping. In Prada, it was seen that there was an increase in prices due to the COVID-19 pandemic and a reduction of staff was noticeable. The paralyzing effect of COVID-19 in financial and even non-financial spheres was ostensible in Dolce Gabbana, where any interest in products, sales and CSR seems to have totally evaporated.

Tab. 5: Front-line employee's attitudes to 6 CSR categories in December 2019

Business	Environment	Emp. Matt.	Social	HumRight	Anti-Corr	R&D
Louis Vuitton	++	+	++	0	0	+
Christian Dior	++	+	++	0	0	++
Fendi	++	++	++	0	0	++
Bulgari	++	++	++	0	0	++
Gucci	+++	++	+	0	0	+
Bottega Venetta	+++	++	+	0	0	+
Prada	+++	++	+	0	0	++
Dolce Gabanna	0	+	+	0	0	+
Tod's	+	+	+	0	0	+
Furla	+	++	++	0	0	+

Tab. 6: Front-line employee's attitudes to 6 CSR categories in August 2020

Business	Environment	Emp. Matt.	Social	HumRight	Anti-Corr	R&D
Louis Vuitton	++	+	++	0	0	+
Christian Dior	++	+++	++	0	0	+++
Gucci	+++	++	+	0	0	+
Prada	+++	0	+	0	0	++
Dolce Gabanna	0	0	0	0	0	0

In sum, the determination regarding all six 6 CSR categories and related values, as solemnly proclaimed by the owners and top management (MacGregor et al., 2020a, 2020b), remain not fully reflected by the low management and front-line employees. Indeed, they continue to not share any interest in certain CSR categories (4. HRs, 5. anti-corruption) and are only moderately interested in the other CSR categories (2. empl., 3. social and 6. R&D). Nevertheless, as opposed to the field search in December 2019, significant changes occurred in three out of five examined businesses. Firstly, Christian Dior has dramatically improved, dropping their arrogant attitude and showing a genuine general CSR interest. Secondly, Prada made the same direct statements, but mystery shopping revealed serious flaws even in the previously excellent category (2. empl.). Thirdly, Dolce Gabbana totally lost interest in CSR, and this both based on the direct information from interviews and on the indirect information implied by observation. It appears that these changes were caused rather by the consequences of the COVID-19 than the pandemic itself. It is worth noting that no business from the observed sample moved to either a price reduction or the incorporation of COVID-19 concerns in its business strategies and employee'ss attitudes. Well, this is one side of the coin, and what about another side of the coin – customers facing these front-line employees and their attitudes?

Tab. 7: Reaction to the COVID-19 pandemic in August 2020

Business	Disinfection	Face masks	Selection of product	Price	Customer care
Louis Vuitton	Available	Yes	N/A	N/A	Poor
Christian Dior	Available	Yes	Same	Rise	Excellent
Gucci	Available	Yes	Reduced	Same	Very good
Prada	Available	Yes	Reduced	Rise	Good
Dolce Gabanna	Available	No	Reduced	Same	Very poor

4.2 Customer's Attitudes

In November, 2020, 24 respondents aged 35 to 42 years and 24 respondents of aged 43 to 50 years returned the completed questionnaires and so allowed the further confirmation and/or rejection of the 3 given hypotheses. The Pearson Chi-squared test processing information and contingency tables for each of these 3 hypotheses are as follows.

- H_1 – My choice is influenced by the CSR of the business, i.e. how the business and its TM actively support sustainability as translated in 6 CSR categories and this depends upon my age.
- H_0 – There is not any dependence between these signs, i.e. respondents do not reflect the CSR of the given business.

Tab. 8: The contingency table for H_1

Sign A	Yes	No	Addition
A1 (# of 35–42 years)	10	14	24
A2 (# of 43–50 years)	12	12	24
Total	22	26	48

The value of the Pearson Chi-squared is $\chi^2 = 1.166$ (converted 0.335) and the level of significance is $\alpha = 0.05$, i.e. $\chi^2_{0.05\ (1)} = 0.335$ (converted 3.841). Since $\chi^2 < \chi^2_{0.05\ (1)}$, H_0 is not rejected ⇒ there is no dependence between signs and respondents, based on their age, do not consider the CSR of the given business during their selection.

- H_2 – My choice is influenced by the values shared by the business, i.e. values actively endorsed and advanced by the business and this depends upon my age.
- H_0 – There is not any dependence between these signs, i.e. respondents do not reflect values proclaimed by the given business.

Tab. 9: The contingency table for H_2

Sign A	Yes	No	Addition
A1 (# of 35–42 years)	10	14	24
A2 (# of 43–50 years)	17	7	24
Total	27	21	48

The value of the Pearson Chi-squared is $\chi^2 = 1.166$ (converted 4.148) and the level of significance is $\alpha = 0.05$, i.e. $\chi^2_{0.05\ (1)} = 4.148$ (3.841). Since $\chi^2 < \chi^2_{0.05\ (1)}$, H_0 is rejected ⇒ there is dependence between signs and respondents, based on their age, i.e. younger respondents care even less than older respondents about the values of the given business during their selection.

- H_3 – My decision is the same now (November 2020) as it was in 2019 (before the COVID-19) and this depends upon my age.
- H_0 – There is not any dependence between these signs, i.e. respondents decide differently – their decision making has changed between December 2019 and November 2020.

Tab. 10: The contingency table for H_3

Sign A	Yes	No	Addition
A1 (# of 35-42 years)	11	13	24
A2 (# of 43-50 years)	19	5	24
Total	30	18	48

The value of the Pearson Chi-squared is $\chi^2 = 1.166$ (converted 5.688) and the level of significance is $\alpha = 0.05$, i.e. $\chi^2_{0.05\ (1)} = 5.688$ (3.814). Since $\chi^2 < \chi^2_{0.05\ (1)}$, H_0 is rejected ⇒ there is dependence between signs and especially younger respondents decide differently, i.e. their decision making has changed between December 2019 and November 2020.

These results need to be appreciated in the context of additional information provided by the questionnaire investigation. Firstly, 65% of respondents have already purchased merchandise in the value of at least CZK 10 thousand from these luxury fashion businesses in Pařížská street. Secondly, the most favorite are Louis Vuitton, Prada and Christian Dior. Thirdly, over 93% of them consider during the selection process their customer experience, but only 35% of them are concerned regarding possible scandals and inconsistencies. Fourthly, the most important CSR concerns are, for them, the animal welfare, protection of rain forests and employee's care. In contrast, only a little interest is generated by the engagement in the fight against the COVID-19, social concerns and

human rights protection, while research and development and fights against corruption and bribery are almost ignored.

Hence, the message can be summarized – customers assign a rather small and diverse importance to the CSR and values shared by the businesses and, although their decision making has changed due to COVID-19 (especially by younger respondents), the engagement of the pertinent business in the fight against COVID-19 is, for customers, basically irrelevant. Further, sadly, younger respondents care less about values than older respondents. Generally, the direct hands-on personal experience, often earned based on the face-to-face meeting, prevails.

5 DISCUSSION AND CONCLUSIONS

The confrontation of the achieved results regarding low-managerial attitudes with customer's attitudes and ultimately with previously published papers, reveal a set of rather surprising and worrisome revelations calling for further verification, explanation and mitigations. Indeed, the significance of CSR during the COVID-19 Pandemic in the Luxury Fashion Industry as shown by the Front-Line Case Study involving front-line employees and their potential clientele remains very fragmented, diversified and not aiming towards the values as conventionally expected and advanced by the EU. Indeed, despite inherent limitations, especially due to the limited size (10 businesses and 48 fully replying customers) the study sheds a new light in the field and reveals discrepancies and a lack of readiness to embrace COVID-19 as an opportunity to move to the sustainable entrepreneurship. The cliché that "crises magnifies the prior difference" appears all too true in regard to the CSR attitude in the luxury fashion industry, at least if a bottom-up perspective is employed. However the proposition that "crises bring new opportunities" seems not matching here.

The number of customers and their readiness to spend money for luxury products in Prague has decreased for a myriad of reasons and perhaps the most significant is the reduction of the flow of tourists. In such a context, it might be expected that these businesses would try to address these challenges by new special editions of products and an appeal for shared sustainable values (Chandler, 2017; Ujwary-Gil, 2017) and CSR in general. One might expect, even more, that these businesses will return, in a modern manner, to their very roots and attempt to combine digitalization and global demands with the commitment to maintain an illustrious quality (Olšanová et al., 2018), high value recognition and implied scarcity. Based on the well-established dynamics of modern entrepreneurship (Drucker, 2015), it might be expected that a transformation will occur, resulting in new trends for a sustainable luxury fashion industry.

All wrong, the impact of COVID-19 on the CSR attitude in the luxury fashion industry, at least at the lowest level, is not perceived as an opportunity for a transformation towards a sustainable entrepreneurship pro-actively embracing CSR. The proclamation of Ursula von der Leyen "We must not hold on to yesterday's economy as we rebuild" (European Commission, 2020c) is well conceived and ill received. Regarding the four open-ended questions, the following responses of front-line management based on the case study in December 2019 and August 2020 can be offered:

a) the competitive advantage of our product is due to the outstanding material, hand processing in Italy, a long tradition and great care of animals;

b) our brand has historic roots, is linked to celebrities and high quality, occasionally as well to charity;

c) sustainability is not critical for us, we are moving against using animal fur and for saving energy and that is that;

d) there is a staff reduction, price increases and our future is threatened, we do not like that and generally do not know what to do.

Well, the COVID-19 problem is not about to be solved here, instead it appears that it creates a set of other problems which could turn out to be, perhaps, even more dangerous. If even the internal stakeholders do not follow the same values, ideally compatible with the CSR, then there is very little hope left and older studies suggesting the contradiction between luxury and sustainability should be resurrected and revisited (Achabou and Dekhili, 2013). Further, this confirms prior research regarding both managers and consumers suggesting that business ethics and CSR are perhaps close, but for sure still sufficiently distinct (Fischer, 2004), and the links between them (Weller, 2020; Ferrell et al., 2019) as well as their relationships to business operations per se and profit maximization remains unclear (Diallo et al., 2020). To put it differently, the old question re-emerges – if the value co-creation is dropped, then why have a luxury fashion industry at all? This is extremely worrisome and touches upon the raison d'être of the luxury industry and perhaps even the modern concept of CSR. The performed study during the COVID-19 pandemic in Prague surprisingly suggests that customers care less than expected regarding CSR and values of these luxury fashion businesses.

Specifically, customers assign a rather small and diverse importance to the CSR and values shared by the businesses and, although their decision making has changed due to the COVID-19, the engagement of the pertinent business in the fight against COVID-19 is, for customers, basically irrelevant. Processing of stated hypotheses led to disappointing CSR results – neither CSR nor values of the business play a significant role in decision making by respondents (H_1, H_2) and younger respondents seem to care even less than older ones while being more prompt to modify their decision making process due to the COVID-19 (H_3). These findings contradict the, so far, prevailing general pro-CSR tenor (Chandler, 2017; Rowley and Berman, 2000; Ting et al., 2019; Ujwary-Gil, 2017) and support the more cautious academic stream stressing that only effective, efficient, perfectly tailored and communicated CSR is relevant, otherwise it is a waste (Barnett, 2007; Scherer and Palazzo, 2011). As a matter of fact, these findings are totally compatible with the proposition that the discrepancies in the CSR-attitude undermines the CSR potential to improve financial and even non-financial performance (Rodríguez-Fernández, 2016) and that even a well selected and homogenously applied CSR is prone to be futile, if not properly communicated at large to all stakeholders (Turcu, 2015).

A detailed elaboration of results of the performed case study points out that the direct hands-on personal experience, often earned based on the face-to-face meeting in luxury fashion boutiques in Pařížská, prevails. Hence luxury fashion customers in Prague agree, or at least are not insulted, with front-line employees stressing (a) outstanding materials, high quality and animal welfare along with (b) historic production roots, and (c) underplaying sustainability. Perhaps they share their (d) passive resignation bordering with nihilism. Czech low management and consumers fit in the picture presented by the academic stream proposing that sustainability is not perceived as an intrinsic element of a luxury product (Achabou and Dekhili, 2013; Davies et al., 2012; Kapferer and Michaut, 2015; Ki and Kim, 2016) and that there are dramatic differences in the perception of certain luxury businesses and brands (Diallo et al., 2020). This lends even more relevance to, so far, underplayed prior studies, such as about the fit between luxury and sustainability for different types of products, which found greater fit for enduring rather than ephemeral products – e.g. jewelry made from extremely rare materials was perceived as more sustainable than clothing (Janssen et al., 2013). It will be highly interesting to observe how this will work for luxury handbags in the future, because some luxury fashion businesses are completely departing from high quality rare materials (e.g. Prada and Gucci dropping exotic fur) and rather opt for non-lavish and arguably strongly pro-sustainability materials (e.g. Prada using old fishing nets and artificial fur).

In sum, the performed front-line case study contributes to the, so far, split theory about the

general (in)significance of the CSR in four directions. Firstly, it supports the, as yet, minority academic stream calling for a more cautious and lean approach (either effective, efficient, perfectly tailored and well-communicated CSR or no CSR at all). Secondly, it proposes that CSR is moderately significant during the COVID-19 pandemic in the Luxury Fashion Industry. Thirdly, it argues there are basically no signs about the synergy effect of SDGs and about the drive to use the crisis as an opportunity to "get better", regardless if this would mean being 'more green' (EU commission) or more effective and efficient (Drucker theory) or closer to fundamental values (ethics). Fourthly, it moves to a prima facia controversial proposition that front-line employees and customers care little for sustainability and once the halos of the top quality and perfect customer service extinguish, then even the lights in the shops in Pařížská street should turn off. The rather vain luxury fashion industry can vainly hope to avoid a downfall in such an idle futility and business relic anachronism. And if the CSR and values are not the priority for those by whom it might be expected to go for it the most, then what about the rest?

These are serious propositions contributing to the current theory and practice and they potentially shake the, so far, prevailing academic stream. At the same time, it must be emphasized that these propositions have inherent limitations and call for further studies. Firstly, the group of top luxury fashion businesses and respondents needs to be expanded. Secondly, it would be illustrative to consider as well the attitudes of the front-line management of these businesses in other countries, in order to check out whether we deal with national particularities or global trends. Thirdly, the longitudinal aspect deserves further expansion and so it would be highly relevant to see further trends by performing a similar case study in six months and in one year, for example. Fourthly, it appears relevant to, next year, explore the CSR reports of these businesses and their Codes of Ethics, so as to see how the top management evolved (however this data will not be available before the Summer of 2021.

Despite these limitations, we strongly believe that this study presents the real situation and is a great second step in the pioneering endeavor to map the (lack of) transformation of the CSR-attitude due to the COVID-19 pandemic in the luxury fashion industry.

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