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Firm and sector performance and adaptability to shocks

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FIRM AND SECTOR PERFORMANCE AND ADAPTABILITY TO SHOCKS

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Firm and Sector Performance and Adaptability to Shocks.

A Thesis Submitted to Universidad De Zaragoza, In Partial Fulfillment of The Requirements for The Degree of

Doctor of Philosophy in the Program Economía y Gestión de las Organizaciones

by

Tahir Iqbal

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Author's Declaration

I, Tahir Iqbal, hereby affirm that my PhD thesis is original work of mine and has not previously been submitted by me for consideration of any degree from the Universidad De Zaragoza or from any other institution across the world.

Name of Student: Tahir Iqbal

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This thesis has not been submitted in any portion elsewhere for another degree. In the partial fulfilment of the criteria for the award of the degree of Doctor of Philosophy in the discipline of Economics and Management of organizations at Universidad De Zaragoza, Spain, this thesis is submitted to the PhD Programme Economia y Gestión de las Organizaciones (Universidad De Zaragoza).

Student Name: Tahir Iqbal

Dedication

This thesis is dedicated, firstly, to my parents for their remarkable love for me. For me, PhD was a dream, which has come true.

This thesis is dedicated secondly to the person who supported throughout my career, my respectable mentor Prof. Dr. Jorge Rosell-Martínez. There are no words to convey how much I am thankful to him.

Acknowledgment

My supervisor, Prof. Dr. Jorge Rosell-Martnez, whose courteous and rigorous assistance cleared the road for me to finish my research work, deserves my profound gratitude. Without his assistance, direction, and support, I would not have been enabled to complete this dissertation.

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List of Acronyms

GDP	Gross Domestic Product.
IMF	International Monetary Fund.
ECB	European Central Bank.
INE	National Statistics Institute.
ERTE	Expediente De Regulación Temporal De Empleo.
FDI	Foreign Direct Investment.
UNCTAD	United Nations Conference on Trade and Development.
SMEs	Small and Mid-Size Enterprises.
OECD	Organization for Economic Cooperation and Development.
ECB	European Central Bank.
MNE	Multinational Enterprise.
GTID	Global Transaction Identifier.
VMP	Vector of Management Practices.
PS	Productivity Shock.
AHC	Attracting Human Capital.
EMS	Environmental Management System.
SDG	Sustainable Development Goals.
ISO	International Organization for Standardization.
EP	Environmental Performance.
NGO	Non-governmental organizations.
EIA	Environmental Impact Assessment.
DID	Difference-In-Differences.
ENGOs	Environmental Non-Governmental Organizations.
HOAs	Homeowner Associations.
AVE	Assess Construct Reliability.

Chapter 0. Introducción y conclusiones en español

0.1 Introducción

Hannan y Freeman (1977) defendían que no son las organizaciones las que se adaptan a los cambios o choques. Es la población de organizaciones la que se adapta y lo hace mediante la desaparición de las organizaciones menos adecuadas y la creación de otras nuevas mejor adaptadas al entorno.
La antigüedad de una organización es uno de los factores más importantes en la ecología de las organizaciones que afectan la supervivencia de una empresa. La especialización y la estandarización de las rutinas, el aprendizaje y el desarrollo necesarios para reproducir las acciones empresariales dependen en gran medida del paso del tiempo. Las empresas más antiguas tendrán más experiencia, habrán superado anteriormente situaciones difíciles del entorno y, al hacerlo, habrán adquirido conocimientos útiles para sobrevivir a las crisis antes que otras que se enfrentan a ellas por primera vez.

No se puede negar el hecho de que la población de empresas estará condicionada por las que hayan sido capaces de sobrevivir a los diversos choques. Pero tampoco se puede negar la capacidad de las empresas para adaptarse a los cambios del entorno. O de promover cambios internos que acaben modificando el propio entorno. Este debate es el leitmotiv de esta tesis. Cómo afectan los distintos shocks del entorno a las industrias y, por extensión, a las economías. Cómo las propias empresas generan shocks capaces de alterar el equilibrio competitivo en la industria y cómo reaccionan el resto de empresas del entorno. Qué hace que las empresas activen sus mecanismos de adaptación. Qué mecanismos de adaptación son más eficaces.
Esta tesis consta de tres capítulos principales, que analizan los cambios en las empresas y las economías desde distintos ángulos. Aunque los tres capítulos principales tienen la misma intención, la metodología, el marco académico y el objeto de estudio son diferentes.
Las economías agregadas se refieren a los resultados económicos globales de un país o región, medidos normalmente por diversos indicadores macroeconómicos como el producto interior bruto (PIB), la tasa de inflación, la tasa de desempleo y la balanza comercial (Audretsch & Belitski, 2023). El término "agregado" implica que estos indicadores se combinan para proporcionar una visión general de la economía en su conjunto, en lugar de centrarse en industrias o sectores específicos. En los años recientes, la economía agregada se ve influida por diversos factores, como la pandemia COVID-19 (los efectos de las medidas de diferente tipo que se tomaron en sus peores momentos), las tensiones geopolíticas y las políticas económicas mundiales (Agostino et al., 2022). A partir de 2023, la economía mundial se está recuperando del impacto debido a la pandemia COVID-19 - pero

el ritmo de recuperación varía según las regiones y los países. Muchos países han experimentado importantes contracciones económicas debido a los cierres relacionados con la pandemia y las interrupciones de la cadena de suministro (S. Wang et al., 2022). Sin embargo, a medida que han desaparecido las restricciones, las economías están se han recuperado y han aparecido otros problemas como la inflación. El Fondo Monetario Internacional (FMI) proyectó un crecimiento mundial del 6,0% para 2023, lo que supone una mejora respecto a la contracción del 3,3% en 2021. Sin embargo, el FMI también señaló que la recuperación es desigual, ya que las economías avanzadas se recuperan en general más rápidamente que las economías de mercado emergentes y en desarrollo (Tauseef Hassan et al., 2023). Además, la pandemia ha afectado de forma desproporcionada a los países de renta baja y a las poblaciones vulnerables, exacerbando las desigualdades económicas existentes. Otro factor que influye en la situación actual de la economía agregada son las tensiones geopolíticas (Ma et al., 2023). Las tensiones comerciales entre las principales economías, como Estados Unidos y China, han contribuido a la incertidumbre mundial y han ralentizado el crecimiento económico. Además, los conflictos en curso y la inestabilidad política en varias regiones pueden afectar a la estabilidad y el crecimiento económicos (Anderson & Ponnusamy, 2023). Las políticas económicas mundiales también están desempeñando un papel importante en la configuración de la situación actual de la economía agregada. Las políticas fiscales y monetarias, como las medidas de estímulo de los gobiernos y las intervenciones de los bancos centrales, se están utilizando para apoyar la recuperación económica y estabilizar los mercados financieros (Chang et al., 2023). Sin embargo, se está analizando el posible impacto a largo plazo de estas políticas sobre la inflación, los niveles de deuda y la estabilidad financiera. La situación actual de la economía agregada se caracteriza por un complejo conjunto de factores, entre ellos la actual pandemia COVID-19, las tensiones geopolíticas y las políticas económicas mundiales (Fatah & Pasławski, 2023). Aunque hay indicios de recuperación, las perspectivas siguen siendo inciertas y están sujetas a riesgos y desafíos significativos.

Las proyecciones sobre el futuro de la economía agregada están sujetas a un alto grado de incertidumbre, ya que se basan en una amplia gama de factores, como las políticas económicas, los avances tecnológicos, los cambios demográficos y los factores medioambientales (Rahman et al., 2023). No obstante, los expertos utilizan diversos modelos y escenarios para hacer proyecciones sobre el futuro de la economía mundial. El Fondo Monetario Internacional (FMI) es una de las principales organizaciones que proporcionan proyecciones futuras para la economía mundial (Kinda et al., 2023). Según el informe Perspectivas de la economía mundial del FMI, publicado en abril de 2022, se espera que la economía mundial crezca un 4,4% en 2021 y un 3,3% en 2022, tras la tasa de crecimiento del 6% prevista para 2022 (FMI, 2022). Sin embargo, el FMI señaló que las

proyecciones están sujetas a una incertidumbre significativa, dependiendo del curso de la pandemia de COVID-19, el éxito de los despliegues de vacunas y la eficacia de las políticas económicas para apoyar el crecimiento y mitigar los riesgos (S. Wang et al., 2023). La Organización para la Cooperación y el Desarrollo Económicos (OCDE) también ofrece proyecciones futuras para la economía mundial. En su último informe de Perspectivas Económicas publicado en marzo de 2021, la OCDE preveía un crecimiento económico mundial del 4,5% en 2022 y del 3,8% en 2023 (OCDE, 2021). La OCDE también señaló que la recuperación sería desigual entre regiones y sectores, y que los riesgos e incertidumbres asociados a la pandemia y a las políticas económicas mundiales podrían afectar significativamente a las proyecciones (Cline, 2023). Otras instituciones y organizaciones también ofrecen proyecciones de futuro para la economía mundial. Por ejemplo, el informe Perspectivas de la economía mundial del Banco Mundial, publicado en enero de 2021, preveía un crecimiento mundial del 4% en 2021, seguido de un crecimiento del 3,8% en 2022 y 2023 (Banco Mundial, 2021). El informe también señalaba que la pandemia tendría efectos duraderos en la economía mundial, y que algunos sectores y países experimentarían retrocesos significativos que podrían afectar al crecimiento a largo plazo (Armoti et al., 2023).

Además, las proyecciones futuras de la economía agregada también se ven influidas por otros factores, como los avances tecnológicos y los cambios demográficos (Yao et al., 2023). Por ejemplo, la creciente adopción de la automatización y la inteligencia artificial podría afectar significativamente a la naturaleza del trabajo y la productividad en el futuro, mientras que los cambios demográficos, como el envejecimiento de la población en algunos países, podrían afectar a la oferta y la demanda de mano de obra (Wolff & Mykhnenko, 2023). Las proyecciones sobre el futuro de la economía agregada están sujetas a una gran incertidumbre y dependen de diversos factores, como las políticas económicas, los avances tecnológicos, los cambios demográficos y los factores medioambientales (Weitzel et al., 2023). Aunque las organizaciones internacionales y otras instituciones proporcionan proyecciones basadas en diversos modelos y escenarios, la exactitud de estas proyecciones depende de la evolución de la economía mundial a lo largo del tiempo y de la eficacia de las políticas y medidas adoptadas para mitigar los riesgos y apoyar el crecimiento.

La productividad de la economía se refiere a la eficiencia con la que un país o región produce bienes y servicios, en relación con el número de recursos que utiliza (Yao et al., 2023). La productividad suele medirse dividiendo la producción de una economía (como el PIB) por los insumos utilizados para producirla (como la mano de obra, el capital y los recursos naturales) (Yang et al., 2022). Los altos niveles de productividad pueden conducir a un mayor crecimiento económico y a una mejora del nivel de vida, ya que se pueden producir más bienes y servicios con el mismo número de recursos (Eldeep y Zaki, 2023). Por otro lado, los bajos niveles de productividad pueden

obstaculizar el crecimiento económico y limitar la capacidad de un país o región para competir en el mercado mundial. Hay varios factores que pueden afectar a la productividad de las economías agregadas. Entre ellos se encuentran la tecnología, el capital humano, las infraestructuras y el entorno normativo (Tauseef Hassan et al., 2023). Tecnología la adopción de nuevas tecnologías puede conducir a un aumento de la productividad mediante la mejora de la eficiencia de los procesos de producción. Capital humano, una mano de obra bien formada y cualificada puede conducir a una mayor productividad al permitir a los trabajadores realizar tareas de forma más eficiente (Jin et al., 2023). Infraestructura, el acceso a infraestructuras modernas como sistemas de transporte, redes de comunicación y fuentes de energía puede mejorar la productividad al reducir el coste de producción y facilitar la conexión con proveedores y clientes. Entorno normativo, un entorno normativo favorable que fomente la competencia y la innovación puede contribuir a aumentar la productividad al animar a las empresas a invertir en nuevas tecnologías y procesos (C. Yu et al., 2023). Básicamente, la productividad es un determinante clave del rendimiento económico de las economías agregadas, y los responsables políticos a menudo se centran en estrategias para mejorar la productividad como medio para promover el crecimiento y la prosperidad. Las proyecciones sobre la productividad futura de la economía agregada también están sujetas a incertidumbre y dependen de diversos factores, como los avances tecnológicos, el capital humano y las políticas económicas. Aunque existen diferentes métodos para medir la productividad, uno de los más utilizados es la productividad laboral, que mide la producción por hora de trabajo.

Según la Organización para la Cooperación y el Desarrollo Económico (OCDE), el crecimiento de la productividad laboral ha sido relativamente lento en muchas economías avanzadas en los últimos años, y se necesitan reformas estructurales e inversiones en innovación y cualificaciones para impulsar la productividad (OCDE, 2021). La OCDE prevé que la pandemia de COVID-19 podría haber exacerbado la desaceleración de la productividad a corto plazo, pero existen oportunidades para que la transformación digital y las inversiones en tecnologías verdes apoyen el crecimiento de la productividad a largo plazo (Madrigal Delgado et al., 2018). Los avances tecnológicos, particularmente en el área de la inteligencia artificial (IA) y la automatización, tienen el potencial de impactar significativamente en la productividad en el futuro (Cui & Wang, 2023). Según un informe del McKinsey Global Institute, la IA podría aportar hasta 13 billones de dólares a la economía mundial en 2030, con el potencial de aumentar la productividad en diversos sectores, como la fabricación, la atención sanitaria y las finanzas (McKinsey Global Institute, 2018). Sin embargo, el informe también señaló que la adopción de tecnologías de IA requeriría inversiones significativas en investigación y desarrollo, así como políticas para abordar el impacto potencial sobre el empleo y la desigualdad (Martínez-Alonso et al., 2022).

El capital humano, incluida la educación y la formación, también desempeña un papel crucial en el crecimiento de la productividad. El Banco Mundial señaló que las inversiones en educación y formación podrían contribuir a una mayor productividad laboral y crecimiento económico a largo plazo (Banco Mundial, 2019). Sin embargo, la calidad de la educación y la formación, así como el acceso a estas oportunidades, siguen siendo un reto en muchos países. Las políticas económicas, incluidas las relacionadas con la fiscalidad, la regulación y la inversión, también influyen en el crecimiento de la productividad. Por ejemplo, un informe de la OCDE señalaba que la reducción de las barreras de entrada y el aumento de la competencia podrían impulsar la productividad en diversos sectores, como el comercio minorista, el transporte y los servicios profesionales (OCDE, 2020). Las proyecciones sobre la productividad futura de la economía agregada dependen de varios factores, como los avances tecnológicos, el capital humano y las políticas económicas. Si bien existen oportunidades para que la transformación digital y las inversiones en educación y formación apoyen el crecimiento de la productividad, abordar el impacto potencial sobre el empleo y la desigualdad, así como promover la competencia y reducir las barreras de entrada, también son esenciales para un crecimiento sostenido de la productividad.

La productividad de una empresa se refiere a la cantidad de producto (bienes o servicios) que produce por unidad de insumo (mano de obra, capital u otros recursos) (Bruhn y Calegario, 2014). Es un indicador clave de la eficiencia de las operaciones de una empresa y de su capacidad para generar beneficios y mantener el crecimiento. Existen diferentes métodos para medir la productividad, dependiendo del tipo de insumos y productos que se consideren. Uno de los métodos más utilizados es la productividad laboral, que mide la producción por hora de mano de obra (H. Yu et al., 2022). Otras medidas de la productividad son la productividad total de los factores, que tiene en cuenta todos los insumos (incluidos el capital y los materiales) y la producción, y la productividad multifactorial, que mide la productividad de varios insumos juntos (Cuvero et al., 2022a). Hay varios factores que pueden afectar a la productividad de una empresa, como los avances tecnológicos, las prácticas de gestión, el capital humano y la inversión en investigación y desarrollo. Los avances tecnológicos pueden ayudar a las empresas a racionalizar sus operaciones y reducir costes, al tiempo que les permiten fabricar productos o servicios de mayor calidad (Torrent-Sellens et al., 2022). Las prácticas de gestión, como la fabricación ajustada o la gestión de la calidad total, también pueden ayudar a mejorar la productividad mediante la eliminación de residuos y la mejora de los procesos. El capital humano, incluida la educación y la formación, también es un factor importante en la productividad. Los trabajadores cualificados y con conocimientos pueden realizar tareas de forma más eficiente y eficaz, lo que puede conducir a una mayor productividad (Tarifa Fernández et al., 2022). La inversión en investigación y desarrollo también es importante para el

crecimiento de la productividad, ya que puede conducir al desarrollo de nuevos productos o procesos que pueden mejorar la eficiencia y reducir los costes. Medir y mejorar la productividad es importante para que las empresas sigan siendo competitivas en el mercado y logren un crecimiento sostenible (Quintana-García et al., 2022). La mejora de la productividad puede generar mayores beneficios, que pueden reinvertirse en la empresa o devolverse a los accionistas (Agostino et al., 2022). Además, una mayor productividad puede permitir a las empresas ampliar sus operaciones y crear más puestos de trabajo. La productividad de una empresa es un indicador clave de su eficiencia y capacidad para generar beneficios y mantener el crecimiento. Los avances tecnológicos, las prácticas de gestión, el capital humano y la inversión en investigación y desarrollo son factores importantes que pueden afectar a la productividad.

Medir la productividad de las economías puede resultar difícil, pero existen varios métodos de uso común. Uno de ellos es la productividad total de los factores (PTF), que mide la eficiencia de todos los insumos, incluidos la mano de obra, el capital y los materiales, en la producción (Gómez et al., 2022). Otro método consiste en utilizar la productividad del trabajo, que mide la producción por hora de mano de obra. La productividad en las economías agregadas puede verse influida por varios factores, como el progreso tecnológico, la inversión en educación y formación y las mejoras en infraestructuras (Cui y Wang, 2023). El progreso tecnológico puede dar lugar a procesos de producción más eficientes y a nuevos productos que aumenten la productividad. La inversión en educación y formación puede mejorar la calidad y la cantidad del capital humano, lo que también puede aumentar la productividad. Las mejoras en infraestructuras, como las redes de transporte y comunicación, también pueden conducir a una producción y distribución más eficientes de bienes y servicios (Agostino et al., 2022). La productividad de las empresas en las economías agregadas se ve influida no sólo por sus operaciones internas, sino también por factores externos como la competencia en el mercado, la normativa gubernamental y las condiciones macroeconómicas. Por ejemplo, un mercado muy regulado puede inhibir la capacidad de las empresas para innovar y mejorar la productividad, mientras que un mercado muy competitivo puede incentivar a las empresas a invertir en nuevas tecnologías y procesos para seguir siendo competitivas (Quintana-García et al., 2022).

Una perturbación (shock) es un acontecimiento o cambio inesperado y significativo que altera el funcionamiento normal de una economía o un mercado. Las perturbaciones pueden ser positivas o negativas y tener su origen tanto en fuentes internas como externas (Miklian y Hoelscher, 2022). Los choques positivos pueden incluir cosas como nuevos avances tecnológicos, un aumento de la demanda de los consumidores o el descubrimiento de nuevos recursos naturales. Estos tipos de perturbaciones pueden conducir a un mayor crecimiento económico, una mayor productividad y

una mejora general del nivel de vida (Ríos-Rull y Santaeulàlia-Llopis, 2010). Por otro lado, las perturbaciones negativas pueden ser catástrofes naturales, guerras o crisis financieras. Este tipo de perturbaciones puede provocar una disminución del crecimiento económico, una reducción de la productividad y un descenso del nivel de vida (Kehoe y Ruhl, 2008). Los shocks también pueden clasificarse como choques de oferta o de demanda. Un choque de oferta se refiere a un cambio repentino en el suministro de bienes o servicios, como un desastre natural que interrumpe la producción de un determinado producto (Carlsson et al., 2016). Por otro lado, un choque de demanda se refiere a un cambio repentino en la demanda de los consumidores, como una recesión que hace que los consumidores reduzcan su gasto. Los shocks pueden tener efectos tanto a corto como a largo plazo en la economía. A corto plazo, pueden provocar perturbaciones en los mercados y las cadenas de suministro, haciendo que los precios suban o bajen rápidamente (Kehoe & Ruhl, 2008). A largo plazo, los choques pueden tener un impacto duradero en la estructura de una economía, provocando cambios en los tipos de bienes y servicios producidos y en la forma en que se producen (Lorenzoni, 2009).

La crisis financiera de 2008 fue un choque externo importante que tuvo un profundo efecto en la industria financiera, la economía en general y la sociedad en general. Las conmociones externas son acontecimientos o factores que escapan al control de un sector concreto y que pueden tener repercusiones significativas e impredecibles en dicho sector (Adhvaryu et al., 2019). En el caso de la crisis financiera, la perturbación externa fue el colapso del mercado inmobiliario estadounidense, que provocó impagos generalizados de hipotecas de alto riesgo, la caída de los precios de la vivienda y una crisis crediticia más amplia. El efecto de la crisis financiera en el sector financiero fue significativo y duradero (Evans, 1992). Los bancos y otras instituciones financieras estaban muy expuestos al mercado inmobiliario a través de inversiones en valores respaldados por hipotecas y otros productos financieros. Cuando el mercado inmobiliario se desplomó, muchas de estas inversiones perdieron su valor, lo que provocó importantes pérdidas a estas instituciones (Corsetti et al., 2008). La crisis también provocó un descenso de la confianza de los consumidores, lo que se tradujo en una disminución de la demanda de productos y servicios financieros, ya que los particulares y las empresas se volvieron más cautelosos a la hora de invertir. El impacto de la crisis financiera en la economía en general también fue grave. El colapso del mercado inmobiliario provocó un descenso del valor de la vivienda, que a su vez provocó una disminución del gasto de los consumidores y una contracción de la economía en general (Glick y Rogoff, 1995). La crisis crediticia también provocó una congelación de los préstamos, ya que los bancos se volvieron más reacios a asumir riesgos y a conceder préstamos a particulares y empresas. Esto agravó, aún más, la recesión económica ya que muchas empresas no pudieron acceder al crédito que necesitaban para

invertir y crecer. El impacto social de la crisis financiera también fue significativo. La crisis provocó la pérdida generalizada de puestos de trabajo, ya que muchas empresas se vieron obligadas a despedir trabajadores o a declararse en quiebra (Kehoe & Ruhl, 2008). Esto, a su vez, provocó un aumento de la pobreza y la desigualdad social. La crisis también minó la confianza pública en el sector financiero y en los reguladores gubernamentales, ya que muchas personas se sintieron defraudadas por los responsables de supervisar el sector (Barón et al., 2020). La crisis financiera de 2008 fue una gran sacudida externa que afectó profundamente al sector español de la construcción. Antes de la crisis, el sector de la construcción en España había experimentado un período de auge, impulsado por los bajos (negativos) tipos de interés reales, la facilidad de crédito y un mercado inmobiliario en rápido crecimiento. Sin embargo, cuando estalló la crisis financiera mundial, la economía española entró en una profunda recesión y el sector de la construcción se vio especialmente afectado (Torrent-Sellens et al., 2022). La crisis tuvo varias repercusiones en el sector de la construcción español, entre ellas un fuerte descenso de la demanda de viviendas nuevas, una disminución de la actividad de la construcción, un aumento de los préstamos morosos y un descenso del valor de los inmuebles. A medida que la economía española entraba en recesión, la demanda de nuevas viviendas se redujo drásticamente, lo que provocó un importante exceso de oferta de viviendas en el mercado (Aranda-Usón et al., 2020). Este exceso de oferta, combinado con un endurecimiento de las condiciones crediticias, provocó un desplome de los precios de la vivienda, lo que redujo aún más la demanda de nuevas construcciones. Con la caída de la demanda de obra nueva, muchas empresas de construcción en España se vieron obligadas a despedir trabajadores o a cerrar por completo. Esto provocó un fuerte descenso de la actividad de la construcción y un aumento del desempleo en el sector. Muchos bancos españoles habían concedido créditos a empresas de la construcción durante el periodo de auge y, cuando llegó la crisis, estos préstamos se convirtieron en morosos. Esto provocó una crisis en el sector bancario español y la necesidad de una intervención gubernamental para estabilizar el sistema bancario. Esencialmente afectó a las cajas de ahorro que representaban casi la mitad del sector bancario español y que, a la vista del resultado, no habían medido adecuadamente los riesgos incurridos. El colapso del mercado inmobiliario provocó un descenso del valor de las propiedades, que tuvo un efecto dominó en toda la economía.

La pandemia de COVID-19, que surgió a finales de 2019 y se extendió rápidamente por todo el mundo, ha supuesto una gran conmoción externa con profundos efectos en diversas industrias, economías y sociedades (Wolff & Mykhnenko, 2023). La pandemia de COVID-19 es una crisis de salud pública que ha obligado a los gobiernos de todo el mundo a aplicar medidas como cierres patronales, restricciones de viajes y directrices de distanciamiento social para limitar la propagación

del virus (Albert et al., 2020). Estas medidas han interrumpido las cadenas de suministro, han reducido la demanda de productos y servicios y han alterado el comportamiento de los consumidores, lo que ha tenido un impacto significativo y a menudo impredecible en las industrias. El efecto de COVID-19 en diversas industrias ha sido significativo y varía en función del sector (Pichler & Farmer, 2022). El sector de los viajes y la hostelería, por ejemplo, se ha visto gravemente afectado, y muchas líneas aéreas, hoteles y restaurantes han experimentado un fuerte descenso de la demanda debido a las restricciones de viaje y al cierre de fronteras. La industria del entretenimiento, incluidos cines, conciertos y eventos deportivos, también se ha visto gravemente afectada, ya que se desalentaron o prohibieron las reuniones públicas (Salas-Fumás, 2021). Mientras tanto, algunas industrias como el comercio electrónico, la educación en línea y la atención sanitaria han experimentado un aumento de la demanda debido a la pandemia. La pandemia de COVID-19 también ha tenido importantes repercusiones en la economía en general. Los cierres patronales y las medidas de distanciamiento social han obligado a muchas empresas a cerrar o reducir sus operaciones, lo que ha provocado la pérdida de puestos de trabajo y un descenso de la actividad económica (Palomino et al., 2023). Los gobiernos de todo el mundo han puesto en marcha paquetes de estímulo y otras medidas para mitigar el impacto económico de la pandemia, pero los efectos a largo plazo sobre la economía siguen siendo inciertos. Los impactos sociales de la pandemia de COVID-19 también han sido significativos. La pandemia de COVID-19 tuvo un impacto significativo en la industria española de la construcción, aunque los efectos fueron diferentes a los de la crisis financiera de 2008. Estas son algunas de las formas en que la pandemia afectó al sector de la construcción en España: interrupción de las cadenas de suministro; suspensión de las obras; cambios en los protocolos de seguridad; cambios en la demanda y cambios en la financiación. La pandemia provocó interrupciones en las cadenas de suministro mundiales, lo que afectó a la disponibilidad de materiales y equipos de construcción. Esto provocó retrasos y aumentó los costes de muchos proyectos de construcción en España (Boscá et al., 2021). Durante las primeras fases de la pandemia, el gobierno español suspendió muchos proyectos de construcción para frenar la propagación del virus. Esto provocó importantes retrasos y pérdidas de ingresos para muchas empresas de construcción. Para reanudar los trabajos de construcción, muchas empresas tuvieron que adoptar nuevos protocolos de seguridad, como medidas de distanciamiento social y un mayor uso de equipos de protección individual (Pedauga et al., 2022). Estas medidas añadieron costes y complejidad a los proyectos de construcción. La pandemia provocó cambios en la demanda de servicios de construcción. Por ejemplo, aumentó la demanda de instalaciones sanitarias y de reformas de edificios existentes para hacerlos más seguros e higiénicos. Sin embargo, también disminuyó la demanda de nuevos edificios de oficinas y comerciales, ya que muchas empresas

pasaron a trabajar a distancia (Palomino et al., 2023). La pandemia provocó cambios en la financiación de los proyectos de construcción, ya que los prestamistas se volvieron más cautelosos y muchos proyectos quedaron en suspenso o se cancelaron debido a la incertidumbre sobre las perspectivas económicas. La pandemia de COVID-19 ha sido un importante choque externo que ha tenido profundos efectos en diversas industrias, economías y sociedades. La pandemia ha puesto de manifiesto las debilidades y vulnerabilidades de varias industrias y ha subrayado la necesidad de una mayor resistencia y adaptabilidad frente a los choques externos. Los efectos a largo plazo de la pandemia en las industrias y economías siguen siendo inciertos, y llevará tiempo evaluar si ha dejado efectos permanentes.

Adaptarse a una crisis es un proceso crucial para que las industrias sobrevivan y prosperen en el dinámico e incierto entorno actual (Dornbusch et al., 1998). Una crisis puede adoptar diversas formas, como una catástrofe natural, una recesión económica o un cambio repentino en las condiciones del mercado. Adaptarse a una crisis exige que la industria sea resistente, flexible y receptiva al cambio. Una industria puede adaptarse a una crisis evaluando su impacto, desarrollando un plan de contingencia, aplicando el plan de contingencia, diversificando, innovando, colaborando, mejorando la eficiencia y supervisando los progresos (A. W. Bartik et al., 2020). El primer paso para adaptarse a una crisis es evaluar su impacto en la industria. El sector debe evaluar el alcance de los daños causados por la crisis, los riesgos y oportunidades potenciales y los recursos necesarios para recuperarse (Juergensen et al., 2020). Esta evaluación debe incluir un análisis de las dimensiones operativa, financiera y estratégica de la industria. Una vez evaluado el impacto de la crisis, la industria debe desarrollar un plan de contingencia (A. Bartik et al., 2020). Este plan debe esbozar las medidas concretas que adoptará la industria para hacer frente a los retos planteados por la crisis. El plan de contingencia debe contemplar varios escenarios y ser lo suficientemente flexible para adaptarse a los cambios en las condiciones del mercado (Eichengreen et al., 1995). Una vez elaborado el plan de contingencia, la industria debe aplicarlo sin demora. Esto implica poner en marcha los recursos, procesos y sistemas necesarios para ejecutar el plan. La industria también debe comunicar el plan a las partes interesadas, como empleados, clientes, proveedores e inversores (Berg et al., 1992). Adaptarse a una crisis también implica diversificar los productos o servicios de la industria. Esto puede ayudar a la industria a reducir su dependencia de un único mercado o cliente. La diversificación también puede ayudar a la industria a repartir el riesgo y aumentar sus posibilidades de supervivencia durante una crisis. La innovación es otro aspecto clave de la adaptación a una crisis (Monreal-Pérez et al., 2012). La industria debe innovar para mantenerse por delante de la competencia y crear nuevas oportunidades. La innovación puede implicar el desarrollo de nuevos productos o servicios, la adopción de nuevas tecnologías o la entrada en nuevos

mercados. La colaboración también es esencial para adaptarse a una crisis. La industria debe colaborar con otras industrias o partes interesadas para compartir recursos y conocimientos, poner en común la experiencia y desarrollar soluciones conjuntas. Esto puede ayudar a la industria a aprovechar la fuerza colectiva y superar los retos de una crisis (Bentolila et al., 1994). Adaptarse a una crisis también implica mejorar la eficiencia y la productividad de la industria. Esto puede ayudar a reducir sus costes y aumentar su rentabilidad. La mejora de la eficacia puede ayudar a la industria a resistir las presiones de una crisis y salir reforzada. La industria debe supervisar continuamente sus progresos en la adaptación a la crisis (Gopinath et al., 2017). Esto implica hacer un seguimiento de la aplicación del plan de contingencia, medir la eficacia de los esfuerzos de diversificación, innovación y colaboración, y evaluar las mejoras de eficiencia. El seguimiento de los avances puede ayudar a la industria a identificar las áreas que necesitan mejoras y a realizar los ajustes necesarios (Gourinchas et al., 2020).

Adaptarse a un shock es esencial para que una industria sobreviva y prospere en el entorno dinámico e incierto de hoy en día. Aquí hay algunas razones clave por las que una industria necesita adaptarse a un shock: para garantizar la continuidad del negocio, mantener la cuota de mercado, reducir el riesgo y la incertidumbre, mejorar la eficiencia y la rentabilidad, mantenerse competitivo y mantener la confianza y lealtad del cliente (A. W. Bartik et al., 2020). Un shock puede interrumpir las operaciones normales de una industria, lo que lleva a pérdidas financieras significativas e incluso al cierre. Adaptarse a un shock ayuda a una industria a minimizar la interrupción, garantizar la continuidad del negocio y evitar el riesgo de quiebra. Su shock puede provocar cambios en las condiciones del mercado, como una disminución de la demanda o un aumento de la competencia (Berg et al., 1992). Adaptarse a un shock ayuda a una industria a mantener su cuota de mercado, incluso ante nuevos desafíos y aumentar el riesgo y la incertidumbre que enfrenta una industria, lo que dificulta la planificación para el futuro. Adaptarse a un shock ayuda a una industria a reducir el riesgo y la incertidumbre anticipando los desafíos y tomando medidas proactivas para mitigarlos (Bentolila et al., 1994). Adaptarse a un shock puede ayudar a una industria a mejorar su eficiencia y rentabilidad. Por ejemplo, al diversificar sus ofertas de productos o servicios, una industria puede reducir su dependencia de un solo mercado o cliente y, por lo tanto, aumentar su rentabilidad. Puede ayudar a una industria a mantenerse competitiva innovando y adoptando nuevas tecnologías o procesos. Esto puede ayudar a una industria a mantenerse por delante de sus competidores y aprovechar nuevas oportunidades. La confianza y lealtad del cliente también se pueden mantener adaptándose a un shock. Al abordar rápidamente los desafíos planteados por un shock, una industria puede demostrar su compromiso con sus clientes y mantener su reputación (Gopinath et al., 2017).

Cuando se trata de adaptarse a un shock, diferentes industrias y empresas pueden tener niveles variables de resiliencia y adaptabilidad. Es importante analizar más de cerca qué industrias y empresas son más propensas a adaptarse a un shock y cómo esto puede beneficiar a diferentes partes interesadas: tecnología, atención médica, comercio minorista, finanzas y logística y transporte (Albert et al., 2020). Las empresas de tecnología suelen estar a la vanguardia de la innovación y están bien posicionadas para adaptarse a los shocks. Esto puede beneficiar a las partes interesadas como los clientes, que pueden beneficiarse de nuevos productos o servicios que aborden necesidades o desafíos emergentes. Los empleados también pueden beneficiarse de una cultura de innovación que fomente la experimentación y la adaptabilidad (Pichler & Farmer, 2022). Los proveedores e investigadores de atención médica están acostumbrados a lidiar con eventos inesperados y adaptar su enfoque según sea necesario. Esto puede beneficiar a los pacientes, que pueden recibir tratamientos más efectivos o tener acceso a nuevas terapias o medicamentos. Los empleados de atención médica también pueden beneficiarse del sentido de propósito y la cultura impulsada por la misión que suele estar presente en esta industria (Salas-Fumás, 2021). Los minoristas suelen verse obligados a adaptarse rápidamente a los cambios en el comportamiento del consumidor o las tendencias del mercado. Esto puede beneficiar a los clientes, que pueden tener acceso a una mayor variedad de productos o experiencias de compra más convenientes. Los empleados minoristas también pueden beneficiarse de la oportunidad de aprender nuevas habilidades o asumir nuevos roles a medida que el negocio se adapta a las circunstancias cambiantes (Palomino et al., 2023). La industria financiera está acostumbrada a lidiar con shocks como las recesiones económicas, los colapsos del mercado y otros eventos inesperados. Esto puede beneficiar a los inversores, que pueden tener acceso a estrategias más sofisticadas de gestión de riesgos u oportunidades de inversión (García-Pérez-de-Lema et al., 2022). Los empleados en la industria financiera también pueden beneficiarse de la oportunidad de trabajar en proyectos desafiantes o adquirir experiencia en nuevas áreas del negocio. La industria de la logística y el transporte está acostumbrada a lidiar con interrupciones en las cadenas de suministro, cambios en las regulaciones y eventos inesperados como desastres naturales. Esto puede beneficiar a los clientes, quienes pueden tener acceso a opciones de envío más confiables y eficientes (García-Pérez-de-Lema et al., 2022). Los empleados de esta industria también pueden beneficiarse de la oportunidad de trabajar en desafíos logísticos complejos o desarrollar nuevas tecnologías que mejoren las operaciones de transporte y logística.

El rendimiento de una industria después de adaptarse a un shock puede variar según una variedad de factores, como la gravedad del shock, el nivel de resiliencia y adaptabilidad de la industria y las estrategias y acciones específicas tomadas por las empresas individuales dentro de la industria

(Adhvaryu et al., 2019). Sin embargo, hay algunas tendencias generales que tienden a surgir cuando las industrias se adaptan a los shocks: mayor eficiencia, innovación, aumento de la competencia, mayor colaboración y mayor resiliencia. Cuando una industria se adapta a un shock, a menudo resulta en una mayor eficiencia a medida que las empresas encuentran nuevas formas de operar y optimizar sus procesos (Carlsson et al., 2016). Por ejemplo, durante la pandemia de COVID-19, muchas industrias se vieron obligadas a adoptar el trabajo remoto y las tecnologías de reuniones virtuales, lo que resultó en una reducción de los costes generales y un aumento de la productividad en algunos casos (Carlsson et al., 2016). Adaptarse a un shock también puede impulsar la innovación a medida que las empresas encuentran nuevas formas de satisfacer las necesidades y preferencias cambiantes de los consumidores. Por ejemplo, durante la pandemia, muchos minoristas y restaurantes adoptaron nuevas tecnologías y procesos para proporcionar opciones de entrega sin contacto y recogida en la acera. Adaptarse a un shock también puede llevar a un aumento de la competencia dentro de una industria a medida que las empresas compiten por la cuota de mercado en un panorama cambiante (Corsetti et al., 2008). Por ejemplo, en la industria minorista, los minoristas en línea como Amazon han ganado cuota de mercado durante la pandemia a medida que los consumidores han pasado al comercio electrónico. Adaptarse a un shock también puede fomentar una mayor colaboración dentro de una industria a medida que las empresas trabajan juntas para desarrollar nuevas soluciones y estrategias (Corsetti et al., 2008). Por ejemplo, durante la pandemia, muchos proveedores e investigadores de atención médica colaboraron para compartir datos y desarrollar nuevos tratamientos y vacunas.

En última instancia, adaptarse a un shock puede ayudar a mejorar la resiliencia de una industria al identificar áreas de debilidad y desarrollar estrategias para mitigar riesgos (Ríos-Rull & Santaeulàlia-Llopis, 2010). Por ejemplo, después de la crisis financiera de 2008, muchos bancos e instituciones financieras implementaron nuevas prácticas de gestión de riesgos y supervisión regulatoria para evitar que ocurrieran crisis similares en el futuro.

Es importante tener en cuenta que el rendimiento de una industria después de adaptarse a un shock puede variar ampliamente según las circunstancias específicas y las estrategias empleadas (Ríos-Rull & Santaeulàlia-Llopis, 2010). Sin embargo, las industrias que pueden adaptarse rápidamente y de manera efectiva a las condiciones cambiantes suelen estar mejor posicionadas para el éxito y el crecimiento a largo plazo.

La crisis financiera de 2008 tuvo un impacto significativo en la economía española, incluidas sus industrias. Si bien la crisis inicialmente provocó una disminución de la productividad en muchos sectores, hubo algunas industrias que pudieron capear la tormenta e incluso aumentar su

productividad después (Glick y Rogoff, 1995). Una industria que experimentó un aumento en la productividad después de la crisis financiera de 2008 es el sector exportador. La crisis provocó un euro débil, lo que hizo que los productos españoles fueran más competitivos en los mercados exteriores, y muchas empresas del sector exportador invirtieron en nuevas tecnologías y procesos para aumentar la eficiencia y reducir costes (Glick y Rogoff, 1995). Esto condujo a una mejora de la productividad y ayudó a compensar el impacto negativo de la crisis en la industria. En particular, La industria automotriz pudo aumentar la productividad después de la crisis implementando técnicas de manufactura esbelta (lean manufacturing), reduciendo el desperdicio y racionalizando los procesos de producción (Evans, 1992). Esto condujo a una mayor eficiencia y ahorro de costes para los fabricantes de automóviles españoles, ayudando a hacerlos más competitivos en el mercado global. De manera similar, la industria química en España pudo aumentar la productividad invirtiendo en investigación y desarrollo para crear productos nuevos e innovadores (Glick y Rogoff, 1995). Esto permitió a las empresas químicas españolas diversificar sus líneas de productos y expandirse a nuevos mercados, lo que en última instancia condujo a una mayor productividad y competitividad. Cabe señalar que no todas las industrias en España pudieron aumentar la productividad tras la crisis financiera de 2008, y muchos experimentaron disminuciones significativas en la productividad debido a la reducción de la demanda y la disponibilidad de crédito (Evans, 1992). Por ejemplo, los sectores de la construcción y el inmobiliario se vieron duramente afectados por la crisis y experimentaron una disminución significativa de su productividad. La crisis financiera de 2008 tuvo un impacto mixto en la productividad dentro de la industria española. Si bien muchas industrias experimentaron una disminución de la productividad, algunas, como la industria exportadora, la automotriz y la química, pudieron capear la tormenta y aumentar la productividad implementando nuevas tecnologías, procesos e innovación (Ríos-Rull & Santaeulàlia-Llopis, 2010). La crisis financiera de 2008 tuvo un impacto mixto en la productividad dentro de la industria española. Si bien muchas industrias experimentaron una disminución de la productividad, algunas, como la industria exportadora, la automotriz y la química, pudieron capear la tormenta y aumentar la productividad implementando nuevas tecnologías, procesos e innovación (Ríos-Rull & Santaeulàlia-Llopis, 2010). La crisis financiera de 2008 tuvo un impacto mixto en la productividad dentro de la industria española. Si bien muchas industrias experimentaron una disminución de la productividad, algunas, como la industria exportadora, la automotriz y la química, pudieron capear la tormenta y aumentar la productividad implementando nuevas tecnologías, procesos e innovación (Ríos-Rull & Santaeulàlia-Llopis, 2010).

La pandemia de COVID-19 tuvo un profundo impacto en la economía española y sus industrias. Si bien muchas industrias experimentaron una disminución significativa de la productividad debido a

los cierres, la reducción de la demanda y las interrupciones de la cadena de suministro, también hubo algunas industrias que pudieron adaptarse e incluso aumentar su productividad en respuesta a la pandemia (Boscá et al., 2021). Una industria que experimentó un aumento de la productividad durante la pandemia es el sector tecnológico. Con el aumento de la demanda de trabajo remoto y servicios en línea, las empresas tecnológicas españolas han podido capitalizar la tendencia e innovar de nuevas formas (Pedauga et al., 2022). Por ejemplo, muchas empresas españolas cambiaron sus modelos de negocio para ofrecer servicios en línea, como telemedicina y aprendizaje a distancia, lo que generó una mayor productividad y una expansión de su base de clientes. Otra industria que ha visto un aumento de la productividad durante la pandemia es el sector sanitario (Berg et al., 1992). Con el aumento de la demanda de suministros y equipos médicos, las empresas españolas del sector sanitario han podido aumentar la producción y la eficiencia. Por ejemplo, las empresas que producen equipos de protección personal (EPP), como mascarillas y guantes, han podido aumentar su productividad para satisfacer la mayor demanda de sus productos (Monreal-Pérez et al., 2012). Vale la pena señalar que no todas las industrias en España pudieron aumentar la productividad durante la pandemia, y muchas experimentaron disminuciones significativas de la productividad debido a la reducción de la demanda y a las interrupciones de la cadena de suministro (Gopinath et al., 2017). Por ejemplo, los sectores del turismo y la hostelería se vieron especialmente afectados por la pandemia y experimentaron una disminución significativa de su productividad. y muchos experimentaron disminuciones significativas en la productividad debido a la reducción de la demanda y a las interrupciones de la cadena de suministro (Gopinath et al., 2017). Por ejemplo, los sectores del turismo y la hostelería se vieron especialmente afectados por la pandemia y experimentaron una disminución significativa de su productividad. y muchos experimentaron disminuciones significativas en la productividad debido a la reducción de la demanda y a las interrupciones de la cadena de suministro (Gopinath et al., 2017).

La crisis financiera de 2008 y la pandemia de COVID-19 tuvieron diferentes impactos en diversas industrias en España, y algunas pudieron aumentar su productividad en respuesta a estos shocks. La industria tecnológica en España experimentó un aumento de la productividad tanto después de la crisis financiera de 2008 como de la pandemia de COVID-19 (Gourinchas et al., 2020). Durante la crisis financiera, muchas empresas de tecnología implementaron nuevas tecnologías y procesos para reducir costes y aumentar la eficiencia. De manera similar, durante la pandemia, la demanda de servicios en línea y trabajo remoto generó un aumento de la productividad en la industria tecnológica, ya que las empresas pudieron capitalizar la tendencia e innovar de nuevas formas (Gourinchas et al., 2020). La industria sanitaria en España también experimentó un aumento de productividad tras la pandemia de COVID-19. Con el aumento de la demanda de suministros y

equipos médicos, las empresas sanitarias españolas pudieron aumentar la producción y aumentar la eficiencia (Dornbusch et al., 1998). Por ejemplo, las empresas que producen equipos de protección personal (EPP) aumentaron su productividad para satisfacer la demanda de sus productos. La industria agrícola en España también experimentó un aumento de la productividad después de la crisis financiera de 2008 y de la pandemia de COVID-19. Durante la crisis financiera, los agricultores españoles implementaron nuevas tecnologías y procesos para reducir costes y aumentar la eficiencia (Dornbusch et al., 1998). De manera similar, durante la pandemia, el cambio hacia los pedidos en línea y la entrega a domicilio de productos frescos permitió a los agricultores vender sus productos directamente a los consumidores, lo que mejoró la eficiencia y la productividad (AW Bartik et al., 2020).

Los shocks de productividad son cambios en la eficiencia de los procesos de producción. El sector industrial español ha experimentado varios shocks de productividad desde la década de 1990, con importantes efectos indirectos en el resto de la economía (Juergensen et al., 2020). A continuación, se describen algunos de los principales shocks de productividad durante este período y sus efectos indirectos. En la década de 1990 se produjo una importante reestructuración en el sector industrial español como resultado de la globalización y el aumento de la competencia internacional. Esto provocó un shock de productividad en el sector industrial, y muchas empresas lucharon por adaptarse al entorno global cambiante (Bartik et al., 2020). Los efectos indirectos de este shock se sintieron en toda la economía, particularmente en el sector de servicios, que experimentó una disminución de la demanda. La crisis financiera mundial de 2008 tuvo un impacto significativo en el sector industrial español, y muchas empresas experimentaron una disminución de la demanda y la inversión (Juergensen et al., 2020). Esto resultó en un shock de productividad en el sector industrial, que tuvo efectos indirectos negativos en el resto de la economía, particularmente en el sector de servicios. La crisis también provocó un aumento de las tasas de desempleo y una disminución del gasto de los consumidores, lo que exacerbó aún más los efectos indirectos negativos (Eichengreen et al., 1995). El sector industrial español también ha experimentado otros shocks de productividad desde la década de 1990, incluidos cambios en los acuerdos comerciales internacionales, cambios en las preferencias de los consumidores y avances tecnológicos. Estos shocks han tenido efectos indirectos en el resto de la economía,

Los efectos indirectos de los shocks de productividad en el sector industrial español se han sentido en toda la economía, particularmente en el sector servicios. En el contexto del sector industrial español, el desbordamiento (spillover) se refiere a la transmisión de efectos económicos de un sector de la economía a otro (Bruhn & Calegario, 2014). En particular, los efectos de desbordamiento pueden ocurrir cuando los cambios en la demanda o la oferta en un sector afectan el desempeño de

las empresas en industrias relacionadas. Por ejemplo, si hay una disminución en la demanda de un tipo particular de producto, como los automóviles, esto puede tener un efecto de contagio negativo en las empresas que suministran componentes o servicios a la industria automotriz (Madrigal Delgado et al., 2018). La inversión extranjera directa (IED) se refiere a la inversión en la producción o las operaciones comerciales de una empresa por parte de una entidad ubicada en un país diferente. En el contexto del sector industrial español, la IED puede tomar la forma de empresas extranjeras que establecen operaciones o adquieren empresas existentes en el sector (Cuvero et al., 2022a). La IED puede tener una serie de beneficios potenciales, incluida la transferencia de tecnología y conocimientos, el acceso a nuevos mercados y una mayor competencia. La relación entre desbordamiento e IED en el sector industrial español es compleja (Tzabbar et al., 2022). Por un lado, la IED puede generar potencialmente efectos indirectos positivos, como la transferencia de nuevas tecnologías o prácticas de gestión de empresas extranjeras a empresas nacionales. Por otra parte, la IED también puede tener efectos indirectos negativos, como el desplazamiento de empresas nacionales o la reducción de la competencia. Para maximizar los beneficios potenciales de la IED y al mismo tiempo minimizar los efectos indirectos negativos, el gobierno español ha implementado una serie de políticas destinadas a promover un clima de inversión favorable (Cuvero et al., 2022b). Por ejemplo, el gobierno ha implementado medidas para reducir la burocracia y agilizar el proceso de establecimiento de una empresa, además de ofrecer incentivos fiscales y otras formas de apoyo financiero a los inversores extranjeros.

Los mecanismos de transmisión del derrame que provocaron un aumento de la productividad sobre el resto de la industria se pueden clasificar en tres categorías (B. Audretsch & E. Lehmann, 2022). En el contexto del sector industrial español, existen varios mecanismos a través de los cuales los efectos derrame pueden transmitirse a otras industrias. Estos incluyen la imitación, la movilidad de los trabajadores y la competencia. Un mecanismo a través del cual se pueden transmitir efectos indirectos es a través de la imitación (B. Audretsch & E. Lehmann, 2022). Esto ocurre cuando empresas de otras industrias observan las prácticas o tecnologías utilizadas por empresas exitosas en el sector industrial y las adoptan en sus propias operaciones. Por ejemplo, si una empresa del sector industrial español desarrolla un proceso de producción más eficiente, este puede ser imitado por empresas de industrias relacionadas. lo que conduce a una mayor productividad y competitividad (Ge & Liu, 2022). Otro mecanismo a través del cual se pueden transmitir los efectos indirectos es la movilidad de los trabajadores. Esto ocurre cuando los trabajadores se mueven entre empresas o industrias, trayendo consigo conocimientos y experiencia adquiridos en experiencias anteriores. Por ejemplo, si un trabajador con experiencia en el sector industrial español se traslada

a una industria relacionada, puede traer consigo conocimientos de mejores prácticas o nuevas tecnologías, que pueden mejorar la productividad de la nueva empresa (Albis Salas et al., 2022). Un tercer mecanismo mediante el cual se pueden transmitir los efectos indirectos es la competencia. Cuando el sector industrial es altamente competitivo, las empresas se ven obligadas a innovar y mejorar sus operaciones para seguir siendo competitivas (Haq et al., 2022). Esto puede conducir al desarrollo de nuevas tecnologías, procesos o productos que pueden ser adoptados por otras industrias. Además, la competencia puede dar lugar a una concentración de trabajadores altamente cualificados en el sector industrial, lo que a su vez puede generar efectos indirectos a través de la movilidad de los trabajadores (Crowley y Jordan, 2022).

La transformación ambiental se refiere a una serie de cambios e innovaciones realizadas dentro de una empresa para mejorar su desempeño ambiental (Barbieri et al., 2022). La transformación ambiental puede incluir iniciativas como la adopción de prácticas de producción sostenible, la reducción del consumo de energía, la implementación de programas de reducción y reciclaje de residuos y la inversión en fuentes de energía renovables (Aldieri et al., 2022). La decisión de transformar e invertir en la transformación ambiental puede tener impactos significativos en el desempeño de una empresa, tanto en términos de su desempeño financiero como de su reputación. Al considerar si invertir en transformación ambiental, las empresas deben evaluar primero los beneficios y costes potenciales asociados con estas iniciativas. Por el lado de los beneficios, las empresas pueden esperar ver mejoras en su desempeño ambiental, costes reducidos asociados con el consumo de recursos y una mejor reputación entre las partes interesadas (Mota Veiga et al., 2022). Estos beneficios pueden traducirse en una mayor rentabilidad, un mejor acceso al capital y una mayor participación de mercado.

Por el lado de los costes, las empresas deben considerar la inversión inicial necesaria para implementar iniciativas de transformación ambiental (Tang et al., 2022). Dependiendo del alcance de la transformación, esto puede implicar importantes gastos de capital, como la compra de nuevos equipos o la instalación de infraestructura de energía renovable (Xu et al., 2022). Además, es posible que las empresas necesiten invertir en capacitación y educación de los empleados para garantizar que estén preparados para implementar y gestionar nuevas prácticas y tecnologías. Para tomar decisiones informadas sobre la transformación ambiental, las empresas deben realizar un análisis y una planificación cuidadosos. Esto puede implicar la realización de una evaluación de impacto ambiental para identificar áreas donde la empresa puede mejorar su desempeño, analizando los costes y beneficios asociados con iniciativas potenciales.

En última instancia, la decisión de transformar e invertir en la transformación ambiental dependerá de una variedad de factores, incluidos los objetivos estratégicos de la empresa, sus recursos

financieros y su compromiso con la sostenibilidad (Liu et al., 2022). Si bien puede haber costes a corto plazo asociados con la transformación ambiental, muchas empresas encuentran que los beneficios a largo plazo superan estos costes y dan como resultado un mejor desempeño financiero y una reputación más sólida entre las partes interesadas. Como tal, las empresas que priorizan la transformación ambiental pueden estar mejor posicionadas para competir en un mercado cada vez más consciente del medio ambiente.

Los aspectos institucionales y las características internas pueden afectar significativamente el desempeño y la productividad de una empresa. Friedmann, 2022 estudió el impacto de la participación pública, la regulación gubernamental y los SGA organizacionales en el desempeño organizacional mediado por el desempeño ambiental. El desempeño ambiental se refiere al grado en que una organización opera de manera ambientalmente responsable. Las siguientes son algunas formas en las que estos factores pueden afectar el desempeño organizacional con el efecto mediador del desempeño ambiental; cuando una organización involucra al público en los procesos de toma de decisiones relacionados con la sostenibilidad ambiental, puede conducir a una mayor confianza y legitimidad, lo que en última instancia puede mejorar. el desempeño ambiental de la organización (Vujanović et al., 2022). Esto a su vez, puede conducir a un mejor desempeño organizacional, ya que los consumidores y las partes interesadas esperan cada vez más que las empresas operen de manera sostenible y responsable. Las regulaciones gubernamentales pueden incentivar o exigir a las organizaciones que adopten prácticas ambientalmente sostenibles, lo que conducirá a un mejor desempeño ambiental. Esto también puede conducir a un mejor desempeño organizacional, ya que el cumplimiento de las regulaciones puede ayudar a las organizaciones a evitar multas y sanciones legales y mejorar su reputación ante los consumidores y las partes interesadas (Krasniqi et al., 2022). La implementación de un SGA eficaz puede ayudar a las organizaciones a identificar y abordar los riesgos y oportunidades ambientales, lo que conducirá a un mejor desempeño ambiental. También puede mejorar el desempeño organizacional al reducir costes, aumentar la eficiencia y and mejorar la reputación de la organización ante sus clientes y *stakeholders* (Lwesya, 2022).

El medio ambiente, el desempeño de la empresa y los objetivos de desarrollo sostenible están interconectados (Halis & Halis, 2022). La transformación ambiental se refiere al proceso de transición hacia un futuro sostenible mediante la reducción del impacto negativo de las actividades económicas en el medio ambiente (J. Wang & Liu, 2023). Los Objetivos de Desarrollo Sostenible (ODS) son un conjunto de 17 objetivos adoptados por las Naciones Unidas en 2015 para promover el desarrollo sostenible a nivel mundial. El desempeño empresarial se refiere a la capacidad de una empresa para lograr sus metas y objetivos mientras equilibra las necesidades de sus partes interesadas (Q.-J. Wang et al., 2022).

Estos determinantes institucionales son las formas en que la transformación ambiental contribuye a lograr los ODS: cumplimiento normativo, reducción de costes, innovación, compromiso de los empleados e imagen de marca (Rodríguez-Espíndola et al., 2022). Las regulaciones y políticas ambientales destinadas a reducir las emisiones de carbono, la contaminación y otros impactos ambientales dañinos pueden afectar el desempeño de una empresa. Las empresas que cumplen con estas regulaciones tienen menos probabilidades de enfrentar sanciones y daños a su reputación (Haldorai et al., 2022). La adopción de prácticas sostenibles, como tecnologías energéticamente eficientes, energías renovables y medidas de reducción de desechos, puede reducir los costes operativos, lo que resulta en un mejor desempeño financiero (Marrucci et al., 2022a). Las empresas que innovan y desarrollan nuevas tecnologías para reducir su impacto ambiental pueden crear una ventaja competitiva y atraer clientes conscientes del medio ambiente (Paraschi et al., 2022). Promover prácticas sustentables e involucrar a los empleados en iniciativas ambientales puede mejorar la moral y la satisfacción laboral de los empleados, lo que resulta en una mayor productividad y una reducción de la rotación. Las empresas que adoptan prácticas sostenibles pueden mejorar su imagen y reputación de marca, atrayendo clientes e inversores que priorizan la responsabilidad ambiental y social (Nassani et al., 2022).

Los ODS proporcionan un marco para que las empresas alineen sus iniciativas ambientales y sociales con los objetivos de sostenibilidad global (Marrucci et al., 2022b). Los ODS cubren una variedad de temas, incluida la reducción de la pobreza, el acceso a agua potable y saneamiento, energía limpia y asequible, ciudades y comunidades sostenibles, consumo y producción responsables y acción climática (Shah et al., 2022). Al contribuir al logro de los ODS, las empresas pueden mejorar su reputación, atraer inversores socialmente responsables y alinearse con una agenda global de sostenibilidad. la transformación ambiental, el desempeño empresarial y los objetivos de desarrollo sostenible están interconectados (García Alcaraz et al., 2022). Empresas que adoptan prácticas sustentables, cumplen con las regulaciones ambientales, innovan, involucran a los empleados, y promover su imagen de marca puede mejorar su desempeño financiero y al mismo tiempo contribuir al logro de los ODS (Fuzi et al., 2022). Al alinear sus iniciativas con los ODS, las empresas pueden demostrar su compromiso con la sostenibilidad global y contribuir a un futuro mejor para todos (Yue et al., 2023).

0.2 Conclusiones y recomendaciones

A principios de la década de 2000, España experimentó un auge del sector de la construcción impulsado por la facilidad de crédito, las inversiones extranjeras y un próspero mercado

inmobiliario. El auge de la actividad, concentrado en las regiones costeras y urbanas, se caracterizó por ambiciosos proyectos impulsados por un optimismo especulativo. La liberalización del crédito facilitó este crecimiento, atrayendo a inversores nacionales e internacionales. Sin embargo, la crisis financiera mundial de 2008, desencadenada por la quiebra de Lehman Brothers, puso de manifiesto las vulnerabilidades del sector, congelando el crédito, paralizando proyectos y aumentando el desempleo. El impacto de la crisis se extendió a industrias interconectadas, poniendo de relieve el papel integral del sector de la construcción dentro de la economía en general. En respuesta, el Gobierno español tomó medidas para reactivar el sector e impulsar la economía, inyectando fondos en las instituciones financieras en dificultades para lograr la estabilidad crediticia e iniciando proyectos de infraestructuras públicas para revitalizar la construcción y el empleo. Las secuelas de la crisis de 2008 afectaron significativamente al sector de la construcción en España, provocando la caída en picado del valor de las propiedades y una lenta recuperación del mercado inmobiliario. Esta experiencia hizo reconsiderar la excesiva dependencia de una sola industria y centrarse en el crecimiento económico sostenible. En conclusión, el crecimiento del sector en la década de 2000, impulsado por la especulación y el crédito accesible, se vio interrumpido por la crisis financiera mundial de 2008, que paralizó los proyectos y subrayó los vínculos del sector con la economía. La respuesta de España se dirigió a la recuperación a través de la intervención financiera e hizo hincapié en la diversificación y la resistencia.

El objetivo principal del estudio es analizar exhaustivamente las intrincadas consecuencias económicas derivadas de la pandemia sin precedentes de COVID-19 en el sector de la construcción en España. Profundizando en numerosas dimensiones, pretende calibrar las perturbaciones inmediatas, como la paralización de proyectos, las complejidades de la cadena de suministro debido a los cierres patronales y los problemas de mano de obra. Además, trata de cuantificar las pérdidas económicas que abarcan la disminución de la actividad de la construcción, los ingresos y las oportunidades de empleo. Simultáneamente, la investigación evalúa las repercusiones en el mercado laboral, incluido el aumento del desempleo y los retos a los que se enfrentan los trabajadores de la construcción. Al explorar las interrupciones de la cadena de suministro, el estudio ilumina la capacidad del sector para obtener recursos esenciales. En última instancia, el estudio contribuye a comprender las consecuencias económicas de la pandemia, que abarcan las repercusiones inmediatas y las perspectivas de futuro del sector de la construcción. El estudio analiza las posibles estrategias de recuperación, la eficacia de las intervenciones gubernamentales y las posibles orientaciones para la formulación de políticas. En resumen, el objetivo es establecer una base sólida de conocimientos que pueda sustentar la toma de decisiones basada en pruebas para

las partes interesadas, los responsables políticos y los líderes de la industria que se esfuerzan por sortear los intrincados retos que plantea la pandemia en el sector de la construcción en España.

Junto con el objetivo principal de evaluar el impacto económico de la COVID-19 en el sector de la construcción en España, este estudio lleva a cabo una investigación paralela sobre las consecuencias económicas comparables derivadas de la crisis financiera mundial de 2008-2009 dentro del mismo sector. Este doble análisis pretende desvelar paralelismos y disparidades entre estas crisis, iluminando la dinámica subyacente del sector. Al examinar de cerca las perturbaciones inmediatas durante la crisis financiera, incluidas las cancelaciones y retrasos de proyectos, la investigación identifica patrones recurrentes y retos específicos del sector en tiempos de turbulencias económicas. Además, cuantifica las pérdidas económicas causadas por la crisis financiera, incluyendo el descenso de las actividades de construcción, los ingresos y el empleo. Al mismo tiempo, el estudio evalúa las repercusiones en el mercado laboral, analizando los aumentos del desempleo y los retos para los trabajadores de la construcción. Una exploración en profundidad de las réplicas en la cadena de suministro revela las perturbaciones en la adquisición de materiales. En general, el objetivo del estudio es ofrecer un análisis comparativo exhaustivo que permita comprender la resistencia del sector, los mecanismos de respuesta y las lecciones extraídas de crisis anteriores. Al yuxtaponer los impactos de estas crisis distintas pero impactantes, contribuye a una comprensión más profunda de las vulnerabilidades, los puntos fuertes y las posibles vías para futuras estrategias de resiliencia.

Un componente clave de este estudio, en consonancia con sus objetivos principales y secundarios, consiste en una amplia comparación entre los efectos económicos de dos crisis distintas pero transformadoras -la pandemia del COVID-19 y la crisis financiera mundial de 2008-2009- sobre el sector de la construcción en España. Este análisis comparativo pretende descubrir matices sobre los impactos compartidos y divergentes, mejorando la comprensión de la adaptabilidad y las vulnerabilidades del sector durante desafíos económicos sin precedentes. Al explorar las perturbaciones inmediatas, como la paralización de proyectos y las limitaciones de la cadena de suministro durante los momentos álgidos de la crisis, el estudio pretende extraer valiosas lecciones sobre la capacidad de respuesta del sector y sus estrategias de afrontamiento. Además, la investigación compara cuantitativa y cualitativamente las pérdidas económicas, incluida la disminución de las actividades de construcción, los ingresos y las repercusiones en el mercado laboral, revelando diversos patrones que caracterizan los impactos de la crisis. El análisis pretende discernir si las lecciones extraídas de la crisis de 2008-2009 influyeron en la respuesta del sector de la construcción a los retos únicos planteados por la pandemia del COVID-19. Además, el estudio evalúa los cambios en el mercado laboral, descubriendo si las experiencias de crisis pasadas

influyeron en la adaptabilidad a la hora de afrontar los retos de la pandemia. Al profundizar en las interrupciones de la cadena de suministro, la investigación pretende descubrir la resistencia y los mecanismos de adaptación del sector, identificando posibles lecciones de la crisis de 2008-2009 para afrontar los retos de la cadena de suministro durante la pandemia de COVID-19. En última instancia, esta investigación comparativa contribuye a una comprensión matizada de la dinámica histórica del sector de la construcción y de su capacidad para hacer frente a dificultades económicas sin precedentes.

Los datos de este estudio proceden de bases de datos como el Instituto Nacional de Estadística, el Ministerio de Fomento y los Indicadores de Desarrollo del Banco Mundial. Utilizando Excel para el análisis, el estudio pretendía dilucidar visualmente la influencia de la industria española de la construcción en facetas vitales como el PIB, el empleo, el mercado de la vivienda y las obras públicas. A través de un enfoque comparativo, la investigación profundizó en las repercusiones de dos grandes acontecimientos, a saber, la crisis financiera mundial y la pandemia del COVID-19, en el sector de la construcción en España. Los resultados del estudio subrayan el papel fundamental que desempeña la industria española de la construcción en la configuración del panorama económico del país. Durante los periodos de fuerte crecimiento del sector, se observa un efecto dominó que impulsa la expansión económica, genera oportunidades de empleo y dinamiza diversos sectores de la economía. Por el contrario, las recesiones en el sector de la construcción pueden ensombrecer el bienestar económico.

En particular, la investigación se basó en una serie de datos específicos. Las conclusiones del estudio ponen de relieve el importante papel que desempeña el sector español de la construcción en la configuración del panorama económico del país. Durante los periodos de fuerte crecimiento de este sector, se observa un impacto en cascada que impulsa la expansión económica, crea oportunidades de empleo y revitaliza diversos sectores de la economía. Por el contrario, las recesiones en el sector de la construcción pueden tener efectos adversos en la salud económica general. Cabe destacar que el estudio utiliza datos específicos, como el PIB a precio de mercado, el número de viviendas vendidas en España, las viviendas iniciadas y terminadas, el total de licitaciones de obras públicas, la variación anual de la tasa de empleo en el sector de la construcción y la tasa de desempleo general en España. El conjunto de estos indicadores permite comprender mejor la dinámica económica de España y la interacción entre la construcción y los indicadores económicos más generales. El estudio también ha puesto de manifiesto el importante impacto de las fuerzas externas en el panorama de la construcción en España. Tanto la crisis financiera mundial como la pandemia del COVID-19 provocaron una contracción de las actividades de construcción,

ejerciendo así una influencia negativa en el conjunto de la economía. A pesar de ello, el sector de la construcción demostró su capacidad de resistencia, recuperándose de estos contratiempos y restableciéndose como un motor fundamental del motor económico español.

El análisis de esta investigación ahonda en las profundas implicaciones de la crisis económica mundial provocada por la aparición del nuevo coronavirus, situándola como el principal reto del siglo XXI. Teniendo en cuenta las repercusiones económicas de la pandemia en todo el mundo, el estudio se centra en el sector de la construcción en España y su relación con el PIB y diversos indicadores de crecimiento. Analizando las tendencias de los datos, la investigación revela un notable descenso de hasta el 19% en el crecimiento de la construcción durante el segundo trimestre de 2020, paralelo a las graves consecuencias económicas desencadenadas por la pandemia. Este descenso se refleja en el crecimiento del PIB, que se desplomó hasta el -20,67% durante el mismo periodo. El estudio también hace hincapié en la matizada interacción entre estas métricas, sugiriendo que factores como el aumento de los costes de la construcción, el mantenimiento de los precios de la vivienda y la reducción de los precios de licitación de obras públicas han influido en los patrones observados.

Además, el estudio examina los efectos en el mercado de la vivienda, descubriendo una trayectoria fluctuante en el número de viviendas vendidas y de viviendas iniciadas y terminadas. La crisis COVID- 19 indujo inicialmente un descenso de las ventas de viviendas, atribuido en parte a las medidas de bloqueo y al cambio de prioridades de los consumidores. Sin embargo, se observó una reversión temporal debido a la inversión procedente del ahorro, una tendencia cuya sostenibilidad sigue siendo incierta. Del mismo modo, las viviendas iniciadas y terminadas se vieron afectadas, mostrando un descenso menos drástico que durante la crisis financiera de 2008-2009, atribuido en parte a la introducción por parte del Gobierno español de mecanismos para salvaguardar las tasas de empleo. El análisis también destaca un patrón discernible en la tendencia de la licitación de obras públicas, marcando cambios relacionados con las crisis económicas. La discusión concluye con una exploración del panorama del empleo, detallando la variación anual de la tasa de empleo del sector de la construcción y la tasa de desempleo general en España. El estudio establece comparaciones entre la crisis financiera de 2008-2009 y la pandemia actual, destacando las intervenciones del Gobierno español a través de mecanismos como el ERTE para paliar el impacto sobre el empleo.

Se prevé que la recesión de COVID-19 tenga un impacto menor que la crisis financiera de 2008-2009, especialmente en los mercados emergentes y de reciente desarrollo. Los indicadores del

estudio sugieren que el sector de la construcción español se enfrentó a un golpe económico menos severo de COVID-19 en comparación con la crisis anterior. En la actualidad, el sector de la construcción se enfrenta a retos relacionados con la oferta, como la dificultad para contratar personal cualificado debido a las preocupaciones derivadas de la crisis anterior. El impacto económico de la pandemia refleja el de la crisis de 2008-2009, que se tradujo en un descenso de la actividad económica y en la pérdida de puestos de trabajo en el sector de la construcción en España. Aunque ambas crisis provocaron descensos del crecimiento económico y del empleo en la construcción, hubo diferencias en el apoyo gubernamental y en los cambios en el comportamiento de los consumidores. Se espera que la recuperación en los mercados emergentes sea más lenta que en las economías desarrolladas. El futuro del sector de la construcción en España y del crecimiento económico en general depende de factores como la eficacia de las vacunas COVID-19 contra las nuevas cepas y las políticas gubernamentales. Estos resultados ofrecen una visión a los inversores y a los responsables políticos, sugiriendo un potencial para la inversión y la estimulación del crecimiento en el sector de la construcción en España para mejorar el PIB del país. Los llamamientos a futuras investigaciones subrayan la necesidad de mejorar las herramientas para estudiar el mercado inmobiliario español y evaluar eficazmente su situación.

El concepto de choques de productividad se refiere a cambios repentinos en la eficiencia de una empresa, que influyen en otras empresas o industrias dentro de la misma economía, lo que se conoce comúnmente como efectos indirectos. Las investigaciones empíricas centradas en el sector manufacturero español revelan desbordamientos de productividad de la gran industria a las empresas más pequeñas, impulsados por la intensificación de la competencia que provoca mejoras de eficiencia entre las PYME. Estos efectos son más pronunciados en las regiones económicamente avanzadas y globalmente integradas, lo que indica que las políticas que fomentan la competencia y reducen las barreras de entrada podrían impulsar la productividad general de la economía española. La atención que suscitan las inversiones extranjeras directas (IED) se extiende tanto a las naciones en desarrollo como a las desarrolladas, y a menudo se traduce en entradas de capital, oportunidades de empleo, infusión de tecnología y conocimientos de gestión. Los efectos indirectos de la IED sobre el conocimiento son cruciales, pero su presencia puede ser esquiva y depender del contexto, variando según las industrias y los sectores. Los estudios sugieren la capacidad de la IED para fomentar resultados positivos, como la productividad, la transferencia de tecnología y la innovación.

La investigación examina los efectos indirectos de la IED en la productividad industrial, haciendo hincapié en factores como la mano de obra, el capital y la innovación. El panorama manufacturero español ejemplifica la heterogeneidad de la productividad entre empresas, donde la capacidad de

absorción y la intensidad de la investigación regional desempeñan un papel fundamental a la hora de determinar los efectos indirectos de los choques de productividad. En el sector de la construcción, las empresas que invierten mucho en I+D influyen positivamente en la productividad de las empresas vecinas. Del mismo modo, los efectos indirectos son más fuertes dentro de la misma industria y región, siendo la colaboración, la intensidad de la I+D y la movilidad de las cualificaciones cruciales para transmitir dichos efectos. Aunque se ha demostrado que los efectos indirectos inducidos por la IED refuerzan la productividad, existen pruebas contradictorias que sugieren una dinámica contextual compleja. Algunos estudios subrayan la transferencia de tecnología de la IED, mientras que otros no encuentran ningún impacto significativo o incluso encuentran efectos negativos en la productividad de las empresas locales. Estos resultados contradictorios ponen de relieve los retos conceptuales y técnicos que subyacen a la investigación sobre los efectos indirectos. Para estudiar los choques de productividad en las empresas españolas, su transmisión y los mecanismos que subyacen a estos efectos, los investigadores pueden utilizar diversos métodos empíricos y fuentes de datos. Los métodos incluyen el análisis de datos a nivel de empresa, el análisis de datos a nivel de sector, el análisis de datos regionales, el análisis de datos para captar patrones y tendencias en la productividad y los efectos indirectos entre industrias y regiones.

Para comprender estas dinámicas en los sectores y regiones de España es fundamental adoptar un enfoque global. Este estudio se centra en tres objetivos clave. En primer lugar, pretende identificar las perturbaciones de productividad en las empresas españolas de 20 sectores manufactureros y 17 regiones entre 1997 y 2016. En segundo lugar, investiga los efectos indirectos de estas perturbaciones, tanto dentro de la misma industria como de la región, sondeando los canales de imitación y movilidad de los trabajadores. En tercer lugar, el estudio arroja luz sobre los mecanismos que impulsan estos efectos indirectos debidos a la inversión extranjera directa (IED) en España. La investigación contribuye a la comprensión de los choques de productividad y sus efectos indirectos dentro de las industrias y regiones españolas. La evidencia empírica apoya firmemente la existencia de efectos indirectos, tanto dentro de los sectores como entre ellos. Los coeficientes positivos, incluso después de tener en cuenta los efectos sectoriales/regionales, ponen de relieve la importancia de los beneficios indirectos entre empresas. El estudio subraya la influencia de las prácticas de gestión eficaces y la captación de talento en la mejora de la productividad de las empresas, impulsada por los avances realizados por las empresas líderes del mercado español.

Este estudio utiliza datos a nivel de empresa de 20 sectores manufactureros que abarcan casi dos décadas (1996-2016) para examinar los shocks de productividad, los efectos indirectos y los

mecanismos en España. La fuente de datos es una amplia encuesta voluntaria realizada por el Ministerio de Hacienda español entre 5.840 empresas de estos sectores. Tras depurar los datos y excluir los valores atípicos, la muestra final de 1502 consta de 28.559 observaciones de 977 empresas. El modelo empleado se centra en una función de producción que integra variables como las ventas netas, la mano de obra, el stock de capital, los suministros y los gastos en I+D. El crecimiento de la productividad se calcula comparando las ventas netas por empleado y el stock de capital por empleado. Los choques de productividad se identifican si el crecimiento supera el 20% y se mantiene constante por encima de este umbral durante al menos dos años consecutivos. Este criterio garantiza picos de productividad notables y sostenidos. Una vez detectados los choques, sus coeficientes se incorporan a la función de producción para captar los efectos indirectos. Se consideran las prácticas de gestión, incorporando la atracción de capital humano y las técnicas modernas de fabricación. El estudio ofrece una visión de la influencia de estos factores en los choques de productividad y los efectos indirectos entre sectores y regiones dentro de España.

Los resultados y debates del estudio giran en torno al análisis de las variables clave y sus implicaciones. El cuadro 1 ofrece un resumen de las estadísticas de las principales variables, incluidos el Choque de Productividad, el Crecimiento de la Productividad, el Crecimiento Parcial de la Productividad, el Crecimiento de la Intensidad de Capital, las Ventas Netas por Empleado y el Stock de Capital por Empleado. El estudio procede a calcular el crecimiento parcial de la productividad y el crecimiento de la intensidad de capital utilizando las variables de ventas netas, mano de obra total y existencias de capital. Esto ayuda a medir el crecimiento de la productividad de las empresas. A continuación, se estima el choque de productividad, con 977 empresas que presentan 1502 observaciones entre 1997 y 2016. Estos choques representan el 5,25% de la muestra total. Otras investigaciones examinan las causas de los resultados excepcionales, centrándose específicamente en el papel de las prácticas de gestión. La introducción de nuevo capital humano y de técnicas de fabricación modernas se consideran buenas prácticas de gestión. Estas prácticas se incorporan a la función de producción, y los coeficientes estimados muestran un fuerte apoyo a que estas prácticas influyan positivamente en las perturbaciones de productividad.

También se explora el efecto indirecto, que indica que los choques positivos de productividad en una industria o región se traducen en un aumento de la productividad para otras empresas dentro de ese ámbito. Este efecto se ve respaldado por la inclusión de variables ficticias y prácticas de gestión, que ponen de relieve la correlación positiva entre dichas prácticas y los choques de productividad. Además, el estudio introduce el concepto de "capacidad de absorción", que mide la eficacia de las empresas a la hora de asimilar nuevos conocimientos y tecnologías para mejorar la productividad y la innovación. Los coeficientes positivos asociados a la interacción entre los choques de

productividad y la atracción de nuevo capital humano demuestran que el mecanismo de spillover puede atribuirse en parte a la absorción de conocimientos a través de la movilidad de la mano de obra. En conclusión, el estudio revela las intrincadas relaciones entre variables, prácticas de gestión y efectos indirectos, arrojando luz sobre la dinámica de los choques de productividad y su impacto en empresas, industrias y regiones en España. Los resultados subrayan la importancia de unas prácticas de gestión eficaces y de la absorción de conocimientos para mejorar la productividad global y el crecimiento económico.

El objetivo de esta investigación es detectar los choques de productividad y analizar sus efectos indirectos dentro de los sectores y regiones de España. La principal contribución consiste en abordar cuestiones clave de la investigación relativas a los efectos indirectos. En primer lugar, el estudio identifica los choques de productividad en un amplio conjunto de datos a nivel de empresa. En segundo lugar, mide la transmisión de estas perturbaciones a otras empresas de la misma región o sector. A continuación, la investigación profundiza en si la imitación o la mejora competitiva impulsan las prácticas de gestión. Los resultados confirman la existencia de efectos indirectos de productividad entre empresas de un mismo sector y región. Los datos apoyan firmemente la hipótesis de que las empresas se benefician de sus homólogas sectoriales y regionales, ya que los avances de algunas de ellas tienen efectos positivos en otras. Estos efectos positivos son observables incluso después de controlar los factores sectoriales y regionales mediante variables ficticias. Además, el estudio demuestra que la adopción de buenas prácticas de gestión mejora la productividad, con coeficientes significativos para las variables individuales. En particular, la contratación de nuevos talentos amplifica este efecto, ayudando a absorber los spillovers de las empresas líderes del mercado. Esta investigación pone de relieve que el conocimiento se transmite a través de la imitación y la movilidad de los trabajadores dentro de los sectores y las regiones.

El estudio también subraya el papel de las inversiones extranjeras directas (IED) en el impulso de los choques de productividad. Las IED pueden mejorar la eficiencia y la innovación de las empresas locales introduciendo tecnologías y prácticas avanzadas, ampliando el acceso al mercado y fomentando la competencia. Los responsables políticos deben gestionar cuidadosamente las políticas de IED para maximizar los beneficios y mitigar al mismo tiempo los posibles inconvenientes. Las conclusiones sugieren que puede ser valioso promover la autosuperación de las empresas nacionales mediante la imitación y la movilidad de la mano de obra, sobre todo en respuesta a las mejoras de la productividad en sectores o regiones. Esta visión informa a las partes interesadas y contribuye a las estrategias para atraer y retener la IED en el país.

El consenso es que el calentamiento global inducido por el hombre es una realidad, que requiere medidas para reducir las emisiones de gases de efecto invernadero, mejorar la eficiencia energética,

apoyar las energías renovables y adaptarse a las condiciones cambiantes. La protección del medio ambiente implica salvaguardar el entorno natural de la contaminación, la degradación y la pérdida de hábitats para garantizar el bienestar humano y ecológico. Abordar la contaminación, el cambio climático y la conservación de los recursos es fundamental para la salud humana, las economías y las industrias sostenibles. Las economías circulares desempeñan un papel clave al minimizar los residuos, conservar los recursos y fomentar la sostenibilidad. Estos modelos fomentan la reutilización de materiales, la conservación de recursos y la reducción de las emisiones de gases de efecto invernadero, ofreciendo beneficios económicos y progreso medioambiental. La aplicación de las leyes de protección del medio ambiente en las economías emergentes es compleja pero vital, y requiere marcos jurídicos sólidos, desarrollo de la capacidad institucional, compromiso público, sanciones y cooperación internacional. Estos esfuerzos están en consonancia con los Objetivos de Desarrollo Sostenible (ODS), que persiguen un uso sostenible de los recursos y un medio ambiente más sano. Sin embargo, las lagunas en la participación pública y el compromiso institucional dificultan la aplicación efectiva en algunas regiones.

En las economías emergentes, como Pakistán, la concienciación pública y la preocupación por la salud están impulsando la demanda de una mejor toma de decisiones en materia de medio ambiente. La preservación del medio ambiente requiere una aportación pública significativa, pero muchos gobiernos responden de forma esporádica y carecen de apoyo institucional. Las disparidades económicas regionales conducen a menudo a una aplicación más débil de las normas medioambientales, y algunas empresas dan prioridad al crecimiento frente a la conservación. La teoría de los paraísos de contaminación sugiere que las empresas se trasladan a regiones con normativas laxas, lo que provoca disparidades de contaminación entre las naciones. A pesar del apoyo teórico, los estudios empíricos sobre los paraísos de contaminación suelen limitarse a las economías desarrolladas, y se centran menos en los países en desarrollo como Pakistán. En particular, el papel de la participación pública en la gobernanza medioambiental está poco estudiado, y los estudios anteriores se han basado en gran medida en indicadores relacionados con la contaminación. La industria textil contribuye de forma vital a la economía de Pakistán, pero también plantea problemas medioambientales debido a la contaminación. Pakistán ha aplicado políticas medioambientales para mitigar estos problemas, que repercuten positivamente en los resultados de las empresas. Estas políticas exigen el cumplimiento de las normas sobre emisiones y residuos, lo que impulsa a las empresas a adoptar prácticas eficientes y sostenibles. Estas prácticas no sólo evitan sanciones y daños a la reputación, sino que también reducen costes y atraen a consumidores concienciados con el medio ambiente, lo que impulsa las ventas. Además, las políticas medioambientales incentivan la innovación, la adopción de tecnología y la eficiencia en

el uso de los recursos, mejorando en última instancia la competitividad y el rendimiento a largo plazo dentro de la industria.

El estudio "Importance of Environmental Policy on Firm Performance for the Textile Industry: A Contextual Study of Pakistan" explora la influencia de la política medioambiental en las empresas textiles paquistaníes. Los efectos directos de esta política implican reglamentos y normas que inducen prácticas sostenibles, lo que repercute en los costes a corto plazo pero mejora la reputación y el rendimiento a largo plazo. Los efectos indirectos se manifiestan a través de la innovación impulsada por los incentivos a la sostenibilidad, reforzando la productividad y la competitividad a lo largo del tiempo. El estudio revela que las empresas que se adhieren a la normativa medioambiental y adoptan prácticas sostenibles muestran mejores resultados. Así pues, la política medioambiental impulsa las prácticas sostenibles y mejora la competitividad, subrayando la necesidad de cumplir la normativa y adoptar estrategias sostenibles para elevar el rendimiento de las empresas a largo plazo. En la gobernanza democrática, la participación pública es crucial, ya que permite tomar decisiones con conocimiento de causa y con transparencia. Los estudiosos abogan por un mayor compromiso público en las decisiones medioambientales, en consonancia con los principios económicos de acceso a la información y toma de decisiones en asociaciones contractuales. Los gobiernos deben capacitar a los ciudadanos como demandantes residuales, dado su interés en los resultados medioambientales y la salud pública. Educar a los ciudadanos en prácticas respetuosas con el medio ambiente e implicarlos en la toma de decisiones puede crear una sociedad más concienciada con el medio ambiente.

La investigación pretende abordar tres retos clave relacionados con el compromiso público en la toma de decisiones medioambientales, centrándose en lo que motiva la participación, las funciones de los actores relevantes y el impacto de la normativa. Para ello, el estudio seleccionó tres casos destacados de activismo medioambiental en Pakistán en función de criterios como la participación pública, la normativa gubernamental y los distintos contextos económicos. Los datos procedentes de fuentes académicas y públicas se analizaron mediante estudios de casos comparativos, lo que permitió comprender en profundidad las fuerzas motrices y las interacciones en los distintos casos. El estudio contribuye a comprender el papel que desempeñan los sistemas de gestión medioambiental, la normativa gubernamental y el compromiso público a la hora de influir en los resultados organizativos y medioambientales. La metodología de investigación emplea un enfoque cuantitativo a través de una encuesta transversal. Se utilizó un cuestionario para recabar datos de los empleados de la industria textil de Pakistán, con el objetivo de explorar las relaciones entre la normativa gubernamental, el rendimiento medioambiental, el rendimiento organizativo y el

compromiso público. La población del estudio incluía empleados de nivel inferior a superior, con 460 respuestas utilizables de un total de 500 recogidas. El análisis estadístico se realizó mediante el método Smart PLS (Partial Least Squares), que permite la modelización causal y el análisis descriptivo. El estudio contribuye a la comprensión de la interacción de diversos factores en el contexto de la toma de decisiones y los resultados medioambientales en la industria textil paquistaní.

En este estudio se distribuyeron 500 cuestionarios, de los que se recogieron 460 para el análisis tras descartar 57 por estar incompletos los datos. Se examinaron factores demográficos como el sexo, la edad, la educación, la designación y la experiencia de los encuestados de la industria textil. El estudio empleó un modelo de medición PLS-SEM para evaluar la fiabilidad y validez de los constructos, incluyendo la carga factorial, el alfa de Cronbach, la fiabilidad compuesta y la varianza media extraída. La validez convergente se confirmó cuando los valores superaron los niveles umbral para todas las variables. El análisis del modelo estructural, utilizando Smart PLS 3, reveló que la participación pública influye positivamente en el rendimiento de las empresas, y que la normativa gubernamental tiene una asociación positiva significativa con el rendimiento de las empresas, confirmando las respectivas hipótesis. La raíz cuadrada del AVE se utilizó para evaluar la validez discriminante del constructo. El enfoque bootstrapping se utilizó para estimar el efecto de mediación, revelando una mediación completa entre el ecologismo y el rendimiento organizativo. Además, el análisis de moderación demostró que el ambientalismo tiene una influencia moderadora significativa y favorable en la conexión entre el desempeño ambiental y el desempeño organizacional. El estudio contribuye a comprender cómo interactúan diversos factores en el contexto de la toma de decisiones medioambientales y el rendimiento organizativo en la industria textil paquistaní.

Esta investigación se centra en la participación pública, la normativa gubernamental y los SGA organizativos en relación con el éxito organizativo, con el rendimiento medioambiental como factor mediador. El estudio halló relaciones favorables y sustanciales entre la participación pública, la normativa gubernamental, el SGMA y el rendimiento medioambiental. Además, el estudio destacó el papel moderador del ecologismo en la relación entre estos factores y el rendimiento organizativo. Los resultados subrayan la importancia de las políticas medioambientales establecidas por la alta dirección para mejorar el rendimiento y la sostenibilidad de la empresa en la competitiva industria textil. Sin embargo, las limitaciones del estudio sugieren la necesidad de seguir investigando. La muestra se limitó a una región y un sector específicos, lo que puede afectar a la generalizabilidad. El hecho de que el estudio se centre únicamente en el compromiso público puede pasar por alto otros factores influyentes. Los métodos cualitativos de recopilación de datos y una representación

geográfica más amplia podrían proporcionar una comprensión más completa. Futuras investigaciones deberían explorar dimensiones adicionales, filosofías de liderazgo y aclarar los vínculos mediadores y moderadores para profundizar en los conocimientos.

En el contexto de los estudios presentados, las "perturbaciones" se refieren a acontecimientos, cambios o hechos significativos que han tenido un impacto transformador en el panorama económico e industrial de España. Estos choques ponen de manifiesto las vulnerabilidades, estimulan las respuestas políticas y, a menudo, provocan adaptaciones para garantizar la resistencia económica, el crecimiento y la sostenibilidad frente a retos imprevistos. Desglosemos las perturbaciones presentadas en cada estudio:

Primer estudio - Impacto de la crisis financiera mundial de 2008 y de la pandemia COVID-19 en el sector de la construcción en España, el shock del primer estudio es la crisis financiera mundial de 2008, que tuvo un profundo impacto negativo en el sector de la construcción en España. Este acontecimiento puso de manifiesto las vulnerabilidades de la industria y provocó la necesidad de intervenciones gubernamentales para reactivar el sector. La pandemia del COVID-19 es el segundo impacto analizado en este estudio. Este acontecimiento sin precedentes perturbó el sector de la construcción de forma similar a la crisis de 2008, pero con características únicas. Puso de manifiesto la capacidad del sector para adaptarse a diferentes tipos de perturbaciones, destacando la importancia de las estrategias de gestión de crisis y el papel de las políticas en la mitigación de tales impactos.

La crisis financiera mundial de 2008 es el shock inicial que se analiza en este estudio. Esta crisis tuvo un grave impacto negativo en el sector de la construcción en España. La industria de la construcción dependía en gran medida del crédito fácil, el optimismo especulativo y las inversiones extranjeras, que se paralizaron cuando estalló la crisis. La quiebra de Lehman Brothers desencadenó una congelación del crédito que provocó la paralización de proyectos, la caída en picado del valor de los inmuebles y el aumento del desempleo en el sector de la construcción. Esta conmoción puso de manifiesto la vulnerabilidad del sector, que dependía excesivamente del crecimiento impulsado por el crédito y los proyectos especulativos. Esto llevó a reevaluar la sostenibilidad de la industria y la necesidad de una intervención gubernamental para estabilizar el sector y reactivar la economía en general.

El segundo choque analizado en este estudio es la pandemia de COVID-19. Este acontecimiento sin precedentes perturbó el sector de la construcción de forma similar a la crisis de 2008, pero con características distintas. Los cierres, las interrupciones de la cadena de suministro y los problemas de mano de obra provocaron la paralización de proyectos y el descenso de la actividad de la

construcción. La pandemia puso de relieve la capacidad del sector de la construcción para adaptarse a otro tipo de conmoción: la provocada por problemas de salud y restricciones de la movilidad. El estudio subraya la importancia de las estrategias de gestión de crisis y el papel de las políticas a la hora de mitigar los efectos de tales conmociones. El impacto de la pandemia puso de relieve la necesidad de cadenas de suministro resistentes, digitalización y adaptabilidad en el sector de la construcción.

Segundo estudio - Choques de productividad y efectos indirectos en los sectores manufactureros españoles, el choque del segundo estudio se refiere a los choques de productividad que se producen en los sectores manufactureros españoles. Estos choques tienen su origen en factores como los avances tecnológicos o los cambios en las prácticas de gestión, que provocan cambios en la productividad de las empresas. El estudio explora cómo estos choques influyen en las empresas vecinas, creando efectos indirectos dentro de la misma industria o región. Esto pone de relieve la naturaleza dinámica de las industrias y la interconexión de los resultados de las empresas. Un choque de productividad se refiere a un cambio repentino y significativo en la eficiencia, productividad o producción de una empresa. Estos choques pueden ser provocados por diversos factores, como avances tecnológicos, cambios en las prácticas de gestión, cambios en los niveles de cualificación de la mano de obra o alteraciones en las condiciones externas. Cuando se produce un choque de productividad, se produce un cambio notable en el nivel de producción o productividad de una empresa. Estos choques pueden ser positivos, provocando un aumento de la eficiencia y la producción, o negativos, causando una disminución de la productividad.
En el contexto del segundo estudio, los choques de productividad son perturbaciones que afectan a la eficiencia y la productividad de las empresas de los sectores manufactureros españoles. Estos choques están provocados por diversos factores, como la introducción de nuevas tecnologías, cambios en los procesos de producción, mejoras en las técnicas de gestión o cambios en la demanda del mercado. Los choques de productividad pueden tener un efecto transformador en las operaciones de una empresa, provocando cambios en su posición competitiva, su rentabilidad y sus resultados globales. Los efectos indirectos se producen cuando los cambios en el comportamiento, las acciones o los resultados de una entidad repercuten en el comportamiento, las acciones o los resultados de otras entidades del mismo sector, región o ecosistema. Estos efectos pueden ser tanto positivos como negativos y a menudo reflejan la interdependencia e interconexión de las distintas partes de un sistema. En el contexto de este estudio, los efectos indirectos se refieren al fenómeno por el cual las perturbaciones de productividad experimentadas por una empresa del sector manufacturero español influyen en los resultados de las empresas vecinas que operan en la misma

industria o región. Cuando una empresa experimenta un choque de productividad positivo y mejora su eficiencia o producción, esto puede conducir a efectos indirectos positivos para otras empresas cercanas. Estas empresas vecinas podrían aprender de las prácticas innovadoras de la empresa exitosa, adoptar tecnologías o técnicas similares y, en consecuencia, mejorar su propia productividad. Por otra parte, un impacto negativo sobre la productividad de una empresa podría tener efectos indirectos adversos, ya que las empresas vecinas podrían experimentar dificultades debido a la disminución de la demanda o al aumento de la competencia. El estudio se centra en los choques de productividad y los efectos indirectos, lo que pone de relieve la naturaleza dinámica de las industrias y las intrincadas conexiones entre las empresas. Las industrias no son entidades aisladas; existen dentro de ecosistemas complejos en los que los cambios en una parte del sistema pueden tener efectos dominó en otras. Los choques de productividad y sus consiguientes efectos indirectos ilustran cómo las empresas de un sector pueden influirse mutuamente y repercutirse, ya sea positiva o negativamente.

En el contexto de los sectores manufactureros españoles, comprender esta dinámica es crucial para los responsables políticos, los líderes industriales y los investigadores. Al estudiar los choques de productividad y los efectos indirectos, pueden comprender mejor cómo las innovaciones y los cambios dentro de las empresas pueden impulsar un crecimiento económico y una competitividad más amplios. Además, la identificación de los mecanismos que facilitan los efectos indirectos positivos puede servir de base a las estrategias para promover el intercambio de conocimientos, la difusión de la innovación y la colaboración dentro de las industrias. El estudio se centra en el concepto de shocks de productividad y sus efectos indirectos en el sector manufacturero español. Los choques de productividad representan cambios significativos en la eficiencia de las empresas, a menudo provocados por avances tecnológicos o prácticas de gestión. Los efectos indirectos ilustran cómo estos choques pueden influir en las empresas vecinas, poniendo de relieve la interconexión y la dinámica de las industrias. Esta comprensión contribuye a comprender cómo evolucionan y se adaptan las industrias a lo largo del tiempo y proporciona información valiosa para fomentar la innovación y el crecimiento dentro del sector manufacturero.

Tercer estudio - Protección del medio ambiente y cambios políticos, el choque en el tercer estudio implica una serie de acontecimientos significativos relacionados con la protección del medio ambiente. Estas perturbaciones incluyen el consenso científico sobre el calentamiento global, la concienciación sobre los impactos negativos de la degradación medioambiental, la adopción de enfoques de economía circular, los retos para hacer cumplir las leyes de protección medioambiental

y la constatación de un compromiso público y unas estructuras institucionales inadecuados para la preservación del medio ambiente. Las conclusiones del estudio sobre el impacto de las políticas medioambientales en el rendimiento de las empresas y el reconocimiento de la contribución de la industria textil a la contaminación también representan impactos transformadores que influyen en la formulación de políticas y en las prácticas empresariales.

En el contexto del tercer estudio, "Protección del medio ambiente y cambios políticos" se refiere a una serie de acontecimientos y hechos significativos relacionados con la protección del medio ambiente y el tratamiento de los problemas medioambientales. Estos acontecimientos y hechos se consideran "shocks" porque tienen un impacto transformador en la forma en que la sociedad, las industrias y los gobiernos perciben y abordan las cuestiones medioambientales. Una de las conmociones más significativas del estudio es el consenso científico sobre el calentamiento global. Se refiere a la idea ampliamente aceptada por la comunidad científica de que las actividades humanas, en particular la emisión de gases de efecto invernadero, están contribuyendo al calentamiento del clima de la Tierra. Este consenso ha provocado un cambio de paradigma en la forma en que los responsables políticos, las industrias y el público en general perciben el cambio climático como un problema mundial acuciante que requiere medidas urgentes. Otra conmoción es la creciente conciencia de los efectos negativos de la degradación del medio ambiente en los ecosistemas, la salud pública y la economía. A medida que la información sobre la contaminación, la pérdida de hábitats y el agotamiento de los recursos se hace más conocida, se toma conciencia de la necesidad urgente de proteger y preservar el medio ambiente para las generaciones actuales y futuras. La adopción de enfoques de economía circular es otra sacudida transformadora. Los principios de la economía circular se centran en minimizar los residuos, maximizar la eficiencia de los recursos y reducir el impacto medioambiental de la producción y el consumo. El cambio de un modelo lineal "tomar-hacer-desechar" a un modelo circular desafía las prácticas empresariales tradicionales y exige enfoques innovadores para minimizar el daño medioambiental. El estudio también aborda los retos que plantea la aplicación de las leyes de protección del medio ambiente. Este choque pone de relieve la constatación de que la eficacia de las políticas medioambientales depende de unos mecanismos de aplicación sólidos. Una aplicación deficiente puede conducir al incumplimiento y a una degradación medioambiental continuada.

Una constatación significativa es que la protección del medio ambiente requiere la participación activa del público y el establecimiento de estructuras institucionales eficaces. Este choque subraya la importancia de implicar a los ciudadanos en los procesos de toma de decisiones relacionados con el medio ambiente y de establecer instituciones capaces de supervisar y regular las políticas medioambientales. Las conclusiones del estudio sobre el impacto de las políticas medioambientales

en el rendimiento de las empresas representan otro choque transformador. Estas conclusiones revelan que las políticas y prácticas medioambientales pueden tener efectos de gran alcance en el rendimiento empresarial, influyendo en factores como la rentabilidad, la reputación y la sostenibilidad a largo plazo. El reconocimiento de la contribución de la industria textil a la contaminación sirve como choque transformador que provoca una reevaluación de las prácticas de la industria. Esta toma de conciencia subraya la necesidad de prácticas sostenibles en la industria textil para mitigar su impacto medioambiental. El tercer estudio explora una serie de choques transformadores relacionados con la protección del medio ambiente. Estas perturbaciones incluyen cambios en la comprensión científica, una mayor conciencia de la degradación del medio ambiente, la adopción de los principios de la economía circular, los desafíos en la aplicación de políticas, el reconocimiento de la participación pública inadecuada, y la comprensión del impacto de las políticas ambientales en el rendimiento de las empresas. Cada una de estas perturbaciones sirve de catalizador para cambios políticos, cambios en las prácticas empresariales y un reconocimiento más amplio de la importancia de la preservación del medio ambiente. El estudio subraya la interconexión de las cuestiones medioambientales, las consideraciones económicas y las respuestas políticas en la configuración de un futuro sostenible.

Estos estudios representan momentos cruciales o cambios que han provocado cambios en las políticas, las estrategias y la conciencia social. Estos choques tienen implicaciones de gran alcance para la trayectoria económica, las industrias y la resiliencia general de España. Ya se deriven de crisis financieras, emergencias sanitarias, avances tecnológicos o problemas medioambientales, estas perturbaciones ponen de relieve la necesidad de estrategias adaptativas, respuestas políticas y colaboraciones para garantizar el crecimiento sostenible, la estabilidad y la competitividad. En conjunto, los estudios subrayan la importancia de comprender y gestionar eficazmente estas perturbaciones para obtener resultados positivos para la economía y la industria españolas.

En cada estudio, el término "rendimiento" se refiere a la eficacia, los resultados o los logros de las entidades, sectores o políticas específicos que se debaten.

En el contexto de los estudios del sector de la construcción, el "rendimiento" se refiere principalmente a los resultados económicos, la productividad y la capacidad de recuperación de la industria de la construcción y su impacto en la economía en general. Los estudios evalúan el rendimiento del sector de la construcción en términos de crecimiento, generación de empleo, contribución al PIB y respuestas a las perturbaciones económicas. El rendimiento se evalúa analizando datos sobre las tendencias del mercado de la vivienda, las viviendas iniciadas y

terminadas, las licitaciones de obras públicas, las tasas de empleo y el crecimiento económico general. Los estudios también examinan cómo el rendimiento del sector de la construcción se ha visto influido por factores externos como la crisis financiera mundial y la pandemia COVID-19. El texto presenta un análisis exhaustivo del impacto de la pandemia COVID-19 en el sector de la construcción español, centrándose en sus consecuencias económicas y los retos asociados. El análisis pone de relieve la importante desaceleración de la economía española debida a la pandemia, que ha provocado graves perturbaciones en diversos sectores, entre ellos el de la construcción. Se examinan los efectos de la pandemia sobre el crecimiento del PIB, el crecimiento industrial, la producción, el desempleo y otros indicadores macroeconómicos, reflejando la naturaleza multifacética del impacto de la crisis. El sector de la construcción se identifica como un pilar crucial de la economía española, destacando sus contribuciones al crecimiento del PIB y al consumo intermedio de otros sectores. Se esbozan las intrincadas interconexiones de la industria de la construcción con otros sectores económicos, destacando su papel en el impulso del crecimiento económico mediante la obtención de productos de otros sectores. El texto analiza la importancia del sector como motor del empleo, su papel en el desarrollo de infraestructuras y su contribución a la urbanización, las infraestructuras de comunicación y el turismo. Además, el artículo subraya la importancia histórica del sector como destino preferente de la inversión financiera, al tiempo que reconoce su volatilidad en el pasado, como puso de manifiesto el estallido de la burbuja inmobiliaria en 2008.

El estudio analiza a continuación el impacto específico de la pandemia en el sector español de la construcción. Destaca los trastornos a los que se enfrentan las empresas de la construcción, incluidos los cierres de obras, las interrupciones de la cadena de suministro y las tensiones financieras. Se esbozan las repercusiones negativas sobre el empleo, en particular para los trabajadores vulnerables y los que tienen contratos temporales. El texto también profundiza en los canales de transmisión económica a través de los cuales los choques de la pandemia impactaron en la economía, incluyendo la confianza, el impacto directo en el comportamiento de los consumidores y los choques por el lado de la oferta. El análisis reconoce los retos a los que se enfrentaron los gobiernos a la hora de equilibrar las medidas de contención de la pandemia con las consecuencias económicas. Además, el estudio esboza los objetivos de la investigación, que consisten en determinar el impacto económico tanto de la pandemia COVID-19 como de la crisis financiera de 2008-2009 en el sector español de la construcción. Mediante el examen de una serie de variables como el crecimiento del PIB, las tasas de empleo, la actividad inmobiliaria y la licitación de obras públicas, la investigación pretende arrojar luz sobre los efectos directos e indirectos de estas crisis en el sector de la construcción. La comparación de las dos crisis ofrece valiosas perspectivas sobre

la recuperación de España y las posibles estrategias para abordar los retos a los que se enfrenta el sector de la construcción. El análisis proporciona una visión detallada del impacto de la pandemia del COVID-19 en el sector de la construcción español desde una perspectiva económica. Subraya la importancia del sector para la economía española, los retos que plantea la pandemia y la necesidad de una investigación exhaustiva para comprender el alcance de los efectos de la crisis y formular estrategias eficaces de recuperación.

El concepto de "rendimiento" es fundamental en los estudios que exploran los choques de productividad, los efectos indirectos y su impacto en las empresas y las industrias. Aquí, "rendimiento" se refiere a la eficiencia, eficacia y competitividad de las empresas y sectores dentro de la economía española. Los estudios analizan los choques de productividad y su propagación a las empresas vecinas, evaluando cómo ciertos factores como las inversiones extranjeras directas (IED) y las buenas prácticas de gestión influyen en el rendimiento de las empresas y en los efectos de contagio. El término se utiliza para cuantificar los resultados positivos derivados de estos factores y cómo mejoran los resultados económicos generales de las empresas y las industrias. La perspectiva del "rendimiento" que se analiza en el texto se centra en los efectos de los choques de productividad y los efectos indirectos en el contexto de la inversión extranjera directa (IED) y su impacto en las empresas españolas. Esta perspectiva pone de relieve los posibles resultados positivos de la IED en diversos aspectos de la economía del país receptor. El análisis se centra principalmente en la industria manufacturera y las empresas industriales españolas, examinando los mecanismos de transmisión de los spillovers de productividad y sus implicaciones.

En la industria manufacturera española, la evidencia empírica sugiere que se producen desbordamientos de productividad desde la gran industria manufacturera hacia las pequeñas y medianas empresas (PYME). La presencia de empresas más grandes crea competencia, obligando a las manufacturas más pequeñas a mejorar su eficiencia y productividad para poder competir eficazmente. Este efecto indirecto es más pronunciado en las regiones con un mayor desarrollo económico y una mayor integración con los mercados mundiales, lo que indica que las políticas dirigidas a fomentar la competencia y reducir las barreras de entrada podrían conducir a una mejora de la productividad global de la economía española. El estudio también hace hincapié en los posibles efectos beneficiosos de la IED sobre el crecimiento económico y el desarrollo del país receptor. La IED destaca por su capacidad para canalizar las entradas de capital, crear empleo, transferir tecnología y mejorar las prácticas de gestión. Los efectos indirectos positivos de la IED se observan en ámbitos como la productividad, los resultados de las exportaciones y el progreso

tecnológico. Estos efectos pueden beneficiar no sólo a los inversores extranjeros, sino también a las empresas locales, en particular a las pequeñas y medianas empresas.

La investigación de los choques de productividad y los efectos indirectos en las empresas españolas implica comprender los factores que influyen en la productividad, como la mano de obra, el capital, la innovación y la capacidad de absorción. El texto destaca la importancia de la capacidad de absorción, la colaboración y la intensidad de I+D en la transmisión de los efectos indirectos. El estudio también profundiza en los mecanismos de la movilidad laboral, la colaboración y las citas de patentes como vías de transmisión de los efectos indirectos de los choques de productividad. Además, la investigación subraya los resultados contradictorios de la bibliografía sobre la presencia y el alcance de los efectos indirectos de la tecnología de las empresas extranjeras a las locales. Mientras que algunos estudios muestran una relación positiva entre la presencia extranjera y la productividad de las empresas locales, otros encuentran pruebas contradictorias. La naturaleza compleja de estos efectos puede atribuirse a diversos retos conceptuales y técnicos. Para investigar la existencia de choques de productividad, efectos indirectos y mecanismos de transmisión, el texto sugiere emplear métodos empíricos y análisis de datos. El análisis podría incluir datos a nivel de empresa, sector y región para identificar patrones, tendencias y relaciones. El estudio pretende aportar ideas sobre cómo afecta la IED a los shocks de productividad, los efectos indirectos y los mecanismos dentro de diversos sectores y regiones de España. La perspectiva de rendimiento enfatiza la naturaleza multifacética de los shocks y spillovers de productividad y su impacto potencial en la economía española, particularmente dentro de la industria manufacturera y los sectores industriales. Subraya la importancia de comprender los mecanismos y canales a través de los cuales se transmiten estos efectos y los beneficios potenciales que ofrecen a los países receptores.

En el contexto del estudio sobre la protección del medio ambiente, el término "rendimiento" se utiliza para describir la eficacia y los resultados de las políticas, normativas y prácticas de gestión medioambientales. El estudio examina cómo influyen las políticas medioambientales en los resultados de las empresas, especialmente en la industria textil, fomentando las prácticas sostenibles, el cumplimiento de las normas sobre emisiones y la innovación. El término "rendimiento" también abarca la evaluación de la participación pública en los procesos de toma de decisiones medioambientales y su potencial para mejorar la gobernanza y los resultados medioambientales. El texto aborda el concepto de "rendimiento" desde varias perspectivas, centrándose principalmente en la protección del medio ambiente, el papel de la política medioambiental en el rendimiento de las empresas y la relación entre el compromiso público y la toma de decisiones medioambientales. Desde el punto de vista de la protección del medio ambiente,

el texto destaca el consenso científico sobre el calentamiento global y sus causas, haciendo hincapié en la importancia de mitigar sus impactos mediante acciones individuales, organizativas y gubernamentales. El texto subraya la importancia de proteger el medio ambiente por su papel esencial en la salud humana, la economía y el bienestar general. Menciona que abordar los retos medioambientales requiere esfuerzos colectivos que abarquen acciones individuales, apoyo político y prácticas sostenibles. Además, se presentan las economías circulares como un medio para contribuir a la protección del medio ambiente minimizando los residuos, conservando los recursos y promoviendo prácticas sostenibles mediante la reutilización y el reciclaje de productos.

Pasando al contexto del rendimiento de las empresas y su relación con la política medioambiental, el texto explica cómo las políticas y normativas medioambientales pueden influir en el comportamiento de las empresas dentro de las industrias, utilizando el ejemplo de la industria textil de Pakistán. Explica que las políticas medioambientales obligan a las empresas a cumplir normas específicas en materia de emisiones, gestión de residuos y utilización de recursos. El cumplimiento de estas normas puede acarrear costes a corto plazo, pero a largo plazo, las empresas que adoptan prácticas sostenibles pueden obtener beneficios gracias a una mejora de su reputación, una reducción de los costes de explotación y el acceso a mercados respetuosos con el medio ambiente. El estudio realizado sobre la industria textil paquistaní demuestra que la política medioambiental repercute positivamente en los resultados de las empresas, tanto directamente, al fomentar las prácticas sostenibles, como indirectamente, al incentivar la innovación. Además, el texto profundiza en los retos que plantea la aplicación de las leyes de protección del medio ambiente en las economías emergentes y destaca las estrategias para una aplicación eficaz, como la cooperación, la creación de capacidad y la participación pública. También explora la interconexión entre los Objetivos de Desarrollo Sostenible (ODS) y las leyes de protección del medio ambiente, haciendo hincapié en su objetivo común de promover el uso sostenible de los recursos y salvaguardar el medio ambiente para las generaciones futuras. Por último, el texto aborda la importancia de la participación pública en la toma de decisiones medioambientales y la necesidad de una administración transparente que garantice la responsabilidad y la libertad de las personas, en consonancia con los principios de la gobernanza democrática.

El "rendimiento" es crucial para comprender cómo funcionan los distintos sectores, industrias y políticas en el contexto español. Se utiliza para medir la eficacia de las acciones emprendidas, los resultados obtenidos y el impacto global en los aspectos económicos, sociales y medioambientales. El término ayuda a cuantificar y calificar el éxito o los retos a los que se enfrentan las distintas entidades en cada estudio, proporcionando información valiosa para los responsables políticos, los investigadores y las partes interesadas.

Chapter 1. General Introduction.

Organizational ecology was pioneered by Hannan, M. T., & Freeman, J. (1977). This research approach determines the aspects of companies that make them more likely to survive with time. The underlying notion is that it is not organizations that adapt to changes or shocks. It is the population of organizations that adapts and does so through the disappearance of less suitable organizations and the formation of new ones that are better adapted to the environment.

Within the organizational ecology, one of the most crucial elements influencing business survival is the age of the organization. The specialization and standardization of routines, the learning and development necessary to reproduce business actions depend much on a period of time. Older companies will be more experienced, will have previously overcome difficult situations in the environment and in doing so will have acquired useful knowledge to survive crises ahead of others facing them aimed at the first time.

There is no doubting that the population of businesses will ultimately be shaped by those who have managed to endure the numerous shocks. We cannot, however, discount the capacity of businesses to adjust to environmental changes. Or to promote internal changes that ultimately change the environment itself. This debate is the leitmotif of this thesis. How the various environmental shocks affect industries and, by extension, economies. How firms themselves generate shocks capable of altering the competitive equilibrium in the industry and how the rest of the firms in the environment react. What makes firms activate their adaptation mechanisms. Which adjustment mechanisms are most effective.

This dissertation is divided into three main chapters that examine developments in businesses and economies from various perspectives. Whereas the three main chapters share the same goal, there are differences in the approach, academic context, and study object.

Aggregate economies refer to the overall economic performance of a country or region, usually measured by various macroeconomic indicators such as gross domestic product (GDP), inflation rate, unemployment rate, and balance of trade (Audretsch & Belitski, 2023). The word "aggregate" suggests that rather than concentrating on particular industries or sectors, these indicators are aggregated to offer a comprehensive assessment of the global economy as a whole. Global economic policies, the ongoing COVID-19 pandemic, international disputes, and other variables all have an impact on the overall economy in the current situation (Agostino et al., 2022). The COVID-19 pandemic's effects are starting to fade as of 2023, but the rate of recovery differs between areas and nations. Many countries have experienced significant economic contractions due to pandemic-related lockdowns and supply chain disruptions (S. Wang et al., 2022). However, as vaccinations increase and restrictions are

eased, many economies are starting to rebound. Global growth of 6.0% was predicted by the International Monetary Fund for 2023, which is an increase over the decline of 3.3% in 2021. However, the IMF also noted that the recovery is uneven, with advanced economies generally recovering faster than emerging market and developing economies(Tauseef Hassan et al., 2023). In addition, the pandemic has disproportionately affected low-income countries and vulnerable populations, exacerbating existing economic inequalities. Another factor influencing the current situation of the aggregate economy is geopolitical tensions(Ma et al., 2023). Trade tensions between major economies such as the United States and China have contributed to global uncertainty and slowed economic growth. In addition, ongoing conflicts and political instability in various regions can impact economic stability and growth(Anderson & Ponnusamy, 2023). The state of the whole economy today is being significantly shaped by global economic policy as well. Financial markets are being stabilized and the economy is being supported by monetary and fiscal measures, such as central bank interventions and government stimulus programmes (Chang et al., 2023). Concerns exist, nevertheless, over how these measures may eventually affect the rate of inflation, levels of debt, and the stability of the economy. Global economic policies, the ongoing COVID-19 epidemic, geopolitical conflicts, and other complex issues all contribute to the aggregate economy's current state (Fatah & Pasawski, 2023). While there are signs of recovery, the outlook remains uncertain and subject to significant risks and challenges.

As they are based on a variety of variables, including economic policies, technology improvements, shifts in demographics, and environmental issues, projections for the future of the overall economy are fraught with uncertainty (Rahman et al., 2023). However, while making predictions about the future of the world economy, analysts use a variety of models and scenarios. One of the top organisations that makes predictions for the future of the world economy is the International Monetary Fund (Kinda et al., 2023). The global economy is anticipated to expand by 4.4% in 2020 and 3.3% in 2022, following a predicted 6% growth rate for 2022, based to the IMF's World Economic Overview report published in April 2022 (IMF, 2022). financial world policies Fatah and Pasławski (2012). However, the IMF noted that the projections are subject to significant uncertainty, depending on the course of the COVID-19 pandemic, the success of vaccine rollouts, and the effectiveness of economic policies in supporting growth and mitigating risks(S. Wang et al., 2023). The Organization for Economic Cooperation and Development (OECD) also provides future projections for the global economy. In its latest Economic Outlook report released in March 2021, the OECD projected global economic growth of 4.5% in 2022 and 3.8% in 2023 (OECD, 2021). The OECD also noted that the recovery would be uneven across regions and sectors, and that the risks and uncertainties associated with the pandemic and global economic policies could significantly impact the projections (Cline,

2023). Future predictions for the world's economy are also provided by other agencies and organisations. In this case, the worldwide Economic Prospects report from the World Bank, which was published in January 2021, forecasted 3.8% expansion between 2022 and 2023 after 4% worldwide growth in 2021 (World Bank, 2021). The global epidemic would have long-lasting impacts on the world economy, with certain industries and nations suffering severe setbacks that could have an impact on growth in the future (Armoti et al., 2023), according to the paper. Furthermore, the future projections for the aggregate economy are also influenced by various other factors, such as technological advancements and demographic changes(Yao et al., 2023). For example, the increasing adoption of automation and artificial intelligence could significantly impact the nature of work and productivity in the future, while demographic shifts, such as aging populations in some countries, could affect labor supply and demand (Wolff & Mykhnenko, 2023). Projections for the future of the aggregate economy are subject to significant uncertainty and depend on various factors, including economic policies, technological advancements, demographic changes, and environmental factors (Weitzel et al., 2023). While international organizations and other institutions provide projections based on various models and scenarios, the accuracy of these projections depends on the evolution of the global economy over time and the effectiveness of policies and actions taken to mitigate risks and support growth.

The effectiveness with which a nation or region generates goods and services in relation to the number of resources it uses is referred to as the economy's productivity (Yao et al., 2023). By dividing an economy's output (such as GDP) by the components (such as labour, capital, and resources of nature) utilized to produce it, productivity is frequently calculated (Yang et al., 2022). As a greater number of products and services can be created with the same amount of resources, high levels of production can result in enhanced economic growth and higher living standards (Eldeep & Zaki, 2022). . On the other hand, low levels of productivity can hinder economic growth and limit the ability of a country or region to compete in the global marketplace. There are several factors that can affect the productivity of aggregate economies. These include technology, human capital, Infrastructure and regulatory environment(Tauseef Hassan et al., 2023)**.** Technology the adoption of new technologies can lead to increased productivity by improving the efficiency of production processes. Human capital, a well-educated and skilled workforce can lead to higher productivity by enabling workers to perform tasks more efficiently(Jin et al., 2023). Infrastructure, access to modern infrastructure such as transportation systems, communication networks, and energy sources can improve productivity by reducing the cost of production and making it easier to connect with suppliers and customers. By encouraging businesses to make investments in new technology and processes, a supportive regulatory framework that

encourages rivalry as well as creativity can assist enhance productivity (C. Yu et al., 2023). In general, productivity is a significant factor influencing how well individual economies operate as a whole, and policymakers frequently concentrate on methods to boost production as a means of fostering wealth and progress. Future projections of the aggregate economy's productivity are likewise unclear and dependent on a number of variables, including technology development, human capital, and monetary policy. While there are different methods to measure productivity, one commonly used metric is labor productivity, which measures the output per hour of labor input.

In many advanced nations, labour productivity growth has been rather moderate in recent years, according to the Organisation for Economic Cooperation and Development, and structural reforms as well as investments in innovation and skills are required to increase productivity (OECD, 2021). However, there are potential for digital change and investments in green technology to enhance long-term productivity growth (Madrigal Delgado et al., 2018). The OECD predicted that the COVID-19 pandemic might exacerbate the productivity slowdown in the medium term. policies. Technological advancements, particularly in the area of artificial intelligence (AI) and automation, have the potential to significantly impact productivity in the future(Cui & Wang, 2023). According to a report by McKinsey Global Institute, AI could contribute up to $13 trillion to the global economy by 2030, with the potential to increase productivity in various sectors, including manufacturing, healthcare, and finance (McKinsey Global Institute, 2018). However, the report also noted that the adoption of AI technologies would require significant investments in research and development, as well as policies to address the potential impact on employment and inequality(Martínez-Alonso et al., 2022).

Human capital, including education and training, also plays a crucial role in productivity growth. Making investments in training and education, according to the World Bank (World Bank, 2019), may eventually lead to higher labour productivity and economic growth. However, access to these possibilities and the calibre of training and instruction remain issues in many nations. Economic policies, including those related to taxation, regulation, and investment, also influence productivity growth. For example, a report by the OECD noted that reducing barriers to entry and increasing competition could boost productivity in various sectors, including retail, transportation, and professional services (OECD, 2020). Projections for the future productivity of the aggregate economy depend on various factors, including technological advancements, human capital, and economic policies. While there are opportunities for digital transformation and investments in education and training to support productivity growth, addressing the potential impact on employment and inequality, as well as promoting competition and reducing barriers to entry, are also essential for sustained productivity growth.

Productivity of a firm refers to the amount of output (goods or services) it produces per unit of input (labor, capital, or other resources)(Bruhn & Calegario, 2014). It is a key indicator of the efficiency of a firm's operations and its ability to generate profits and sustain growth. There are different methods to measure productivity, depending on the type of inputs and outputs being considered. One commonly used metric is labor productivity, which measures the output per hour of labor input(H. Yu et al., 2022). Other measures of productivity include total factor productivity, which takes into account all inputs (including capital and materials) and output, and multi-factor productivity, which measures the productivity of several inputs together(Cuvero et al., 2022a). A number of variables, such as managerial techniques, human resources, investments in R&D, and technology improvements, can have an impact on a company's productivity. Technology developments can enable businesses to generate higher-quality goods and services while also streamlining their processes and lowering expenses (Torrent-Sellens et al., 2022). Management practices, such as lean manufacturing or total quality management, can also help to improve productivity by eliminating waste and improving processes. Human capital, including education and training, is also an important factor in productivity. Skilled and knowledgeable workers can perform tasks more efficiently and effectively, which can lead to higher productivity(Tarifa Fernández et al., 2022). Investment in R&D is crucial for productivity growth since it can result in the creation of novel goods or processes that increase productivity and cut costs. For businesses to maintain market competitiveness and achieve sustainable growth, productivity measurement and improvement are crucial (Quintana-Garca et al., 2022). Improving productivity can lead to higher profits, which can be reinvested in the firm or returned to shareholders(Agostino et al., 2022). Additionally, higher productivity can enable firms to expand their operations and create more jobs. The productivity of a firm is a key indicator of its efficiency and ability to generate profits and sustain growth. Technological advancements, management practices, human capital, and investment in research and development are important factors that can affect productivity.

Measuring productivity in economies can be challenging, but there are several commonly used methods. One method is to use total factor productivity (TFP), which measures the efficiency of all inputs, including labor, capital, and materials, in producing output(Gómez et al., 2022). Another method is to use labor productivity, which measures the output per hour of labor input. Productivity in aggregate economies can be influenced by several factors, including technological progress, investment in education and training, and improvements in infrastructure(Cui & Wang, 2023). Technological progress can lead to more efficient production processes and new products that increase productivity. The quantity and quality of human capital can be improved by investments in education and training, which can also raise productivity. A more effective production and distribution of

products and services might result from advancements in facilities such as networks for transportation and communication (Agostino et al., 2022). Market competition, governmental laws, and macroeconomic conditions are just a few examples of the external factors that have an impact on a firm's productivity in collective economies. For example, a highly regulated market may inhibit firms' ability to innovate and improve productivity, while a highly competitive market may incentivize firms to invest in new technologies and processes to remain competitive(Quintana-García et al., 2022).

When compared to other enterprises in the same economy, a firm's productivity evaluates how effectively it uses resources to generate goods and services (Tarifa Fernández et al., 2022). In general economies, productivity growth is a major driver of economic expansion and is crucial for raising living standards. Productivity is influenced by a variety of internal and external factors, such as market rivalry, governmental restrictions, and macroeconomic situations, as well as by technology advancement, investments in training and education, and infrastructural upgrades. A shock refers to an unexpected and significant event or change that disrupts the normal functioning of an economy or market. Shocks can be either positive or negative, and can originate from both internal and external sources(Miklian & Hoelscher, 2022). Positive shocks might take the form of innovations in technology, a rise in demand from consumers, or the identification of new natural resources. These kinds of shocks may result in greater economic expansion, increased output, and an overall rise in living standards Rosa-Rull and Santaeulàlia-Llopis (2010). On the other hand, negative shocks can include things like natural disasters, war, or financial crises. These types of shocks can lead to a decrease in economic growth, lower productivity, and a decline in living standards.(Kehoe & Ruhl, 2008) Negative shocks can also lead to significant job losses and an increase in poverty and inequality. Shocks can also be classified as supply or demand shocks. A supply shock refers to a sudden change in the supply of goods or services, such as a natural disaster that disrupts the production of a particular commodity(Carlsson et al., 2016). A demand shock, on the other hand, refers to a sudden change in consumer demand, such as a recession that causes consumers to reduce their spending. Shocks can have both short-term and long-term effects on the economy. In the short-term, shocks can lead to disruptions in markets and supply chains, causing prices to rise or fall rapidly(Kehoe & Ruhl, 2008). Long-term shocks may have a significant effect on an economy's structure, changing both the types and methods of production of products and services (Lorenzoni, 2009).

The 2008 financial crisis was a major external shock that had a profound effect on the financial industry, the broader economy, and society at large. External shocks are events or factors that are outside of a particular industry's control, and that can have significant and unpredictable impacts on that industry(Adhvaryu et al., 2019). In the case of the financial crisis, the external shock was the

collapse of the US housing market, which led to widespread defaults on subprime mortgages, declining housing prices, and a broader credit crisis. According to Evans (1992), the financial crisis had a severe and protracted impact on the financial sector. Through investments in securities backed by mortgages and other financial products, banks and other financial firms had significant exposure to the housing market. Many of these assets lost value when the real estate market crashed, causing these institutions to suffer large losses (Corsetti et al., 2008). The crisis also caused consumer confidence to drop, which in turn reduced demand for financial goods and services as people and businesses become more wary of their investment decisions. The financial crisis had a serious effect on the overall economy as well. This further exacerbated the economic downturn, as many businesses were unable to access the credit they needed to invest and grow. The social impact of the financial crisis was also significant. As a result of the crisis, several businesses were compelled to fire employees or declare bankruptcy, which resulted in significant employment losses (Kehoe & Ruhl, 2008). Due to the fact that so many people and families were struggling to make ends meet, this in turn contributed to an increase in unemployment and social inequality. Because many people believed that those in charge of regulating the industry had let them down, the crisis also damaged the public's confidence in the financial sector and government authorities (Barón et al., 2020). The Spanish construction industry was severely impacted by the financial crisis of 2008, which constituted a significant external shock. Prior to the crisis, Spain's construction economy had been booming thanks to cheap interest rates, easy access to credit, and a quickly expanding housing market. However, when the global financial crisis hit, the Spanish economy went into a deep recession, and the construction sector was particularly hard hit(Torrent-Sellens et al., 2022). The crisis had several impacts on the Spanish construction sector, including a sharp decline in demand for new housing, a decline in construction activity, a rise in non-performing loans and a decline in property values. As the Spanish economy entered a recession, demand for new housing declined sharply, leading to a significant oversupply of homes on the market(Aranda-Usón et al., 2020). This oversupply, combined with a tightening of credit conditions, led to a collapse in housing prices, which further reduced demand for new construction. With demand for new construction falling, many construction firms in Spain were forced to lay off workers or shut down entirely. This led to a sharp decline in construction activity and a rise in unemployment in the sector. Many banks in Spain had extended credit to construction firms during the boom period, and when the crisis hit, these loans became non-performing as many firms were unable to repay them. This led to a crisis in the Spanish banking sector and a need for government intervention to stabilize the banking system. The collapse of the housing market led to a decline in property values, which had a ripple effect throughout the economy. Many homeowners found themselves underwater on their

mortgages, meaning that they owed more than their homes were worth. This reduced their ability to sell their homes or refinance their mortgages, which further dampened demand for new construction. The COVID-19 pandemic, which emerged in late 2019 and spread rapidly across the world, has been a major external shock with profound effects on various industries, economies, and societies(Wolff & Mykhnenko, 2023). In order to stop the COVID-19 pandemic from spreading further, governments all over the world have been compelled to enact policies including lockdowns, travel bans, and social distance rules (Albert et al., 2020). These actions have had a major and frequently unforeseen influence on sectors because they have disrupted supply networks, decreased demand for goods and services, and changed customer behaviour. The effect of COVID-19 on various industries has been significant and varies depending on the sector(Pichler & Farmer, 2022). The travel and hospitality industry, for example, has been severely impacted, with many airlines, hotels, and restaurants experiencing a sharp decline in demand due to travel restrictions and the closure of borders. The entertainment industry, including movie theaters, concerts, and sports events, has also been severely impacted as public gatherings were discouraged or prohibited(Salas-Fumás, 2021). Meanwhile, some industries like e-commerce, online education, and healthcare have experienced a surge in demand due to the pandemic. The general economy has been significantly impacted by the COVID-19 pandemic. Lockdowns and other social isolationist tactics have driven numerous companies to shut down or scale back, which has resulted in job losses and a drop-in economic activity (Palomino et al., 2023). Governments all across the world have launched stimulus programmes and other efforts to lessen the pandemic's economic impact, but it is still unclear how the economy will fare in the long run. The COVID-19 epidemic has had a major social impact as well. Domestic violence, mental health concerns, and social isolation have increased as a result of the pandemic's caused forced numerous individuals to work from their homes and limit their ability to socialize (Fernández-Cerezo et al., 2022). The COVID-19 pandemic had a significant impact on the Spanish construction industry, although the effects were somewhat different than those of the 2008 financial crisis. Here are some of the ways that the pandemic affected the construction sector in Spain Disruption of supply chains, Suspension of work, Changes in safety protocols, Changes in demand and Changes in financing. The pandemic caused disruptions in global supply chains, which affected the availability of construction materials and equipment. This led to delays and increased costs for many construction projects in Spain(Boscá et al., 2021). During the early stages of the pandemic, the Spanish government suspended many construction projects in order to slow the spread of the virus. This led to significant delays and lost revenue for many construction firms. In order to resume construction work, many firms had to adopt new safety protocols, such as social distancing measures and increased use of personal protective equipment(Pedauga et al., 2022).

These measures added costs and complexity to construction projects. The pandemic led to changes in demand for construction services. For example, there was increased demand for healthcare facilities and renovations to existing buildings to make them safer and more hygienic. However, there was also decreased demand for new office and commercial buildings as many businesses shifted to remote work(Palomino et al., 2023). The pandemic led to changes in financing for construction projects, as lenders became more cautious and many projects were put on hold or cancelled due to uncertainty about the economic outlook. The COVID-19 pandemic has been a major external shock that has had profound effects on various industries, economies, and societies. The pandemic has exposed weaknesses and vulnerabilities in various industries, and highlighted the need for greater resilience and adaptability in the face of external shocks. The long-term effects of the pandemic on industries and economies remain uncertain, and it will take time and concerted efforts to recover from the impacts of this crisis.

Adapting to a shock is a crucial process for industries to survive and thrive in today's dynamic and uncertain environment (Dornbusch et al., 1998). A shock can come in various forms such as a natural disaster, an economic downturn, or a sudden change in the market conditions. Adapting to a shock requires an industry to be resilient, flexible, and responsive to change. An industry can adapt to a shock through assess the impact of the Shock, develop a contingency plan, implement the contingency plan, diversification, innovation, collaboration, improve efficiency and monitor progress(A. W. Bartik et al., 2020). The first step in adapting to a shock is to assess its impact on the industry. The industry needs to evaluate the extent of the damage caused by the shock, the potential risks and opportunities, and the resources required to recover(Juergensen et al., 2020). This assessment should include an analysis of the operational, financial, and strategic dimensions of the industry. Once the impact of the shock is assessed, the industry needs to develop a contingency plan(A. Bartik et al., 2020). This plan should outline the specific steps that the industry will take to address the challenges posed by the shock. The contingency plan should consider various scenarios and be flexible enough to accommodate changes in the market conditions(Eichengreen et al., 1995). After developing the contingency plan, the industry needs to implement it promptly. This involves putting in place the necessary resources, processes, and systems required to execute the plan. The industry should also communicate the plan to its stakeholders, including employees, customers, suppliers, and investors(Berg et al., 1992). Adapting to a shock also involves diversifying the products or services of the industry. This can help the industry to reduce its dependence on a single market or customer. Diversification can also help the industry to spread the risk and increase its chances of survival during a shock. Innovation is another key aspect of adapting to a shock(Monreal-Pérez et al., 2012). The industry should innovate to stay ahead of the competition and create new opportunities. Innovation can involve developing new products or

services, adopting new technologies, or entering new markets. Collaboration is also essential in adapting to a shock. The industry should collaborate with other industries or stakeholders to share resources and knowledge, pool expertise, and develop joint solutions. This can help the industry to leverage the collective strength and overcome the challenges of a shock(Bentolila et al., 1994). Adapting to a shock also involves improving the efficiency and productivity of the industry. This can help to reduce its costs and increase its profitability. Improved efficiency can help the industry to withstand the pressures of a shock and emerge stronger. The industry needs to monitor its progress in adapting to the shock continually(Gopinath et al., 2017). This involves tracking the implementation of the contingency plan, measuring the effectiveness of the diversification, innovation, and collaboration efforts, and evaluating the efficiency improvements. Monitoring progress can help the industry to identify the areas that need improvement and make the necessary adjustments(Gourinchas et al., 2020). Adapting to a shock is essential for an industry to survive and thrive in today's dynamic and uncertain environment. Here are some key reasons why an industry needs to adapt to a shock, to ensure business continuity, to maintain market share, to reduce risk and uncertainty, to improve efficiency and profitability, to remain competitive and to maintain customer trust and loyalty(A. W. Bartik et al., 2020). Shock can disrupt the normal operations of an industry, leading to significant financial losses and even closure. Adapting to a shock helps an industry to minimize the disruption, ensure business continuity, and avoid the risk of bankruptcy. Its shock can lead to changes in the market conditions, such as a decrease in demand or an increase in competition(Berg et al., 1992). Adapting to a shock helps an industry to maintain its market share, even in the face of new challenges and increase the risk and uncertainty faced by an industry, making it difficult to plan for the future. Adapting to a shock helps an industry to reduce the risk and uncertainty by anticipating the challenges and taking proactive measures to mitigate them(Bentolila et al., 1994). Adapting to a shock can help an industry to improve its efficiency and profitability. For example, by diversifying its product or service offerings, an industry can reduce its reliance on a single market or customer, and thereby increase its profitability. It can help an industry to remain competitive by innovating and adopting new technologies or processes. This can help an industry to stay ahead of its competitors and capitalize on new opportunities. Customer trust and loyalty can also be maintained by adapting to a shock. By promptly addressing the challenges posed by a shock, an industry can demonstrate its commitment to its customers and maintain its reputation(Gopinath et al., 2017).

When it comes to adapting to a shock, different industries and firms may have varying levels of resilience and adaptability. It is important to take a closer look at which industries and firms are more likely to adapt to a shock, and how this can benefit different stakeholders' technology, healthcare, retail, finance and logistics and transportation(Albert et al., 2020). Technology firms are often at the

forefront of innovation and are well-positioned to adapt to shocks. This can benefit stakeholders such as customers, who may benefit from new products or services that address emerging needs or challenges. Employees may also benefit from a culture of innovation that encourages experimentation and adaptability(Pichler & Farmer, 2022). Healthcare providers and researchers are accustomed to dealing with unexpected events and adapting their approach as needed. This can benefit patients, who may receive more effective treatments or have access to new therapies or medications. Healthcare employees may also benefit from the sense of purpose and mission-driven culture that is often present in this industry(Salas-Fumás, 2021). Retailers are often forced to adapt quickly to changes in consumer behavior or market trends. This can benefit customers, who may have access to a wider variety of products or more convenient shopping experiences. Retail employees may also benefit from the opportunity to learn new skills or take on new roles as the business adapts to changing circumstances(Palomino et al., 2023). The finance industry is accustomed to dealing with shocks such as economic downturns, market crashes, and other unexpected events. This can benefit investors, who may have access to more sophisticated risk management strategies or investment opportunities(García-Pérez-de-Lema et al., 2022). Employees in the finance industry may also benefit from the opportunity to work on challenging projects or gain exposure to new areas of the business. The logistics and transportation industry is used to dealing with disruptions to supply chains, changing regulations, and unexpected events such as natural disasters. This can benefit customers, who may have access to more reliable and efficient shipping options(García-Pérez-de-Lema et al., 2022). Employees in this industry may also benefit from the opportunity to work on complex logistics challenges or develop new technologies that improve transportation and logistics operations.

The performance of an industry after adapting to a shock can vary depending on a variety of factors, such as the severity of the shock, the industry's level of resilience and adaptability, and the specific strategies and actions taken by individual firms within the industry(Adhvaryu et al., 2019). However, there are some general trends that tend to emerge when industries adapt to shocks improved efficiency, innovation, increased competition, greater collaboration and improved resilience. When an industry adapts to a shock, it often results in increased efficiency as firms find new ways to operate and streamline their processes(Carlsson et al., 2016). For example, during the COVID-19 pandemic, many industries were forced to adopt remote work and virtual meeting technologies, which resulted in reduced overhead costs and increased productivity in some case(Carlsson et al., 2016). Adapting to a shock can also drive innovation as firms find new ways to meet changing consumer needs and preferences. For example, during the pandemic, many retailers and restaurants adopted new technologies and processes to provide contactless delivery and curbside pickup options. Adapting to a

shock can also led to increased competition within an industry as firms compete for market share in a changing landscape(Corsetti et al., 2008). For example, in the retail industry, online retailers such as Amazon have gained market share during the pandemic as consumers have shifted to online shopping. Adapting to a shock can also foster greater collaboration within an industry as firms work together to develop new solutions and strategies(Corsetti et al., 2008). For example, during the pandemic, many healthcare providers and researchers collaborated to share data and develop new treatments and vaccines. Ultimately, adapting to a shock can help improve the resilience of an industry by identifying areas of weakness and developing strategies to mitigate risks(Ríos-Rull & Santaeulàlia-Llopis, 2010). For example, after the 2008 financial crisis, many banks and financial institutions implemented new risk management practices and regulatory oversight to prevent similar crises from occurring in the future.

It's important to note that the performance of an industry after adapting to a shock can vary widely depending on the specific circumstances and the strategies employed(Ríos-Rull & Santaeulàlia-Llopis, 2010). However, industries that are able to adapt quickly and effectively to changing conditions are often better positioned for long-term success and growth.

The 2008 financial crisis had a significant impact on the Spanish economy, including its industries. While the crisis initially caused a decrease in productivity across many sectors, there were some industries that were able to weather the storm and even increase their productivity in the aftermath(Glick & Rogoff, 1995). One industry that saw an increase in productivity following the 2008 financial crisis is the export sector. The crisis led to a weak Euro, which made Spanish products more competitive in foreign markets, and many firms in the export sector invested in new technologies and processes to increase efficiency and reduce costs(Glick & Rogoff, 1995). This led to improved productivity and helped to offset the negative impact of the crisis on the industry. In particular, the automotive industry was able to increase productivity following the crisis by implementing lean manufacturing techniques, reducing waste and streamlining production processes(Evans, 1992). This led to increased efficiency and cost savings for Spanish automakers, helping to make them more competitive in the global market. Similarly, the chemical industry in Spain was able to increase productivity by investing in research and development to create new and innovative products(Glick & Rogoff, 1995). This allowed Spanish chemical firms to diversify their product lines and expand into new markets, ultimately leading to increased productivity and competitiveness. It is worth noting that not all industries in Spain were able to increase productivity following the 2008 financial crisis, and many experienced significant decreases in productivity due to reduced demand and credit availability(Evans, 1992). For example, the construction and real estate industries were hit hard by the

crisis and experienced a significant decrease in productivity. The 2008 financial crisis had a mixed impact on productivity within the Spanish industry. While many industries experienced a decrease in productivity, some, such as the export, automotive, and chemical industries, were able to weather the storm and increase productivity by implementing new technologies, processes, and innovation(Ríos-Rull & Santaeulàlia-Llopis, 2010).

The COVID-19 pandemic had a profound impact on the Spanish economy and its industries. While many industries experienced a significant decrease in productivity due to lockdowns, reduced demand, and supply chain disruptions, there were also some industries that were able to adapt and even increase their productivity in response to the pandemic(Boscá et al., 2021). One industry that saw an increase in productivity during the pandemic is the technology sector. With the increased demand for remote work and online services, Spanish tech firms have been able to capitalize on the trend and innovate in new ways(Pedauga et al., 2022). For example, many Spanish companies shifted their business models to offer online services, such as telemedicine and remote learning, which led to increased productivity and expansion of their customer base. Another industry that has seen an increase in productivity during the pandemic is the healthcare sector(Berg et al., 1992). With the increased demand for medical supplies and equipment, Spanish firms in the healthcare industry have been able to ramp up production and increase efficiency. For example, companies that produce personal protective equipment (PPE), such as masks and gloves, have been able to increase their productivity to meet the increased demand for their products(Monreal-Pérez et al., 2012). The agriculture sector in Spain has also seen an increase in productivity during the pandemic. With the reduced availability of imported produce due to supply chain disruptions, Spanish farmers were able to increase production to meet domestic demand. Additionally, the shift towards online ordering and home delivery of fresh produce allowed farmers to sell their products directly to consumers, which improved efficiency and productivity(Bentolila et al., 1994). It is worth noting that not all industries in Spain were able to increase productivity during the pandemic, and many experienced significant decreases in productivity due to reduced demand and supply chain disruptions(Gopinath et al., 2017). For example, the tourism and hospitality industries were hit particularly hard by the pandemic and experienced a significant decrease in productivity.

The COVID-19 pandemic had a mixed impact on productivity within the Spanish industry. While many industries experienced a decrease in productivity, some, such as the technology, healthcare, and agriculture sectors, were able to adapt and increase productivity by innovating, ramping up production, and shifting towards new business models(Gopinath et al., 2017).

The 2008 financial crisis and the COVID-19 pandemic had different impacts on various industries in Spain, and some were able to increase their productivity in response to these shocks. The technology industry in Spain saw an increase in productivity after both the 2008 financial crisis and the COVID-

19 pandemic(Gourinchas et al., 2020). During the financial crisis, many tech firms implemented new technologies and processes to reduce costs and increase efficiency. Similarly, during the pandemic, the demand for online services and remote work led to an increase in productivity in the tech industry as companies were able to capitalize on the trend and innovate in new ways(Gourinchas et al., 2020). The healthcare industry in Spain also saw an increase in productivity after the COVID-19 pandemic. With the increased demand for medical supplies and equipment, Spanish healthcare firms were able to ramp up production and increase efficiency(Dornbusch et al., 1998). For example, companies that produce personal protective equipment (PPE) increased their productivity to meet the demand for their products. The agriculture industry in Spain also saw an increase in productivity after both the 2008 financial crisis and the COVID-19 pandemic. During the financial crisis, Spanish farmers implemented new technologies and processes to reduce costs and increase efficiency(Dornbusch et al., 1998). Similarly, during the pandemic, the shift towards online ordering and home delivery of fresh produce allowed farmers to sell their products directly to consumers, which improved efficiency and productivity(A. W. Bartik et al., 2020). The export industry in Spain saw an increase in productivity after the 2008 financial crisis. The weak Euro made Spanish products more competitive in foreign markets, and many firms in the export sector invested in new technologies and processes to increase efficiency and reduce costs(A. W. Bartik et al., 2020). This led to improved productivity and helped to offset the negative impact of the crisis on the industry. The automotive industry in Spain also saw an increase in productivity after the 2008 financial crisis. Spanish automakers implemented lean manufacturing techniques, reducing waste and streamlining production processes(Juergensen et al., 2020). This led to increased efficiency and cost savings, making them more competitive in the global market.

Productivity shocks are changes in the efficiency of production processes. The Spanish industry sector has experienced several productivity shocks since the 1990s, with significant spillover effects on the rest of the economy(Juergensen et al., 2020). Some of the key productivity shocks during this period and their spillover effects are outlined below, the 1990s saw significant restructuring in the Spanish industry sector as a result of globalisation and increased international competition. This led to a productivity shock in the industry sector, with many businesses struggling to adapt to the changing global environment(A. Bartik et al., 2020). The spillover effects of this shock were felt throughout the economy, particularly in the services sector, which saw a decrease in demand. The global financial crisis of 2008 had a significant impact on the Spanish industry sector, with many businesses experiencing a decline in demand and investment(Juergensen et al., 2020). This resulted in a productivity shock in the industry sector, which had negative spillover effects on the rest of the economy, particularly in the services sector. The crisis also led to a rise in unemployment rates and a

decrease in consumer spending, further exacerbating the negative spillover effects(Eichengreen et al., 1995). The Spanish industry sector has also experienced several other productivity shocks since the 1990s, including changes in international trade agreements, shifts in consumer preferences, and technological advancements. These shocks have had spillover effects on the rest of the economy, particularly in industries that are closely linked to the industry sector, such as transportation and logistics(Eichengreen et al., 1995).

The spillover effects of productivity shocks in the Spanish industry sector have been felt throughout the economy, particularly in the services sector. In the context of the Spanish industry sector, spillover refers to the transmission of economic effects from one sector of the economy to another(Bruhn & Calegario, 2014). In particular, spillover effects can occur when changes in demand or supply in one sector affect the performance of firms in related industries. For example, if there is a decrease in demand for a particular type of product, such as automobiles, this can have a negative spillover effect on firms that supply components or services to the automobile industry(Madrigal Delgado et al., 2018). Foreign direct investment (FDI) is when a company receives funding from a foreign entity to invest in its production or business operations. According to Cuvero et al. (2022a), FDI in the Spanish manufacturing industry can take the shape of foreign enterprises opening up shop or buying out already established businesses. The transmission of knowledge and technology, accessibility to new financial markets, and enhanced competitiveness are only a few of the possible advantages of FDI. In the Spanish industrial sector, spillover and FDI have a complicated relationship (Tzabbar et al., 2022). On the one hand, foreign direct investment (FDI) has the potential to have beneficial consequences of spillovers such as the passing on cutting-edge management techniques from foreign companies to domestic companies. However, FDI can also result in unfavourable spillover effects, such the displacement of native businesses or a decline in competition. The Spanish government has enacted a number of policies aiming at promoting a friendly investment climate in order to take advantage of the potential advantages of FDI while reducing its adverse spillover effects (Cuvero et al., 2022b). For instance, the government has taken steps to lessen red tape and simplify the business startup process, as well as offering tax breaks and other forms of financial assistance to foreign investors. The mechanisms of transmission of spillover that caused increased productivity over the rest of the industry can be classified into three categories(B. Audretsch & E. Lehmann, 2022). In the context of the Spanish industry sector, there are several mechanisms through which spillover effects can be transmitted to other industries. These include imitation, workers mobility, and competition. One mechanism through which spillover effects can be transmitted is through imitation(B. Audretsch & E. Lehmann, 2022). This occurs when firms in other industries observe the practices or technologies used by successful

firms in the industry sector and adopt them in their own operations. For example, if a firm in the Spanish industry sector develops a more efficient production process, this may be imitated by firms in related industries, leading to increased productivity and competitiveness(Ge & Liu, 2022). Another mechanism through which spillover effects can be transmitted is through workers mobility. This occurs when workers move between firms or industries, bringing with them knowledge and expertise gained from previous experiences. For example, if a worker with experience in the Spanish industry sector moves to a related industry, they may bring with them knowledge of best practices or new technologies, which can improve the productivity of the new firm(Albis Salas et al., 2022). A third mechanism through which spillover effects can be transmitted is through competition. When the industry sector is highly competitive, firms are forced to innovate and improve their operations in order to remain competitive(Haq et al., 2022). This can lead to the development of new technologies, processes, or products that can be adopted by other industries. Additionally, competition can lead to a concentration of highly skilled workers in the industry sector, which can then lead to spillover effects through workers mobility(Crowley & Jordan, 2022).

Environmental transformation refers to a series of changes and innovations made within a company to improve its environmental performance(Barbieri et al., 2022). Environmental transformation can include initiatives such as adopting sustainable production practices, reducing energy consumption, implementing waste reduction and recycling programs, and investing in renewable energy sources(Aldieri et al., 2022). The decision to transform and invest in environmental transformation can have significant impacts on a firm's performance, both in terms of its financial performance and its reputation. When considering whether to invest in environmental transformation, firms must first assess the potential benefits and costs associated with these initiatives. On the benefits side, firms can expect to see improvements in their environmental performance, reduced costs associated with resource consumption, and an enhanced reputation among stakeholders(Mota Veiga et al., 2022). These benefits can translate into increased profitability, improved access to capital, and increased market share.

On the costs side, firms must consider the upfront investment required to implement environmental transformation initiatives(Tang et al., 2022). Depending on the scope of the transformation, this can involve significant capital expenditures, such as the purchase of new equipment or the installation of renewable energy infrastructure(Xu et al., 2022). Additionally, firms may need to invest in employee training and education to ensure that workers are equipped to implement and manage new practices and technologies. To make informed decisions about environmental transformation, firms must engage in careful analysis and planning. This may involve conducting an environmental impact assessment to

identify areas where the company can improve its performance, analyzing the costs and benefits associated with potential initiatives, and developing a long-term strategy for implementing and managing these initiatives(Cui & Wang, 2023).

Ultimately, the decision to transform and invest in environmental transformation will depend on a variety of factors, including the company's strategic goals, its financial resources, and its commitment to sustainability(Liu et al., 2022). While there may be short-term costs associated with environmental transformation, many firms find that the long-term benefits outweigh these costs and result in improved financial performance and a stronger reputation among stakeholders. As such, firms that prioritize environmental transformation may be better positioned to compete in an increasingly environmentally conscious marketplace.

A firm's efficiency and effectiveness can be strongly impacted by institutional factors and internal traits. Researchers looked at how organisational performance, as mediated by environmental performance, is affected by public involvement, governmental regulation, and organisational EMS (Friedmann, 2022). The degree to which a company performs sustainably is referred to as its environmental performance. bureaucracy, reduce the time it takes to start a firm, and offer tax breaks and other financial assistance to international investors. The following are some ways in which these factors can impact organizational performance with the mediating effect of environmental performance, when an organization involves the public in decision-making processes related to environmental sustainability, it can lead to increased trust and legitimacy, which can ultimately improve the organization's environmental performance(Vujanović et al., 2022). This, in turn, can lead to improved organizational performance, as consumers and stakeholders increasingly expect businesses to operate in a sustainable and responsible manner. Government regulations can incentivize or require organizations to adopt environmentally sustainable practices, leading to improved environmental performance. This can also lead to improved organizational performance, as compliance with regulations can help organizations avoid fines and legal penalties and improve their reputation with consumers and stakeholders(Krasniqi et al., 2022). Implementing an effective EMS can help organizations identify and address environmental risks and opportunities, leading to improved environmental performance. This can also improve organizational performance by reducing costs, increasing efficiency, and enhancing the organization's reputation with consumers and stakeholders(Lwesya, 2022).

Sustainable development objectives, company performance, and the environment are all linked (Halis & Halis, 2022). According to J. Wang & Liu (2023), environmental transformation is the process of moving regarding a sustainable future by minimising the detrimental effects of economic activity on the environment. The United Nations approved the 17 Sustainable Development Goals (SDGs) in 2015

to encourage sustainable development on a global scale. According to Q.-J. Wang et al. (2022) "firm performance" is the capacity of an organisation to meet its aims and objectives while juggling the demands of its stakeholders.

These institutional determinants are the ways in which environmental transformation contribute to achieving the SDGs regulatory compliance, cost reduction, innovation, employee engagement and brand image(Rodríguez-Espíndola et al., 2022). Environmental regulations and policies aimed at reducing carbon emissions, pollution, and other harmful environmental impacts can affect a firm's performance. Firms that comply with these regulations are less likely to face penalties and reputational damage(Haldorai et al., 2022). Adopting sustainable practices such as energy-efficient technologies, renewable energy, and waste reduction measures can reduce operational costs, resulting in improved financial performance(Marrucci et al., 2022a). Firms that innovate and develop new technologies to reduce their environmental impact can create a competitive advantage and attract environmentally conscious customers(Paraschi et al., 2022). Promoting sustainable practices and engaging employees in environmental initiatives can improve employee morale and job satisfaction, resulting in improved productivity and reduced turnover. Firms that adopt sustainable practices can improve their brand image and reputation, attracting customers and investors who prioritize environmental and social responsibility(Nassani et al., 2022).

The SDGs provide a framework for firms to align their environmental and social initiatives with global sustainability goals(Marrucci et al., 2022b). The SDGs cover a range of topics, including poverty reduction, access to clean water and sanitation, affordable and clean energy, sustainable cities and communities, responsible consumption and production, and climate action(Shah et al., 2022). By contributing to the achievement of the SDGs, firms can enhance their reputation, attract socially responsible investors, and align themselves with a global sustainability agenda. environmental transformation, firm performance, and sustainable development goals are interconnected(García Alcaraz et al., 2022). Firms that adopt sustainable practices, comply with environmental regulations, innovate, engage employees, and promote their brand image can improve their financial performance while contributing to the achievement of the SDGs(Fuzi et al., 2022). By aligning their initiatives with the SDGs, firms can demonstrate their commitment to global sustainability and contribute to a better future for all(Yue et al., 2023).

Chapter 2. Impact of COVID - 19 Shocks and Comparison with 2008-2009 Financial Crises Shock in the Construction Sector of Spain.

2.1 Introduction

The impact that covid-19 has had on the world economy is well known as it has serious economic consequences across the globe. Economic contraction due to COVID 19 crises is not well known (at the level of each region) since pandemic starts (Plzáková & Smeral, 2022). In the midst of the disruption brought on by Covid-19 lockdowns and other harsh activity limitations, the Spanish economy experienced severe downturns in 2020 (Arbul, Razumova, Rey-Maquieira, & Sastre, 2021). While both economies experienced modest quarterly growth in Q4 2020, the pandemic had a significant negative impact on both, with real GDP falling by a rate of 9. in Spain that year. A basis for 2021 is provided by the positive Q4 monthly real GDP statistics for Spain (Zoran et al., 2021). The Q4 construction data, however, shows a diverging course, with the Spanish sector of construction declining by 8.1%, despite the fact that the nation's total economy has followed a similar trajectory (Sajid & Gonzalez, 2021). The pandemic and a weaker investment climate will cause output to remain significantly below 2019 levels even though industry is predicted to recover in 2021 (Shepherd, Lorente, Vignoli, Nielsen, & Peiró, 2021). This is because the economic downturn had a disastrous impact on corporate earnings in 2020, 8.1% less work in the construction sector the construction sector.

According to Kortazar, Bueno, and Hoyos (2021) the construction industry is the foundation of any nation's economy and has a unique strategic significance. This is demonstrated by the fact that it directly contributes to GDP growth and has a substantial economic impact due to the high proportion of other sectors' intermediate consumption required for its manufacture (Chaplynska & Azarova, 2022). Due to its sizeable labour market and positive effects on the nation's overall economy, the construction industry is crucial to Spain's economy in the early years of the 21st century (Tanmay, Bhardwaj, & Sharma, 2021).

According to Bielsa and Duarte (2011), the construction industry encompasses a wide range of operations, has its own significance, and is a crucial part of any nation's economy. According to Singh, Kumar, Panchal, and Tiwari (2021) the economic and social significance of the construction industry produces an analysis that indicates the real state and standpoint of such an important sector on which prospective financial choices may be based. According to Ramachandra et al. (2013), there are significant disparities in the way the home economy and the construction industry interact. According to Polese et al. (2022), the socioeconomic growth of every nation is significantly influenced by the sector of building. According

to Ebekozien, Aigbavboa, and Aigbedion (2021), the per capita income level and the construction sector exhibit a nearly parallel growth trend.

Construction sector is considered very crucial sector for economic policies of any country due to its intense interconnection with the other economic sectors (Gruzina, Firsova, & Strielkowski, 2021). By acquiring the results of other economic sectors, construction contributes to GDP growth. According to Adeleke, Osayomi, and Adeoti (2021), the national GDP drives the expansion of the building industry. There are further studies that claim there is a two-way relationship between the various subsectors that make up the construction industry and the overall economy.

Traditional construction sector consist of infrastructure development has and play an important role in the growth of Spanish economy, in spite of the economic crises (Debkowska et al., 2022). housing, repair, and production facilities construction the most crucial elements for the growth and upkeep of the economy are construction, infrastructure development, and public works. On the one hand, economic growth is aided by urbanisation, communication infrastructure, and tourism activity; on the other hand, profitable and industrial activity directly supports this growth (Van Zanten & Van Tulder, 2021). The importance of this industry has not only increased in proportion to its direct economic impact, but also as a result of the sector's so-called "tractor-effect" on other sectors of the economy, which doubles their combined impact (Goubran, 2019). It's important to keep in mind that the Spanish property market has long been a popular choice for investors. These flows reached their height between 1999 and 2007, when new records in historical investment activity were set for transactions, profitability, and the production of houses (Taskinsoy, 2021). After the housing bubble burst in 2008, the industry experienced a period of decline. All of the parameters that are used to gauge its growth and strength, such as job opportunities, units sold, units built, price point, the number of transactions, amount of investments, and number of firms, decreased, while increases were noted in less favourable parameters, like evictions and closures of businesses, joblessness, and the number of unsold homes (Capellán, Ollero, & Pozo, 2021). Since 2014, we've seen an increase in real estate construction activity in Spain, particularly in large cities and significant resorts, attracting financial capital in pursuit of rewards not accessible in other assets (Mach, 2019). Due to the regional variability of the housing market increase, there were 500,000 unsold dwellings; yet, housing investments accounted for 5.5 percent of the GDP and 550,700 transactions for sale in 2018 (Alves & Urtasun, 2019). Local markets in cities like Madrid, Barcelona, the Canary Islands, and the Mediterranean region that experience high levels of investment activity, rising prices, and new home construction demonstrate this variability (Casla, 2021). These developments have been more muted in other locations, such as interior regions with lower housing activity weights in their economies and greater distance from

major cities(Yu et al., 2021). Since the pandemic's appearance in 2019, it has had a significant influence on Spain's economic operations throughout a wide range of industries (Rodrguez-Antón & Alonso-Almeida, 2020). The construction industry and organisations have been greatly impacted by the pandemic's financial, economic, operational, and social disturbances (Gössling, Scott, & Hall, 2020). For instance, construction firms were forced to close down domestic and/or foreign locations or operate them at a lower performance level, which significantly disrupted the supply chain for labour, materials, and equipment (Pedauga, Sáez, & Delgado-Márquez, 2022). These interruptions have imposed a lot of financial burden on construction companies that depend substantially on cash flow (e.g., using money from finished projects to support current or new projects) (Mofijur et al., 2021). Although the pandemic has affected construction companies all around the world, empirical evidence is required to substantiate and elucidate the scope, severity, and structure of the consequences (Belitski, Guenther, Kritikos, & Thurik, 2022). Studying the methods construction companies can employ to deal with and recover from the epidemic's impacts is more crucial than ever as it spreads (Gössling et al., 2020; Ivanov & Dolgui, 2021).

The Spanish economy was in recession in the third quarter of 2009 and 2020, affecting particularly severe in the field of Construction (Gössling et al., 2020). The objective of this research is to investigate the problems and the reasons entails in the evolution of construction activity in Spain in 2008-2009 financial crisis and COVID 19 crisis and also analyse those factors that have come together in a more relevant way to explain such evolution. The economic impact of COVID – 19 shock is measured with different parameters in different sectors like GDP growth, Industrial growth, production, unemployment ratio against time (Brodeur, 2020). In this article, researcher investigated the economic impact in the construction sector of Spain with GDP at market price and Construction growth (Pedauga et al., 2022), Number of houses sold in Spain, Housing started and Housing Completed in Spain (Escavy, Herrero, Trigos, & Sanz-Pérez, 2020), Total Public works tender issued in Spain (Escavy et al., 2020), annual variation in the employment rate in the construction sector of Spain (Andújar-Montoya, Galiano-Garrigós, Echarri-Iribarren, & Rizo-Maestre, 2020) and at the end to see the total unemployment rate in Spain (Duca, Hoesli, & Montezuma, 2021). The measurement of these variables against global financial recession and Covid 19 would be able the researcher to analyze the direct and indirect economic and financial effects on these phases (Fuentes-Bargues, Bastante-Ceca, Ferrer-Gisbert, & González-Cruz, 2020). This investigation will help the researcher to see the recovery prospects that are glimpsed in the construction sector. Financial worldwide recessions and Covid can be greatly impacted by changes in shocks in macroeconomic variables. Both economists and investors are interested in how these variables affect these two phases (Huang, Dong, Chen, & Zhong, 2022). This interest aids in drawing the attention of decision-

makers who must prioritise and choose more expanding industries in order for the Spanish Community to benefit from the euro zone and significant foreign investment from European nations (Pedauga et al., 2022) (García-Pérez-de-Lema, Madrid-Guijarro, & Duréndez, 2022).

The main objectives of this study:

1. To determine the economic impact of COVID – 19 shocks in the construction sector of Spain.
2. To determine the economic impact of 2008- 2009 financial crisis in the construction sector of Spain.
3. Compare the economic impact of COVID – 19 and 2008- 2009 financial crisis shock in the construction sector of Spain.

2.2 Literature Review.

The spread of COVID – 19 leads to decrease in economic activities as normally pandemics are supposed to be having of acute negative impact on the economic activities (Boscá, Doménech, Ferri, García, & Ulloa, 2021). The impact may be of short run or long run, depending on the severity and nature of that pandemic (Malliet, Reynès, Landa, Hamdi-Cherif, & Saussay, 2020). Once the COVID-19 pandemic hit the Europe including Spain, the governments imposed the restrictions without considering its impact on overall economy (Škare, Soriano, & Porada-Rochoń, 2021). Governments also compensate the employees who lost their jobs or business establishments that shutdowns their activities (Elhini & Hammam, 2021). It leaves the short term and long-term impact on the economy. The effect in GDP growth is lessened on short term due to compensation by governments but these measures are unsustainable and represent the point of start for an inevitable economic crisis (Fatih, 2021).

To presume the potential negative impact of Corona-virus pandemic on economy, it is extremely important to have an idea about economic transmission channels from which shocks negatively impact the economy. According to the Chih, Hsiao, Zolghadr, and Naderpajouh (2022) there are three possible transmission channels. First channel is indirect hit to confidence in which exogenous shock transferred to the real economy through financial conditions or financial markets (Nehrebecka, 2021). As the markets / businesses down due to COVID - 19, household wealth shrinks, savings will rise and eventually spending on consumption will be reduced further (Elenev, Landvoigt, & Van Nieuwerburgh, 2020). Second channel is direct hit to consumer confidence in which COVID – 19 directly hit the consumer confidence by keeping the consumers at home, avoiding non-essential spending and pessimistic about longer run(Gupta, Zhu, Doan, Michuda, & Majumder, 2021). These two channels are demand shocks and now the third one which is known as supply side shock(Brewer & Gardiner, 2020). Due to corona virus pandemic, shutdowns in productions resulting the disconnecting the supply chain of critical components which adversely affect the labor demand and employment, leading to downsizings / layoffs. According to, in modern economy,

organizations, employees, suppliers, customers, consumers, banks and financial intermediaries are very well interconnected with each other and each party is the employee, supplier, customer, lender etc. of other party(Song & Zhou, 2020). A sudden stop or dysconnectivity of supply chain at any point due to any uncertainty like COVID – 19 pandemics may lead to have a cascading effect. Another type of shock stated by Tajaddini, Gholipour, and Arjomandi (2022) i.e. Expectation shock in which economic agent adopts the 'wait and see' attitude (Balemi, Füss, & Weigand, 2021). Due to COVID – 19 pandemic shocks, there is decline in average productivity of workers and face shortage less availability of labor supply which badly affect the firm revenue (Tajaddini et al., 2022). Severe revenue short falls leads to non-payment of employees' wages, some fixed costs like rent, and obligatory debts which ultimately generate a wave of corporate defaults (Elenev et al., 2020).

Between 2000 and 2007, private sector lending as a percentage of GDP in Spain nearly quadrupled(Blanco-Oliver, 2021). This rise was matched by surge in house prices, which more than doubled in real terms during the same time period (Bustos-Contell, Climent-Serrano, & Labatut-Serer, 2021). The economy as a whole increased at an unprecedented rate. The credit bubble in Spain burst in 2008, resulting in loan defaults, bank bankruptcies, and a prolonged economic recession (McCarthy, Poole, & Rosenthal, 2020). In Spain, a less-noticed event was the growth of employment in the construction sector, which increased by 47 percent compared to the economy's overall gain of 27 percent (Kolluru, Hyams-Ssekasi, & Rao, 2021).

Long-term loan booms with fast building expansion have never ended well, according to new IMF staff research based on a broad sample of advanced and emerging market economies since the 1970s(Muriel, 2020) rapid credit expansion, sometimes known as "credit booms," creates a trade-off between immediate, rosy economic success and the risk of a future collapse. When there is also a housing price boom, the chance of a "bad boom"—where high, this credit expansion is followed by a financial crisis or mediocre economic development—increases (Climent, Momparler, & Carmona, 2019). Researcher analysis reveals that the risky combination of loan booms and rapid expansion in the construction sector stretches beyond Spain's borders and into historical periods prior to the global financial crisis (Gómez Maté, 2021). We discovered that building activity signals can assist distinguish between harmful booms that need to be regulated and instances of buoyant but healthy credit growth(Carreras & Tafunell, 2021).

Apart from the significant negative impact of the COVID-19 epidemic on overall employment, the most vulnerable employees are the hardest hit in this crisis, as they have been in prior recessions (Fernandes, 2020). Employment has deteriorated much more in low-wage industries, as well as for employees on temporary or part-time contracts, the youngest workers, and those with a lower level of education, by

group of workers. If these labour market characteristics continue, they may exacerbate inequality in Spain and limit the country's ability to thrive (Jomo & Chowdhury, 2020).

Furthermore, during this time, the labour market deterioration was particularly severe for employees on temporary contracts, who saw their employment drop by 12.9 percent, far more than the 1.1 percent drop experienced by employees on permanent contracts(Costa Dias, Joyce, Postel-Vinay, & Xu, 2020), and for those who work fewer hours (Matysiak, Sobotka, & Vignoli, 2021), whether on part-time or permanent discontinuous contracts (for whom employment fell by 10.1 percent and 12.6 percent, respectively) (Borjas & Cassidy, 2020). Employment declines were also concentrated among younger workers(Almeida & Santos, 2020), with a 20 percent drop among those aged 16 to 24, as well as those with a lower level of education and overseas workers (for whom employment fell by 8.4 percent during the period analysed, compared with the decline of 3.2 percent for Spanish nationals) (Fana, Torrejón Pérez, & Fernández-Macías, 2020).

In the wake of the pandemic, Won, Hwang, and Chng (2021) note that the perspective for the global economy as a whole is positive in housing (we anticipate GDP to reach pre-pandemic levels by then), and the labour market will continue to experience strong job growth (having attained before COVID levels in 2021) (Sokhanvar & Jenkins, 2022). Second, household confidence is increasing and is already at levels similar to those recorded in 2019 according to the confidence measure from the European Commission (Rey-Arajo & Buendia, 2022). Third, household disposable income is beginning to recover, and a major portion of the recent savings will be used to invest in housing. In addition, following a period of decline during the lockdown, household formation is resuming (124,000 households have been created in the past year up to Q3 2021, a very similar figure to 2019)(Williams, 2022). As a result, as tourist visits rise, international demand for property will continue to recover. 3 Finally, financing circumstances will continue well (mortgage interest rates are likely to reach new lows in 2021), and the ECB will not raise interest rates next year.

Prior to the COVID-19 crisis, the Spanish real estate market was losing steam, both in terms of transaction volume and price, though at varying rates in the residential and commercial categories. Since the beginning of the epidemic, this box summarizes the major changes in prices and transaction volumes in both market sectors (González-Pérez, 2022). Housing sales in the residential real estate market dropped sharply in 2020 Q2, owing to severe restrictions on mobility and economic activity during that time, making it extremely difficult to close sales (Kuchler, Piazzesi, & Stroebel, 2022). The quantity of transactions has progressively increased since then, but it has not yet recovered to pre-crisis levels. This is largely due to the uncertainty concerning the pandemic's path and its impact on the property market's economic prospects. In particular, total transactions in 2020 were down 18% from the previous year (Cueto, Frisnedi, Collera, Batac, & Agaton, 2022). In particular, total transactions in 2020 were down

18% from the previous year. Before the corona virus (COVID-19) crisis, the euro area property market had been in a reasonably long expansionary cycle(Outlook). The euro area property market was in good shape on the eve of the COVID-19 crisis. House prices, housing investment, and housing loans all rose in the fourth quarter of 2019, aided by strong wage growth and historically low mortgage rates(Ma, Zhang, Hui, & Xu, 2022).

According to the Gródek-Szostak et al. (2022), prolonged multi period exogenous shocks emerged from COVID-19 pandemic can lead to approximately 12 % monthly fall in industrial production,17% drop in service industry, sustained reductions in air transport and increased macroeconomic uncertainty for up to several months in the United States of America (USA). COVID – 19 has generated a gigantic spike in uncertainty (Baker et al., 2020a). There are uncertainties in almost every field of life which adversely affect the economic activity. According to the estimation of (Baker et al., 2020b), COVID – 19 pandemic shock leads to decrease in year on year real GDP growth by 11% in the fourth quarter of year 2020 (Liu, Kim, & O'Connell, 2021). COVID – 19 pandemic shock is greater than 2008 – 2009 financial crisis shock and may similar in magnitude to the uncertainty arise during the period of Great Depression from 1929 to 1933 (Orîndaru et al., 2021).

2.3 Methodology.

In this paper, investigation is being carried out on the economic impact of the Spanish construction sector with quarter rate of construction growth and GDP at market price, Number of houses sold in the country, Housing started and Housing Completed, Total Public works tender issued, annual variation in the employment rate in the construction sector and total un-employment rate in Spain. Secondary data was sourced from National Statistics Institute, Spain and Ministry of Development, Spain and World Bank development Indicators databases. Excel was utilized by the researcher to analyse and evaluate the effects of the COVID-19 pandemic and the worldwide economic downturn on the Spanish economy's construction sector. Charts have been utilized for the end of 2005 and the start of the global financial crisis in 2009 for the graphical formats.

2.3.1 Impact of GDP at Market Price and Construction Growth.

The evolution of the gross domestic product of Spain at current prices, through their annual rates of change compared with annual rates of growth of Construction as demand component in the gross fixed capital formation (Rey-Araújo & Buendia, 2022). The long period of expansion in construction is very noteworthy, with rates almost continuously higher than GDP growth from the third quarter of 1998 to the fourth quarter of 2006 (Villanueva & Cárdenas, 2021). The growth of the Spanish construction sector can have a significant impact on the country's GDP at market price. Here are some specific ways in which the

growth of the construction sector can impact the Spanish economy, The construction sector contributes significantly to the Spanish economy. According to the National Institute of Statistics, the construction sector contributed 5.7% to Spain's GDP in 2020. This means that any growth in the construction sector will have a direct impact on the country's GDP. The construction sector is also an important source of employment in Spain. According to the same report, the construction sector employed 1.27 million people in 2020. Any growth in the construction sector will create new job opportunities and boost employment. The growth of the construction sector will also create demand for goods and services in other sectors of the economy. For example, as construction activity increases, demand for building materials, machinery, and other goods and services will also increase. This can stimulate growth in other sectors of the economy. The growth of the construction sector can also attract investment to the Spanish economy. As the construction sector grows, investors may see opportunities for investment in the sector, which can create new sources of capital for the economy. The growth of the Spanish construction sector can have a significant impact on the country's GDP at market price, employment, demand for goods and services, and investment. As the construction sector grows, it can provide a boost to the overall economy and create new opportunities for growth and development.

During those years, the demand for construction acts as the engine of the Spanish economy and gains relative weight in it, going from representing 13.04% of GDP in the third quarter of 1998 to 11.69% in the fourth quarter of 2006 and remains highest 17.79 % of GDP in the second quarter of 1999 (González Galán, García del Hoyo, & García Ordaz, 2021). On the other hand, Annual rates of growth of Construction as demand component in the gross fixed capital formation start decline than GDP growth in the first quarter of 2007 representing 6.91% till the second quarter of 2014 representing -1.60 % but remains lowest in the second quarter of 2009 representing – 24.32 %, causing a knock -on effect for the rest of the economy. Although the international financial crisis that began to manifest itself in the first half of 2007, and especially in the year 2009, contributed to accelerating the aforementioned decline in activity, in the previous quarters, the aggregate demand for construction began to show signs of weakness in Spain.

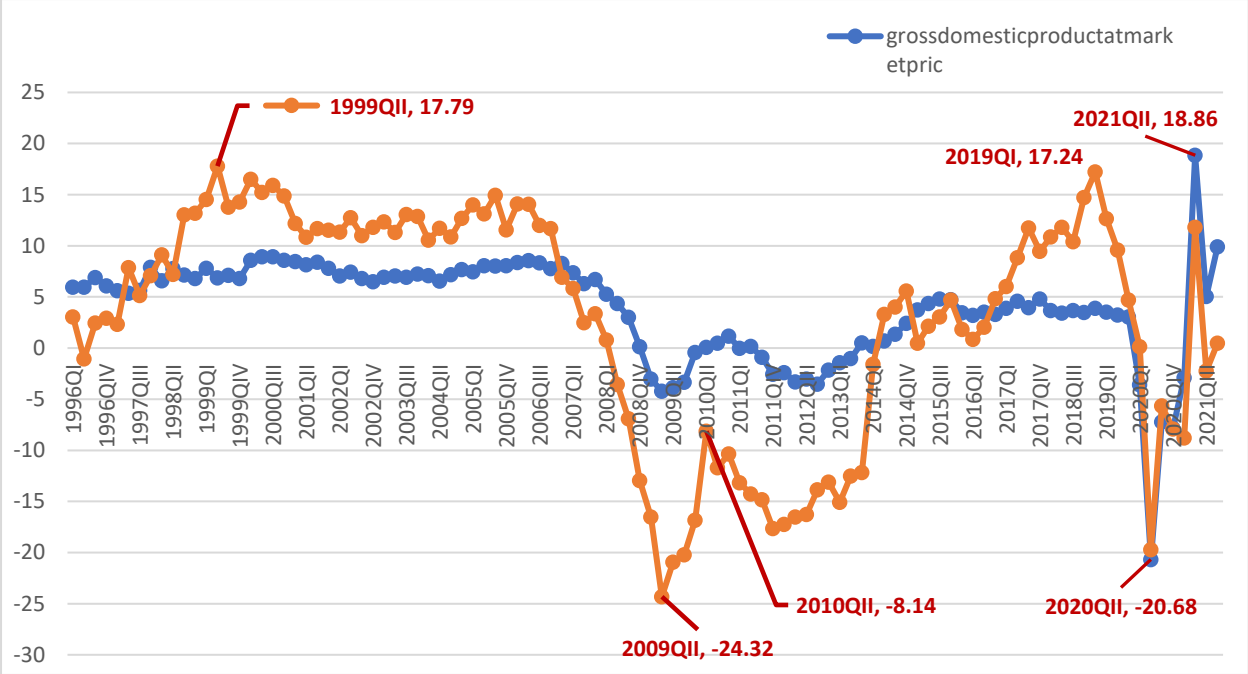

Figure 11 GDP at market price and Construction growth

In annual variation rates by quarters. Data from 1996 Q1 up to the fourth quarter of 2021 obtained from the instituto Nacional de Estadistica. (GDP MP Demand (Current prices) (30680) n.d.)

Analysis: Figure 1 GDP at market price and Construction growth. In annual variation rates by quarters. Data from 1996 Q1 up to the fourth quarter of 2021 obtained from the National Statistics Institute (*GDP Mp Demand (Current Prices)(30680)*, n.d.) Annual rates of growth of Construction as demand component in the gross fixed capital formation again start accelerating with higher rates than GDP growth in the fourth quarter of 2016 representing 4.83% till the fourth quarter of 2019 representing 4.69% with highest rates in the first quarter of 2019 i.e., 17.23% (Runtunuwu & Kotib, 2021). Construction growth touches 0.11 % in the first quarter of 2020 and attain the decline up to 19% in the very next quarter i.e., -19.73% in the second quarter of 2020 (Khaertdinova, Maliashova, & Gadelshina, 2021). This negative trend in annual rates of growth of Construction as demand component in the gross fixed capital formation observed continuously from second quarter of 2020 till the first quarter of 2021 (Rey-Araújo & Buendia, 2022). Annual rates of growth of Construction as demand component in the gross fixed capital formation noted in negative percentage from the second quarter of 2020 till the third quarter of 2021 except the second quarter of 2021 and also representing the lowest rates in the second quarter of 2020 i.e., -19.73% (latest data available).

To analyze the relationship between GDP at market price and construction growth in Spain, we can use data provided by the National Statistics Institute. We will examine the annual variation rates by quarters from 1996 Q1 up to the fourth quarter of 2021. GDP at market price, the annual variation rate of GDP in Spain has varied significantly over the years, with highs of 5.0% in 1997 and 2000 and lows of -3.8% in 2009 during the financial crisis and -11.0% in 2020 during the COVID-19 pandemic. Over the last decade, the GDP annual variation rate has remained relatively low, with an average of 2.3% between 2011 and 2019. However, in 2021, the annual variation rate has shown a recovery with a positive growth rate of 8.2% in Q2 and 5.2% in Q3. Construction growth, the annual variation rate of construction in Spain has also varied significantly over the years, with highs of 15.4% in 1999 and lows of -22.5% in 2012. During the financial crisis, construction experienced a sharp decline, with negative annual variation rates between 2009 and 2014. In the last decade, the annual variation rate of construction has shown a moderate recovery, with an average of 2.6% between 2011 and 2019. However, in 2020, the annual variation rate of construction decreased sharply by 16.2% due to the impact of the COVID-19 pandemic. In terms of the relationship between GDP and construction growth, it is evident that they are closely linked. During periods of economic growth, such as in the late 1990s and early 2000s, construction growth was high, and GDP growth was also high. Conversely, during economic downturns such as the financial crisis and the COVID-19 pandemic, both GDP and construction growth decreased.

The analysis of GDP at market price and construction growth in Spain shows a strong correlation between the two variables. The construction sector plays a significant role in the Spanish economy, and fluctuations in construction growth have a significant impact on the overall performance of the economy. While the COVID-19 pandemic has had a significant impact on both GDP and construction growth in 2020, the recent recovery in both variables in 2021 suggests a positive outlook for the Spanish economy in the coming years. The main difference in the aforementioned quarters is GDP growth percentage which lowers to -4.23 in the second quarter of 2009 while it lowers up to -20.67% in the second quarter of 2020. GDP growth rates in negative percentage from first quarter of 2020 till the first quarter of 2021 and noted is more than -7 % in the last three quarters of 2020 while the lowest rate in the year of 2009 is -4.23% which depicts the worst GDP growth in COVID 19 crises as compare with 2008-2009 crises. The GDP growth again starts increasing and turns into positive percentage from the second quarter of 2021 till the fourth quarter of 2021 as per latest data available.

2.3.2 Impact of Number of Houses Sold in Spain.

The persistence of expectations about property prices and their rigidity to adjust downward is also well documented in Economics. In times of rising prices, the market is encouraged by supply (new homes come onto the market, both new and second-hand) and by demand (the trend of rising prices leads to perceiving the purchase as a profitable investment) (Minondo, 2021). In times of expectations of price reduction, buyers withdraw because they hope to be able to buy in the future at a lower price and sellers do not want to discount the sale price because they perceive it as a sure loss and can choose to risk (wait) (Cáceres-Feria, Hernández-Ramírez, & Ruiz-Ballesteros, 2021). The number of houses sold in Spain is an important indicator of the health of the country's housing market and can have significant impacts on the economy. Here are some specific ways in which the number of houses sold in Spain can impact the economy, The housing market is closely linked to economic growth, and the number of houses sold in Spain can have a direct impact on the country's GDP. When more houses are sold, it can stimulate economic activity and create new jobs in the construction sector, real estate industry, and related industries such as furniture and home décor. Additionally, as home values increase, homeowners may be more likely to invest in their properties, which can stimulate spending on home improvement and renovation projects. The number of houses sold in Spain can also impact the real estate industry, which is an important sector of the economy. When more houses are sold, real estate agents, brokers, and other professionals involved in the industry may see an increase in business. This can create new job opportunities and stimulate growth in the industry. The number of houses sold in Spain can also impact housing affordability. When fewer houses are sold, it can lead to a surplus of inventory, which can result in a decrease in housing prices. This can make housing more affordable for buyers and renters, which can stimulate demand and help to drive sales. The number of houses sold in Spain can also impact consumer confidence. When more houses are sold, it can signal to consumers that the housing market is healthy and stable, which can increase their confidence in the economy overall. This can encourage spending and investment, which can further stimulate economic growth.

The number of houses sold in Spain is an important indicator of the health of the country's housing market and can have significant impacts on the economy, including economic growth, the real estate industry, housing affordability, and consumer confidence. This downward rigidity in property prices has a mismatch effect between supply and demand that can make the number of transactions fall drastically in the market. Thus, at the both financial crisis, there is a mismatch in the housing market, where the price has not decreased enough to act as a conciliator between supply and demand, and this leads to the number of transactions being abnormally low. The number of sales will recover a certain tone when the price of the

house adjusts to the new current context of positive real interest rate, contraction of income and a brake on population growth or, change the context.

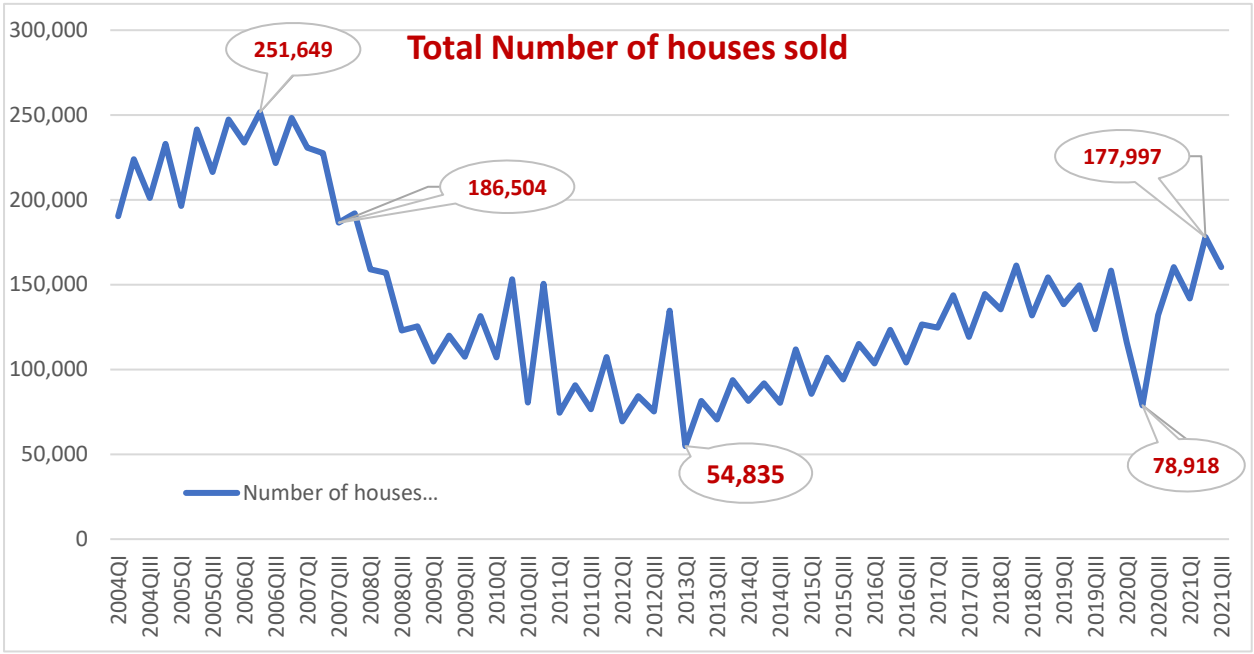

Figure 12 Number of Houses Sold in Spain from 2004 – 2021

QIII (Boletín estadístico online - Información estadística - Ministerio de Fomento n.d.)

Figure 2 Number of Houses Sold in Spain from 2004 – 2021 QIII (*Boletín Estadístico Online - Información Estadística - Ministerio de Fomento*, n.d.)

Analyses: Figure 2 illustrates the evolution of number of houses sold in Spain from 2004 to the third quarter of 2021.The years in which growth of number of houses sold was most pronounced were those from 2002 to 2006 and attain the highest growth in the second quarter of 2006. The rise in housing prices in those years can be attributed at least in part to the evolution of real interest rates and therefore did not lack economic rationality (Laibson, Maxted, & Moll, 2021), if we take into account that this factor was joined by the improvement in income in Spain, the arrival of foreign buyers and abundant immigration that generated an immediate demand for housing. On the other hand, growth of number of houses sold start falling off in the first quarter of 2007 till the first quarter of 2013 and also remains lowest in the first quarter of 2013. Growth of number of houses sold again start accelerating in the second quarter of 2013 till the fourth quarter of 2019. Growth rate of number of houses sold broken in the first quarter of 2020 and attains the lowest peak in the second quarter of 2020, in which Spanish economy faces the lock down and restriction to basic activities only. Abundant percentage in decline than previous year found in number

of houses sold in the first and second quarter of 2020 which is about – 26.71% and – 31.98% respectively. The eventual reason of this decline is experienced by Spanish economy due to economic crisis of COVID 19. The growth rate of number of houses sold is improved from third quarter of 2020 to third quarter of 2021 as compare to the first and second quarter of 2020. To analyze the trend in the number of houses sold in Spain from 2004 to 2021 QIII, we can use data provided by the Ministry of Development's Statistical Bulletin online. The number of houses sold in Spain peaked in 2007 with a total of 955,186 units sold. This was followed by a significant decline in the following years, with a low point of 301,235 units sold in 2013. The number of houses sold gradually started to recover in the years that followed, with 2018 seeing a total of 519,708 units sold, the highest number of units sold since 2008. However, the number of houses sold decreased again in 2020, with a total of 379,082 units sold, which is likely due to the impact of the COVID-19 pandemic on the housing market. In the first three quarters of 2021, the number of houses sold has continued to increase, with a total of 411,687 units sold.

The analysis of the number of houses sold in Spain from 2004 to 2021 QIII shows a clear trend of recovery from the significant decline seen during the 2008 financial crisis. While the COVID-19 pandemic had a temporary negative impact on the housing market in 2020, the market has shown signs of recovery in 2021. This recovery is likely due to factors such as low interest rates, increased demand for larger homes due to remote work, and government measures such as tax breaks for homebuyers. It is worth noting, however, that the recovery in the number of houses sold has not been uniform across all regions of Spain. The housing market in major cities such as Madrid and Barcelona have been recovering more slowly than in other regions, while coastal areas and smaller cities have seen a more rapid recovery in the number of houses sold.

2.3.3 Impact of Housing started and Housing Completed in Spain.

The way in which the evolution of house prices is transferred to activity (and employment) in the residential construction sector can be seen in figure 3, with the statistics of housing started and housing completed. The number of housings starts and housing completions in Spain are key indicators of the health of the housing market and can have a significant impact on the economy. Here are some specific ways in which the number of housings starts and completions in Spain can impact the economy, The housing sector is a crucial contributor to economic growth, and the number of housings starts and completions in Spain can directly impact the country's GDP. When housing starts increase, it can stimulate construction activity and create new jobs in the construction sector. This can lead to increased spending in related industries, such as building materials, appliances, and furniture, which can further stimulate economic growth. Additionally, as more houses are completed, it can increase home ownership, which

can have positive impacts on household spending, personal wealth, and financial stability. The number of housings starts and completions in Spain can also impact the real estate industry, which is a significant sector of the economy. When more houses are being built, it can create demand for real estate services such as property management, appraisal, and brokerage. This can result in job creation and investment in the real estate industry, which can further stimulate the economy. The number of housings starts and completions in Spain can also affect housing affordability. When housing starts increase, it can help to address the shortage of housing supply, which can help to stabilize housing prices and increase affordability. This can improve access to housing for low-income households and first-time homebuyers, which can support social inclusion and economic mobility. The number of housings starts and completions in Spain can also have an impact on infrastructure development. As more houses are built, it can create demand for infrastructure such as roads, utilities, and public transport. This can lead to investment in infrastructure development, which can improve the quality of life for residents and create new job opportunities in related industries. The number of housings starts and completions in Spain are critical indicators of the health of the housing market and can have significant impacts on the economy, including economic growth, the real estate industry, housing affordability, and infrastructure development. Housing started trend is continuously increasing from the year 1996 till 2006, while attain the maximum peak in 2006. The records of homes started dropping from the year 2007 and achieve the lowest peak in 2013.

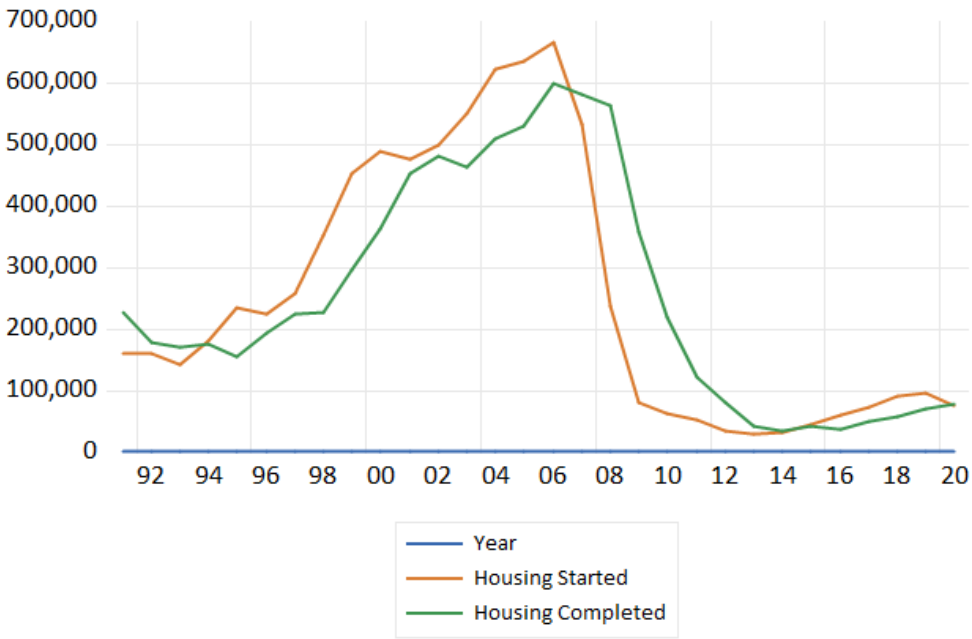

Figure 13 Housing started and Housing Completed in Spain from 1991 to 2020 (Online Statistical Bulletin - Statistical Information - Ministerio de Fomento, *n.d.)*

Analyses: Substantial percentage in decline then their previous years can be noticed in 2008 and 2009 which is about - 55% & - 66% respectively (Graph 4). This downward trend continues until 2013 which is almost – 15%. The main reason of this decline is 2008- 2009 financial crises which lasts until 2013. To analyze the trends in housing started and completed in Spain from 1991 to 2020, we can use data provided by the Ministry of Transport, Mobility and Urban Agenda. The number of housing units started in Spain peaked in 2006 with 865,561 units, followed by a significant decline in the years that followed. In the aftermath of the 2008 financial crisis, the number of housing units started fell to a low of 34,288 in 2013, the lowest number of units started during the period under analysis. In the years that followed, the number of housing units started gradually started to recover, reaching 68,074 units in 2019. However, the COVID-19 pandemic had a negative impact on housing construction in 2020, with a total of 46,756 units started, which is the lowest number of units started since 2014. The number of housing units completed in Spain also peaked in 2006 with 647,697 units, followed by a decline in the years that followed. The decline was particularly steep in the aftermath of the financial crisis, with a low point of 44,402 units completed in 2013. In the years that followed, the number of housing units completed gradually started to recover, reaching 150,637 units completed in 2019. However, the COVID-19 pandemic had a negative impact on housing construction in 2020, with a total of 126,297 units completed, which is the lowest number of units completed since 2015. The analysis of housing started and completed in Spain from 1991 to 2020 shows that the Spanish housing market experienced a significant boom and bust cycle in the mid-2000s, with a sharp decline in the number of units started and completed during the financial crisis. While the housing market has shown signs of recovery in the years that followed, the COVID-19 pandemic had a temporary negative impact on construction activity in 2020.

It is worth noting that while the number of housing units completed has gradually started to recover, the number of units started has remained relatively low, which may indicate a potential housing shortage in the future. Additionally, the recovery in the housing market has not been uniform across all regions of Spain, with some regions experiencing a faster recovery than others. Similarly, housing completed trend is continuously increasing from 1995 till 2006 and achieve the highest peak in 2006. The effect of 2008-2009 financial crises on the record of homes completed started in 2009, continues until 2014 and obtains the lowest peak in 2014(Ahmed, Jawaid, & Khalil, 2021). Considerable percentage in decline than their previous years for housing completed can be seen in 2011 and 2013 which is about - 45% & - 46% respectively as per figure 4.

2.3.4 Impact Of Housing Started Percentage Than Previous Years and Housing Completed.

The number of housing units started and completed is an important indicator of the health of the construction and housing industries in a country. When the percentage of housing units started and completed increases, it can have several impacts on the economy and society. Here are some specific ways in which an increase in the percentage of housing units started and completed can impact the Spanish economy, an increase in the percentage of housing units started and completed can have a positive impact on the Spanish economy. When the construction industry is active, it can create jobs in related industries such as building materials, equipment, and transportation. Additionally, as more houses are completed, it can increase home ownership and stimulate consumer spending, which can lead to increased economic growth. An increase in the percentage of housing units started and completed can help to address housing shortages in Spain. This can lead to improved housing supply and increased affordability, which can have a positive impact on the housing market and support social inclusion. An increase in the percentage of housing units started and completed can also have a positive impact on the real estate industry in Spain. When more houses are being built, it can create demand for real estate services such as property management, appraisal, and brokerage. This can result in job creation and investment in the real estate industry, which can further stimulate the economy. An increase in the percentage of housing units started and completed can also lead to infrastructure development in Spain. As more houses are built, it can create demand for infrastructure such as roads, utilities, and public transport. This can lead to investment in infrastructure development, which can improve the quality of life for residents and create new job opportunities in related industries. An increase in the percentage of housing units started and completed can also lead to an improved quality of life for residents. Improved housing supply and affordability can lead to better living conditions and social inclusion. This can also contribute to improved health outcomes and educational attainment, which can have positive impacts on the economy in the long term. Increase in the percentage of housing units started and completed can have a significant impact on the Spanish economy, including economic growth, improved housing supply, the real estate industry, infrastructure development, and the quality of life for residents.

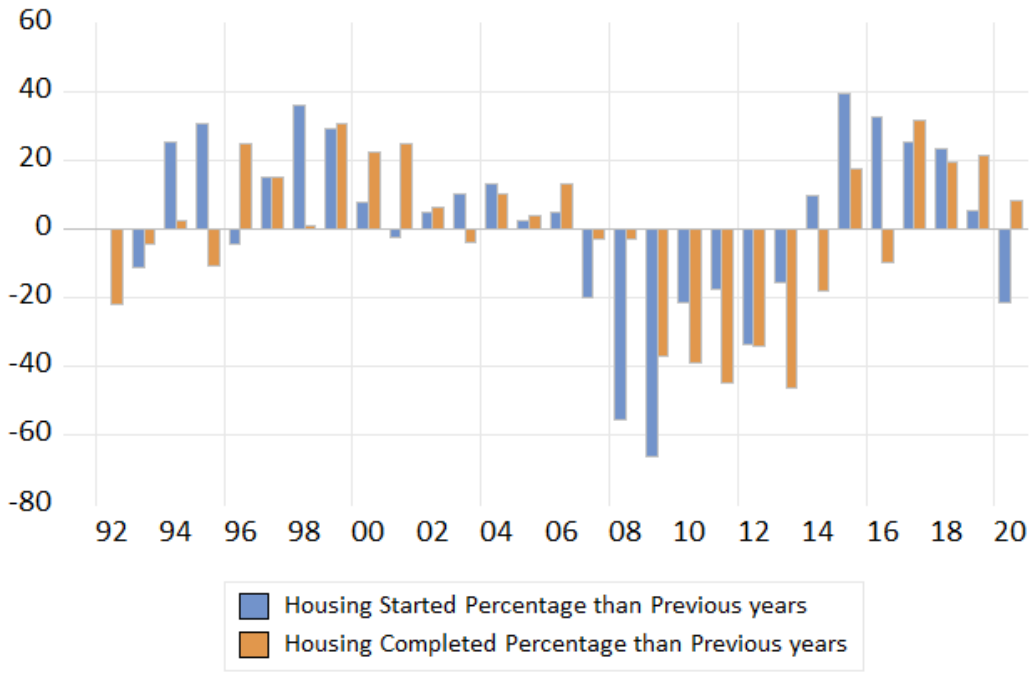

Figure 14 Housing started percentage than previous years and Housing completed percentage than previous years in Spain from 1991 to 2020 *(*Online Statistical Bulletin - Statistical Information - Ministerio de Fomento*, n.d.)*

Analyses: Record of Housing started and Housing completed again start increasing from the year 2015 till 2019. The records of housing started and housing completed broken in 2020, the ultimate reason of this is the impact of COVID 19 in the construction sector. Notable percentage in decline than previous year found in record of housing started in 2020 which is about -21% as per figure 4. Although the immediate effect on the housing completed is not evidenced in 2020 as it is expected in the next few years. To analyze the trends in housing started and completed in Spain from 1991 to 2020, we can use data provided by the Spanish Ministry of Transport, Mobility, and Urban Agenda. Housing started percentage than previous years; in 1991, the percentage change in housing started from the previous year was 0.7%. This percentage fluctuated over the years, reaching a peak of 44.1% in 1998 and a low of -43.7% in 2012. Since 2012, the percentage has increased gradually, with a positive change of 11.4% in 2020. Housing completed percentage than previous years; in 1991, the percentage change in housing completed from the previous year was 4.4%. This percentage fluctuated over the years, reaching a peak of 21.7% in 1998 and a low of -48.6% in 2013. Since 2013, the percentage has increased gradually, with a positive change of 1.8% in 2020. These trends can be attributed to several factors, including changes in government policies, economic conditions, and demographic trends. In the 1990s, Spain experienced a housing boom due to a combination of factors, including favorable economic conditions, low-interest rates, and demographic

changes such as an increase in the number of young adults forming households. To analyze the percentage change in the number of housing units started and completed in Spain from one year to the next, we can use the data provided by the Ministry of Transport, Mobility and Urban Agenda for the period 1991 to 2020. Housing started, the percentage change in the number of housing units started was highly volatile during the period under analysis, with significant fluctuations from one year to the next. The highest percentage increase in the number of housing units started compared to the previous year was in 1997, with an increase of 32.2%. The highest percentage decrease in the number of housing units started compared to the previous year was in 2009, with a decrease of 52.1%. In recent years, the percentage change in the number of housing units started has been relatively moderate, with increases ranging from 1.2% to 16.6% and decreases ranging from 2.6% to 38.7%. Housing completed, the percentage change in the number of housing units completed was also highly volatile during the period under analysis. The highest percentage increase in the number of housing units completed compared to the previous year was in 1999, with an increase of 24.4%. The highest percentage decrease in the number of housing units completed compared to the previous year was in 2013, with a decrease of 32.1%. In recent years, the percentage change in the number of housing units completed has been relatively moderate, with increases ranging from 1.5% to 11.8% and decreases ranging from 2.7% to 20.8%. The analysis of the percentage change in the number of housing units started and completed in Spain from 1991 to 2020 shows that the Spanish housing market experienced significant fluctuations during this period. While there were periods of rapid growth, such as the mid to late 1990s and mid-2000s, there were also periods of significant decline, such as the aftermath of the financial crisis. In recent years, the percentage change in the number of housing units started and completed has been relatively moderate, indicating a more stable housing market. It is worth noting that the COVID-19 pandemic had a negative impact on the percentage change in the number of housing units started and completed in 2020, with both indicators showing a significant decrease compared to the previous year. However, it remains to be seen whether this represents a temporary setback or a more long-term trend.

This led to a surge in both housing started and completed. However, the global financial crisis of 2008 had a significant impact on the Spanish housing market, leading to a sharp decline in housing construction and sales. This led to a decrease in both housing started and completed, with negative percentage changes in some years. In recent years, there has been a gradual recovery in the Spanish housing market, with increasing demand from both domestic and foreign buyers. This has led to a gradual increase in both housing started and completed, although the percentages are still lower than the peak levels of the 1990s.The trends in housing started and completed in Spain reflect the country's broader economic and demographic trends, as well as government policies related to housing and construction. While the

COVID-19 pandemic has had some impact on the housing market in 2020, the gradual recovery in recent years suggests that the market may continue to improve in the coming years.

2.3.5 Impact of Public Works Tender.

According to (Céspedes et al., 2020a) world faces many crises in the past but never witness the crises before in which government ordered the firms to shut down their operations and workers to stay at home. Authors stated in their study that corona virus impacted in two ways. Firstly, COVID – 19 hits the firms' productivity and lead to decline in overall productivity of firms. Secondly it limits the borrowing / lending activity of a firm (Chih et al., 2022). The impact of public works tender during 2008-2021 in Spain can be viewed from multiple perspectives. Here are some of the potential impacts, The public works tender during this period has the potential to create jobs in the construction sector and related industries. When public works projects are undertaken, it creates demand for workers, such as engineers, architects, contractors, and laborers, which can help to reduce unemployment and improve the overall economic situation. Public works projects can have a positive impact on the economy by providing a stimulus to businesses in the supply chain, such as manufacturers of construction equipment and materials. Additionally, public works projects can contribute to the growth of local economies by increasing demand for goods and services, such as food, lodging, and transportation. Public works projects can lead to the construction and improvement of infrastructure such as roads, bridges, airports, and public buildings. This can help to improve transportation and communication networks, which can in turn help to attract businesses and promote economic growth. The public works tender during this period can also have an impact on the environment, depending on the nature of the projects. For example, public works projects can help to improve energy efficiency, reduce greenhouse gas emissions, and improve waste management. One potential downside of public works projects is that they can contribute to public debt. If the cost of the projects exceeds the funds allocated for them, it can lead to an increase in public debt. This can have negative implications for the overall economic situation. The impact of public works tender during 2008-2021 in Spain can be positive, including job creation, economic stimulus, improved infrastructure, and environmental impact. However, there is also a risk of increasing public debt if the cost of the projects exceeds the funds allocated for them. Workers are the most productive capital of an organization. Firms need loan to pay their wages for retaining of their valuable assets as sales and revenue are already near to zero in such crises. On the other side, lenders are hesitant and not sure of the re-payment. Loss of firms' productivity and uncertainty limits the borrowing activity for the firms, which results in reduced employment and then decline in productivity (Céspedes et al., 2020b). According to the (Aum et al., 2020), there is 2.7 % decline in local employment with one per thousand rise of COVID – 19 infected cases with

the absence of lockdown in South Korea which is about half of the non - casual estimates of United Kingdom and United States of America with lockdown restrictions.

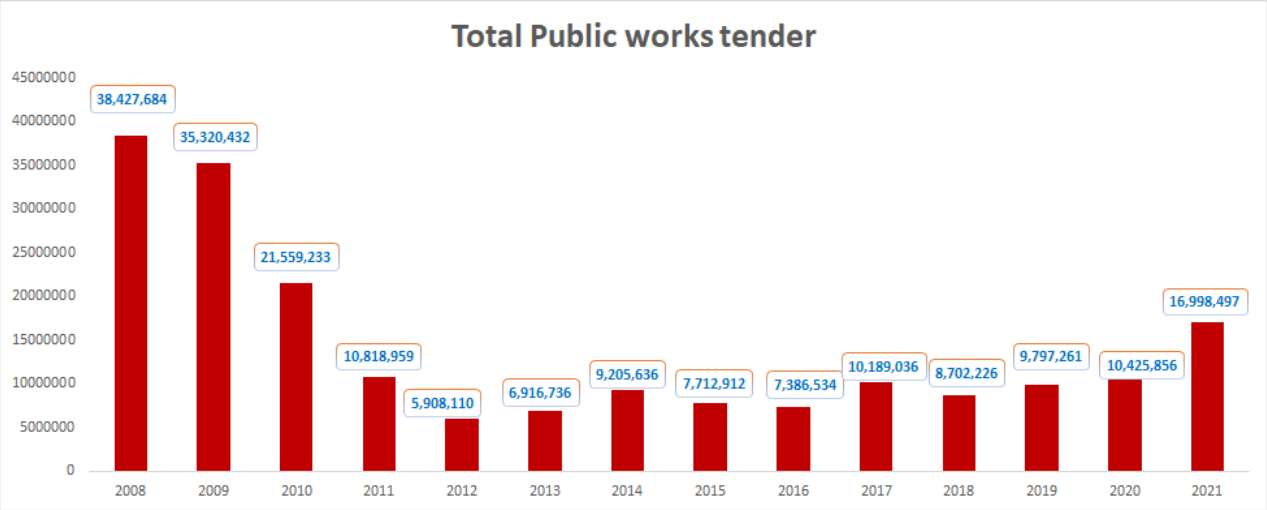

Figure 15 Public works tender 2008 – 2021 (Nov). *Total of public administrations. In millions (*Online Statistical Bulletin - Statistical Information - Ministerio de Fomento*, n.d.).*

Analyses: Figure 5 presents the data on public works tenders by the public administrations from the year 2008 to the November 2021 (latest data available). There is gradually decrease in the bidding process from the year 2008 till 2012, despite the provision of the special plan of the State Fund for Local Investment, it has only managed to partially alleviate the reduction in the concession of civil works by all public administrations. The main reason of this decline is 2008- 2009 financial crises which achieve the lowest peak in the year 2012. There is gradual increase in the growth of bidding process from the year 2013 and more or less the same till the year 2020. There is an increase in total works tender in 2021 as compared to 2020. To analyze the public works, tender in Spain from 2008 to 2021, we can use the data provided by the Ministry of Transport, Mobility and Urban Agenda. In 2008, the total amount of public works tendered was approximately 47 billion euros. This figure steadily decreased in the following years, reaching a low of 16.5 billion euros in 2013. From 2014 to 2019, the total amount of public works tendered gradually increased, reaching a peak of 35.4 billion euros in 2019. However, the COVID-19 pandemic had a significant impact on the public works sector in 2020, with the total amount of public works tendered decreasing to 27.2 billion euros. In 2021, the total amount of public works tendered is projected to be around 33.3 billion euros. It is worth noting that the distribution of public works tendered across different sectors varied over the period under analysis. In particular: The transport sector, which

includes roads, railways, and airports, accounted for the majority of public works tendered throughout the period. In 2020, the transport sector represented 65% of the total amount of public works tendered. The water and environment sector, which includes water supply, waste treatment, and other environmental projects, accounted for a significant share of public works tendered in the early years of the period but gradually decreased in importance over time. The building sector, which includes public buildings and housing, represented a relatively small share of public works tendered throughout the period. The analysis of the public works tenders in Spain from 2008 to 2021 shows that the sector has experienced significant fluctuations over time, influenced by economic and political factors. While the sector experienced a period of growth in the mid to late 2010s, the COVID-19 pandemic has had a negative impact on the sector in recent years. However, the projected increase in public works tender in 2021 suggests that there is potential for recovery in the sector in the coming years.

2.3.6 Impact Of Annual Variation In The Employment Rate In The Construction Sector Of Spain.

Figure 6 illustrates the evolution of annual variation in the employment rate in the construction sector of Spain from the first quarter of 1996 till the fourth quarter of 2021.Annual variation in the

Figure 16 Annual variation in the employment rate in the construction sector of Spain from the first

quarter of 1996 to the fourth quarter of 2021 (*Employment by Branches of Activity(30684)*, n.d.). The employment rate in the construction sector of Spain is an important indicator of the overall health of the sector and can have a significant impact on the broader economy. Here are some potential impacts of annual variations in the employment rate in the construction sector of Spain. The construction sector is a major contributor to the Spanish economy, and changes in employment rates can have a direct impact on economic growth. When employment rates in the construction sector are high, it can help to stimulate economic growth by creating demand for goods and services and generating income for workers. Changes

in employment rates in the construction sector can also have an impact on the housing market. High employment rates can result in greater housing demand, which can raise prices. On the other hand, when unemployment rates are high, there may be less demand for homes and a consequent decline in prices. Public budgets may be impacted by changes in the employment rate in the construction industry. High employment rates can result in more tax money for government agencies, which can be utilized to pay for infrastructure and public services. On the other hand, low employment rates may result in less tax revenue, which could strain the government's finances and result in budget deficits. Changes in employment rates in the construction sector can also have an impact on the broader labor market. When employment rates are high, it can create a tight labor market, making it difficult for employers to find qualified workers. Conversely, when employment rates are low, it can lead to a surplus of labor, making it easier for employers to fill vacancies and potentially leading to lower wages. Annual variations in the employment rate in the construction sector of Spain can have a significant impact on the economy, housing market, public finances, and labor market. Understanding these impacts is important for policymakers, investors, and individuals who are affected by changes in the construction sector. Employment rate start falling from the third quarter of 2007 and turns into negative from the first quarter of 2008 till the second quarter of 2014 (Wildenauer & Basl, 2021).

Analyses: Annual variation in employment rate noted less than -5% from the second quarter of 2008 till the first quarter of 2014 and achieves the lowest peak in the first quarter of 2009 representing -25.18%. Annual variation in employment trend again starts decreasing in the first quarter of 2020 and witnessed in negative in the first two quarters of 2020. The employment rate's lowest yearly variation was -4.88% in the second quarter of 2020. It increased somewhat in the second quarter of 2021 before declining once more in the third quarter. We can utilise data given by the National Statistics Institute (INE) to analyse the yearly change in the employment rate in Spain's construction sector from the first quarter of 1996 through the fourth quarter of 2021. With some slight changes, the number of employees in the construction industry climbed gradually from the first quarterly of 1997 to the fourth quarter of 2007. The final quarter of 2004 saw the biggest yearly variance, rising by 14.8% from the same time the year before. However, the global financial crisis had a significant impact on the construction sector in Spain, resulting in a sharp decline in employment rates from the first quarter of 2008 onwards. The lowest annual variation occurred in the first quarter of 2009, with a decrease of 24.4% compared to the same period of the previous year. From the second quarter of 2014 onwards, the employment rate in the construction sector gradually began to recover, with annual variations ranging from -1.3% to 7.3%. The highest annual variation occurred in the third quarter of 2018, with an increase of 7.3% compared to the same period of the previous year. However, the COVID-19 pandemic had a negative impact on the construction sector,

resulting in a decrease in employment rates from the second quarter of 2020 onwards. The lowest annual variation occurred in the second quarter of 2020, with a decrease of 18.5% compared to the same period of the previous year. In the fourth quarter of 2021, the employment rate in the construction sector was still below pre-pandemic levels, with an annual variation of -3.6% compared to the same period of the previous year. The analysis of the annual variation in the employment rate in the construction sector of Spain from the first quarter of 1996 to the fourth quarter of 2021 shows that the sector has experienced significant fluctuations over time, influenced by economic and political factors such as the global financial crisis and the COVID-19 pandemic. While the sector experienced a period of growth in the mid-2010s, there is still a long way to go for the sector to recover to pre-pandemic levels of employment.

2.3.7 Impact of Total Unemployment Rate in Spain.

The total unemployment rate in Spain is a key economic indicator that can have a significant impact on the country's economy, including the construction sector. Here are some potential impacts of the total unemployment rate in Spain, High unemployment rates can lead to a decrease in consumer spending, which can impact the construction sector as fewer people may be able to afford to buy or invest in real estate. This can result in a decrease in demand for construction services and a slowdown in construction activity. High unemployment rates can also have an impact on government finances. When unemployment rates are high, there may be an increase in demand for government assistance programs, which can strain public finances and lead to budget deficits. This can impact the government's ability to invest in infrastructure projects or provide incentives for construction companies. High unemployment rates can create a surplus of labor in the market, making it easier for construction companies to find workers and potentially leading to lower wages. Conversely, low unemployment rates can create a tight labor market, making it difficult for construction companies to find qualified workers and potentially leading to higher wages. The total unemployment rate in Spain can also impact economic growth. When unemployment rates are high, it can lead to a decrease in economic activity and lower GDP growth. Conversely, when unemployment rates are low, it can lead to increased consumer spending, higher demand for goods and services, and stronger economic growth. The total unemployment rate in Spain can have a significant impact on the construction sector, as well as the broader economy. Understanding these impacts is important for policymakers, investors, and individuals who are affected by changes in the unemployment rate.

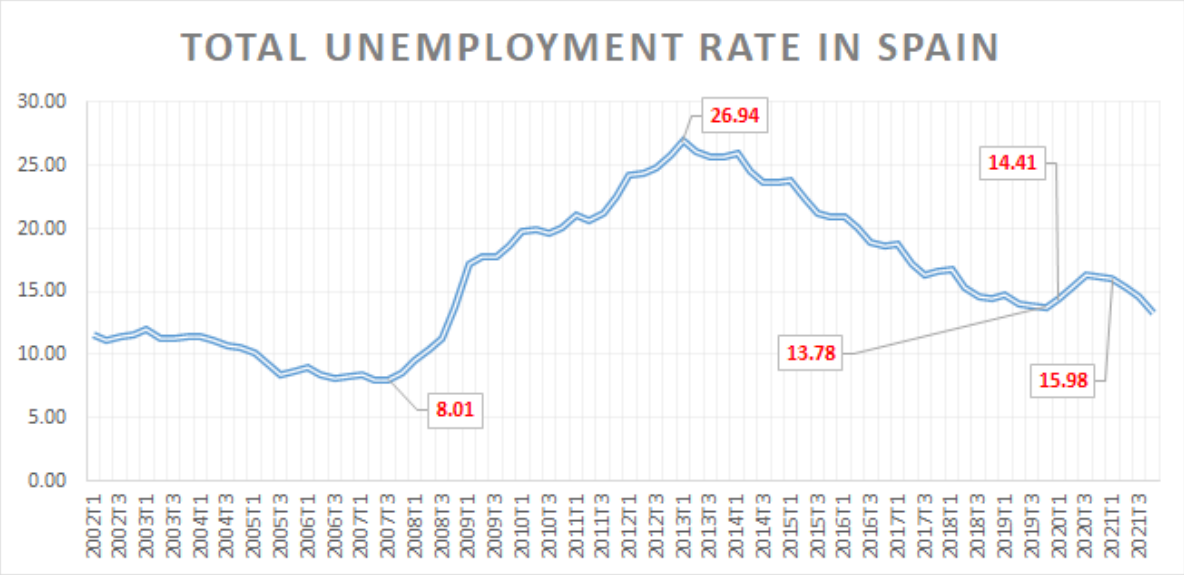

Figure 17 Total Unemployment rate in Spain from 2002 – 2021 Q4 *(*Unemployment Rates by Different Age Groups, Sex and Autonomous Community(4247)*, n.d.)*

Analyses: Figure 7 demonstrates the evolution of unemployment rate in Spain from the first quarter of 2002 till the fourth quarter of 2021. The lowest unemployment rate in Spain was found in the second quarter of 2007 which represent 7.93%. Total unemployment rate in Spain starts rising from the third quarter of 2007 representing 8.01% till the first quarter of 2013 representing 26.94%(Burton, Edwards, Roberts, Chileshe, & Lai, 2021). The obvious reason of this upward trend in unemployment rate is 2008-2009 financial crises which achieves the maximum rate in the first quarter of 2013. This upward trend start decline from the second quarter of 2013 representing 26.06% till the fourth quarter of 2019 representing 13.78%. Unemployment rate in Spain again start progressing in the first quarter of 2020 representing 14.41% till the first quarter of 2021 (latest data available) representing 15.98%. To analyze the total unemployment rate in Spain from 2002 to 2021 Q4, we can use data provided by the National Institute of Statistics (INE). The total unemployment rate in Spain has varied significantly over the period from 2002 to 2021 Q4. The highest unemployment rate occurred in the first quarter of 2013, with a rate of 26.94%, while the lowest unemployment rate occurred in the fourth quarter of 2019, with a rate of 13.78%. From 2002 to 2006, the unemployment rate remained relatively stable at around 11%. The rate began to increase in 2007, reaching a peak of 26.94% in 2013. Following the peak in 2013, the unemployment rate began to decrease, with a steady decline up to the fourth quarter of 2019, when it reached its lowest level since 2008. However, the COVID-19 pandemic had a significant impact on the unemployment rate in Spain, resulting in a sharp increase from the first quarter of 2020 onwards. The unemployment rate reached a peak of 16.13% in the third quarter of 2020. In the fourth quarter of 2021, the total unemployment rate

was still above pre-pandemic levels, with a rate of 14.25%. In addition, the INE also provides data on unemployment rates by different age groups, sex, and autonomous communities. According to this data, unemployment rates tend to be higher among younger age groups and among women. The autonomous community with the highest unemployment rate in the fourth quarter of 2021 was the Canary Islands, with a rate of 22.23%, while the community with the lowest rate was the Balearic Islands, with a rate of 9.67%.

The analysis of the total unemployment rate in Spain from 2002 to 2021 Q4 shows significant fluctuations over time, with the rate reaching a peak during the global financial crisis and again during the COVID-19 pandemic. While the rate has decreased in recent years, it remains above pre-crisis levels, indicating ongoing challenges for the Spanish labor market.

2.4 Discussion.

The global economic crisis emerged from the novel corona virus is the biggest challenge of the 21st century. Corona virus pandemic has serious economic consequences across the world. Annual rates of growth of Construction as demand component in the gross fixed capital formation attain little bit less decline peak in the second quarter of 2020 as it was in second quarter of 2009 due to 2008- 2009 financial crises. Construction growth achieve the notable decline up to 19% in the second quarter of 2020 and continuously negative trend observed from second quarter of 2020 till the first quarter of 2021 and in the third quarter of 2021.

COVID 19 is only the reason for rates in 0% or continuously falls in negative percentage of annual rates of construction growth and GDP growth at market price in the full year of 2020 and in the first quarter of 2021. This shows overall worst economic growth in all sectors and in construction sector as well. The main problem is the growth percentage of Gross domestic product at market price which lowers to -4.23% in the second quarter of 2009 while it declines up to -20.67% in the second quarter of 2020. GDP growth rates in negative percentage from first quarter of 2020 till the first quarter of 2021 and above -7% in the last three quarters of 2020 which is quite serious while - 4.23% was the lowest growth rate that Spanish economy face at the time of 2008-2009 financial crises. GDP growth percentage at market price in negative shows the worst economic condition due to COVID 19 crises than the 2008-2009 financial crises. The GDP growth again starts accelerating and turn into positive percentage from the second quarter of 2021 till the fourth quarter of 2021 as per latest data available.

From the analysis, it is evidenced that during 2008-2009 financial crises, trend of annual rates of Construction growth touches the decline peak but it didn't affect the overall GDP growth with the same rate. During COVID 19 crises, the scenario is bit interesting and observed that GDP growth is decreased

with the same pace as the annual rate of construction growth decreases in the year 2020. The situation is little bit different in 2021 as annual rates of construction growth is not boosting with the same rate as the GDP growth. The reason for slow down growth of annual rate of construction growth may be due to increase the overall cost of construction sector while the rents and prices of houses remain the same or decreased as it was prior to COVID 19. Public office also didn't increase the public work tender prices, so the overall business activity in the construction sector is performed in mass but the margins are less due to overall increase the cost in construction sector. This is the ultimate reason to not boosting the annual rate of construction growth with the same growth rate of GDP in 2021.

However, global economy is again entered in a weaker position in 2022, estimated 5.9% in 2021 and forecasted 4.4% in 2022 while Spanish economy growth is estimated 4.9% in 2021 and projected 5.8% in 2022 and 3.8% in 2023 as per the IMF world economic outlook published in January 2022 (IMF, 2022).

Downward trend in number of houses sold in Spain start from 2007 and achieves the lowest peak in the first quarter of 2013. After this decline, upward trend in number of houses sold observed from the second quarter of 2013 to the fourth quarter of 2019. Number of houses sold is again start decreasing due to COVID 19 crises since the first quarter of 2020, achieves lowest peak in the second quarter of 2020 but improved from third quarter of 2020 till third quarter of 2021. During COVID 19, Spanish Government introduced ERTE mechanism in order to facilitate the establishments and working personnel. From the first quarter to fourth quarter of 2020, there are certain restrictions imposed by government on entertainment industry, hotels & restaurant industry and un-necessary movement from one place to another place etc., so the people only have to spend on their basic necessities. The extra amount which they spend on extra activities like entertainment, outside dinning, outings and tourism etc., become the part of their savings. We observed that the people invest their savings in the construction sector. Due to investment, Trend of number of houses sold is increased from third quarter of 2020 to third quarter of 2021.But it is too early to say that this trend will be prolonged how far and will be more intensive, less intensive or still the Spanish economy have to experience the lowest growth peak due to COVID 19 crisis in the coming years which more or less similar to the lowest peak observed in first quarter of 2013 due to 2008-2009 financial crisis.

Percentage in decline than previous year for housing started and housing completed yet not touches the lowest point due to COVID 19 crises as it was at the time of 2008-2009 crises. Lowest percentage in decline than previous year for housing started due to 2008-2009 financial crises was -55% and - 66% in 2008 & 2009 respectively while it is about -21% in 2020. It is projected that yet the Spanish economy

have to face the lowest peak for housing started due to COVID 19 crisis in the coming years. Lowest percentage in decline than previous year for housing completed due to 2008-2009 financial crises was -39% and -45 % in 2010 & 2011 respectively while it is about + 08% in 2020. Visible effect on the housing completed due to COVID 19 crises will start from 2021 and continue onwards. During COVID crises, Housing started and housing completed percentage is also less because of the ERTE mechanism introduced by Spanish Government in order to facilitate the establishments and working personnel. Because of this step of Spanish government, employment rate in the construction sector is not fall as it was during 2008-2009 financial crises and also total unemployment rate was better than it was during 2008-2009 financial crises.

There is continuous downward trend in the bidding process from the year 2008 till 2012 due to 2008- 2009 financial crises while achieves the lowest peak in 2012. After that there is gradual upward trend in the growth of bidding process from the year 2013 and more or less the same till the year 2020. In 2021, there is notable increase in total works tender as compared to previous year. The main reason of this increase as there was no lock down in 2021 and public office also didn't increase the public work tender prices as with increase the overall cost of construction sector. At present, economic impact of COVID 19 is not observed and expected to emerged in the coming years which would be very difficult to predict its intensity at present or to say more or less same as had in 2008-2009 financial crises.

There is a significant downward trend in the annual variation in the employment rate i.e. less than -5% from the second quarter of 2008 till the first quarter of 2014 and attains the lowest peak in the first quarter of 2009 representing -25.18%. Downward trend in annual variation in employment observed negative in the first two quarters of 2020 and achieves the lowest rate i.e., -4.88% in the second quarter of 2020. During COVID 19 crises, Annual variation in the employment rate in the construction sector of Spain did not decrease as it was during 2008-2009 financial crises due to ERTE mechanism introduced by Spanish Govt in order to facilitate the establishments and working personnel. It is bit early to say that annual variation in employment rate is achieved its lowest peak as it achieves the lowest peak in the first quarter of 2009 due to 2008-2009 financial crises.

Upward trend in the total unemployment rate in Spain starts from 8.01% in the third quarter of 2007 while achieves the highest peak 26.94% in the first quarter of 2013.This trend starts decreasing from the second quarter of 2013 till the last quarter of 2019. There is again rise in unemployment rate observed from first quarter of 2020 representing 14.41% till the first quarter of 2021 (latest data available) representing 15.98% due to COVID 19 crises. This rising trend in unemployment rate is due to COVID 19 economic crises which results in reduction of overall employment rate in Spain. The overall trend of total

unemployment rate is not increased during COVID 19 crises as compared with 2008-2009 financial crises due to ERTE mechanism introduced by Spanish Govt in order to facilitate the establishments and people. As per the, unemployment rate in Spain would be 16.8% in the year 2021 and 15.8% in 2022 which depicts that employment rate in Spain will progress in 2022.

2.5 Policy Implications.

- Spain's economic model, which is primarily focused on labor-intensive construction and tourism and is not particularly productive, contributes to the unemployment crisis by failing to create long-term employment. Small businesses abound in Spain, with less than 1% employing more than 50 people. Firms must grow in size in order to benefit from economies of scale, which will allow them to, among other things, export more successfully. Fleta-Asín et al., (2020) investigate how higher labor qualifications can reduce company risks and increase overall value. The study considers three main approaches for achieving higher labor qualifications: hiring more qualified personnel, investing in the training and qualification of existing staff, and adopting technology to increase labor productivity. Although these methods may lead to increased average personnel costs, the research argues that they offer long-term benefits without compromising profitability and significantly enhance the company's chances of survival. The research also highlights the importance of measuring the value of human capital through remuneration and demonstrates that higher remuneration is a result of having more valuable human capital, rather than the cause.
- The construction industry is the only one that regularly performs differently during credit booms. In bad booms, output and employment in the construction industry expand by 2 to 3 percentage points more than in good booms. The difference is minor and not significant in all other industries (except trade, but only when it comes to output growth). Many other industries have greater development potential than construction. To put it another way, excessive construction spending may divert resources away from more productive activities, resulting in decreased output.
- Additionally, some employees may be discouraged from investing in their education and abilities due to the transient increase in construction employment and the relatively low level of skills required. This could have long-term consequences for output once the boom is over. Sánchez-Sellero et al., (2014) investigate the determinants influencing the survival of construction companies. The study explores the significance of human capital and company size as key factors contributing to the resilience of these firms during times of crisis. Using empirical data, the study quantifies the impact of each determinant on company survival. Notably, the research highlights that human capital plays a crucial role by increasing the average lifespan of a company by approximately 9.8 years. Moreover, the constant term in the model indicates that a hypothetical company with zero years of age and no employees would

experience a negative average lifespan. The findings shed light on the factors that enhance construction companies' ability to withstand adverse conditions and endure challenges effectively.

- The building industry's extremely rapid expansion helps to identify credit bubbles. During a boom, a 1% rise in output and employment growth in the construction industry increases the likelihood of the boom being poor by 2 and 5 percentage points, respectively.

- Construction expansion, more than any other variable, is a better predictor of the economic costs of disastrous booms. During a terrible boom, a one-percentage-point increase in construction output growth correlates to a nearly 0.1-percentage-point decline in aggregate output growth during the crash.
- Officials may consider tightening macroeconomic policies and using macro prudential measures if the building sector expands rapidly during a credit boom (such as higher down payments for mortgages). Fleta-Asín et al., (2020) explores the effectiveness of well-targeted training policies for all personnel, including management levels, when integrated into the overall company strategy, as a means to mitigate business risk and enhance the value of construction companies. However, the interpretation of these results requires a nuanced understanding beyond a simplistic viewpoint. While it may seem intuitive that increased investment in training would lead to more valuable human capital and greater resilience during crises, the reality is more intricate and necessitates a broader perspective on business decision-making. This study aims to provide a comprehensive analysis of the intricate relationship between training policies, human capital value, and company resilience, offering valuable insights for business managers and stakeholders alike.
- On the other hand, Spain has reached a fork in its economic development and is unable to continue on its current route. The housing market crash has ruthlessly exposed the shortsightedness of an economic strategy that is overly focused on construction. The decision is now between economies based on arms (labor-intensive, unskilled) or an economy based on brains (more knowledge-based and internationalized). Iqbal et al., (2022) explore the integration of well-targeted training policies for all company personnel, including management levels, appears to be a highly effective approach in mitigating business risks and consequently enhancing the value of construction companies. However, the interpretation of this finding should not be oversimplified. While it may seem that increased investment in training leads to more valuable human capital and greater crisis resistance, the reality is more intricate and necessitates a comprehensive perspective on business decision-making.
- It has been scientifically proven that internationalised enterprises create steadier and higher-quality jobs than companies operating simply in their home market. These businesses are typically larger in order to achieve critical mass, and they must be more productive and competitive to survive. However, size isn't the only factor to consider when it comes to Internationalisation, but the variability in the business

modes in also important. Sánchez-Sellero et al., (2014) conclude that certain companies adopt a business approach characterized by specialization or a long-term vision, leading them to maintain a more stable workforce, thereby making investments in training more profitable. The perception of job stability among employees incentivizes them to actively engage in their own training and fosters a stronger commitment to the company's stability and viability. The accumulation of experience, training, and dedication to the organization enhances the employee's value to the company. Consequently, amidst some job mobility, these individuals tend to receive higher average salaries that align with their productivity. This business model has demonstrated greater resilience to crises.

2.6 Conclusions and Recommendations.

It seems that COVID-19 recession will leave smaller impact than 2008-2009 financial crises while it leaves significant impact on the low economies and newly developed markets. All indicators in the above study also showing that economic impact of COVID-19 in the construction sector of Spain is not as worst and less in magnitude as it was during 2008-2009 financial crises(Tan & Abdul-Samad, 2022). At present, the main bottleneck in the construction sector is on the supply side. Construction firms are expressing to have some difficulties to hire qualified personnel to grow as fast as demand does. Some experts find that there is some memory about the dramatic loss of jobs after the financial crisis, so young people look to other sectors that seem safer in stability to their eyes. This disequilibrium may be solved with an increase in salaries of construction later or now, relative to other sectors. The COVID-19 pandemic has had a significant economic impact on the construction sector of Spain, similar to the 2008-2009 financial crisis. However, there are some key differences between the two shocks. Here's a closer look at the economic impact of these events on the construction sector of Spain, Both the 2008-2009 financial crisis and the COVID-19 pandemic resulted in a decline in economic activity in Spain. The construction sector was hit particularly hard, as demand for new construction projects decreased sharply. During the financial crisis, the construction sector was responsible for a significant portion of Spain's economic growth in the years leading up to the crisis. However, during the pandemic, the construction sector was not seen as a priority, and projects were put on hold or canceled. Both shocks resulted in significant job losses in the construction sector. During the financial crisis, construction employment in Spain fell by over 40% between 2008 and 2013. The COVID-19 pandemic had a similar impact on employment in the construction sector, with many projects put on hold and workers furloughed or laid off. During the financial crisis, the Spanish government implemented a number of policies to support the construction sector, including tax incentives for new home buyers and infrastructure investment. However, during the COVID-19 pandemic, the government's focus was on supporting the healthcare system and providing economic relief to individuals and businesses. As a result, the construction sector did not receive as much government support. The COVID-

19 pandemic has led to changes in consumer behavior that have impacted the construction sector. For example, there has been an increased demand for outdoor living spaces and home offices, as many people have been working from home. This has led to a shift in construction priorities, with a greater focus on outdoor living spaces and home renovations. The economic impact of the COVID-19 pandemic and the 2008-2009 financial crisis on the construction sector of Spain are similar in many ways, including declines in economic activity and job losses. However, there are also some key differences, including changes in consumer behavior and government intervention.

Economic recovery in the emerging markets is projected to be sluggish than developed economies. Future developments in the global economic growth and construction sector of Spain depends on the pathway of health crises, either the new strains of COVID-19 are susceptible to COVID vaccines or they show resistance and prolong the pandemic. These results encourage the investors to invest in the construction sector of Spain and facilitate to improve the GDP growth of the country. These results also inspire to policy and decision makers which help them to take the steps which improves the construction growth and overall economic growth of Spain. Julio Rodríguez, former president of the Banco Hipotecario and a member of the Superior Council of Statistics, an advisory body to the National Statistics Institute (INE) Rodríguez considers that Spain clearly has “insufficient” tools to study the real estate market and assess the situation. Future study is recommended to investigate statistical mechanism to find balance between prospective real estate demand and resources required.

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Chapter 3. Spillovers of Firms' Productivity Shocks: Absorption or Reactions.

3.1 Introduction.

Productivity shocks refer to unexpected changes in a firm's production efficiency, which can be positive or negative. Spillovers occur when these productivity shocks affect other firms or industries within the same economy. In the context of the Spanish retail industry, empirical researchers have found evidence of productivity spillovers from large retailers to small and medium-sized enterprises (SMEs). Specifically, the presence of large retailers in a local market leads to increased productivity among nearby SMEs. This effect is attributed to increased competition, as small retailers are forced to improve their efficiency in order to compete with larger firms. Additionally, researchers have found that productivity spillovers are stronger in regions with higher levels of economic development and greater integration with global markets. This suggests that policies aimed at promoting competition and reducing barriers to entry in the retail sector may have positive effects on overall productivity in the Spanish economy. Foreign direct investments (FDI) attract the attention of governments in both developing and developed countries (Roording and Vaal 2010). Numerous economies facilitate, encourage or even subsidize the foreign investment firms. According to (Perri and Peruffo 2016) there are considerable benefits of foreign direct investments in a host country. When foreign direct investments locate their activities from home country to abroad, they channel capital inflows, uplift employment in the host country, bring new technology and technical & management expertise in the host country (Perri and Peruffo 2016). In addition to these direct effects, host economies expect FDI to generate beneficial spillovers, including knowledge spillover (Roording and Vaal 2010).

The study of the spillovers of foreign direct investment (FDI) on the productivity of industrial companies has received considerable attention from researchers (Cuvero et al. 2022a). Spillovers (overflows) arise from out-of-market transactions in which resources, especially knowledge is disseminated without a contractual relationship (Meyer 2004). The first studies on spillovers focused on horizontal relationships (within the sector), one of the most cited works being that of (B. J. Aitken and Harrison 1999a). Later, vertical relationships (between supplier and customer sectors) were included in the analysis (Javorcik, 2004; Blalock and Gertler, 2008). In the literature on foreign direct investment (FDI), spillovers are understood as the result of accumulated profits in domestic firms from foreign firms operating in sectors that are either suppliers or customers.

Foreign direct investments (FDI) can generate numerous beneficial spillover effects in the host country in several ways. FDI brings in capital from foreign investors, which can help boost the host country's economic growth and development (Cuvero et al. 2022a). FDI can create new job

opportunities in the host country, which can help reduce unemployment and boost local incomes. FDI can bring in new technology and technical expertise, which can help improve the host country's productivity and competitiveness. FDI can bring in new management practices and expertise, which can help improve the efficiency and effectiveness of local businesses. FDI can also facilitate the transfer of knowledge and ideas between foreign and local firms, which can help stimulate innovation and creativity in the host country (Tzabbar, Lee, and Seo 2022a). Overall, these spillover effects can help promote economic growth and development in the host country, creating a win-win situation for both the foreign investors and the host country.

Many studies have demonstrated the potential beneficial spillover effects of FDI on the host country (Cuvero et al. 2022b). A study by the International Monetary Fund (2021) found that FDI inflows can have positive spillover effects on the host country's productivity, export performance, and technological progress (B. Audretsch and E. Lehmann 2022). Another study by the World Bank found that FDI can contribute to the development of local supply chains and promote knowledge and technology transfers, which can help boost the host country's economic growth and development. A study by the United Nations Conference on Trade and Development (UNCTAD) found that FDI can help promote the development of small and medium-sized enterprises (SMEs) in the host country (Ge and Liu 2022), which can help create new jobs and increase productivity. A study by the Organization for Economic Co-operation and Development (OECD) found that FDI can help improve the host country's business environment, promote competition, and stimulate innovation (Albis Salas, Alvarez, and Cantwell 2022). A meta-analysis of studies by the European Central Bank (ECB) found that FDI can have positive spillover effects on the host country's productivity, human capital, and technology, particularly in industries that are knowledge-intensive or export-oriented (Haq, Hussain, and Amin 2022). These studies suggest that FDI can have numerous beneficial spillover effects on the host country, including promoting economic growth, job creation, technological progress, and innovation.

In order to study the spillovers of FDI on productivity, it is necessary to consider other factors that affect productivity. Thus, the factors traditionally considered to affect productivity are labor and capital (Crowley and Jordan 2022). Subsequently, new determinants have been introduced such as those related to innovation and overflows in foreign direct investment. Innovation favors the development of the company, the industry and the country in which it is carried out and is very relevant to achieve greater productivity (Tzabbar, Lee, and Seo 2022b). Here are some studies that investigate the existence of productivity shocks spillovers, and their transmission mechanisms in Spanish firms, industries, and regions, a study by Fernández-Márquez et al. (2020) examined the productivity performance of Spanish manufacturing firms from 2000 to 2014. The authors found evidence of substantial heterogeneity in productivity across firms, and they identified the role of productivity

shocks spillovers in explaining the differences in productivity. They found that the impact of productivity shocks spillovers on productivity was stronger for firms with high absorptive capacity and for firms located in regions with high R&D intensity (Barbieri, Ramaciotti, and Rizzo 2022). A study by Rodríguez et al. (2020) investigated the transmission of productivity shocks spillovers across firms in the Spanish construction sector. The authors found that productivity shocks spillovers from firms with high R&D investments positively influenced the productivity of other firms in the same region (Aldieri, Makkonen, and Vinci 2022). They also found that firms that collaborate with universities and research centers had higher absorptive capacity and were more likely to benefit from productivity shocks spillovers. A study by Arauzo-Carod and Liviano-Solis (2019) examined the spatial patterns of productivity shocks spillovers in the Spanish manufacturing sector. The authors found that productivity shocks spillovers were stronger within the same industry and region, and that the intensity of spillovers varied depending on the industry and the region (Mota Veiga, Fernandes, and Ambrósio 2022). They also found that firms with high R&D investments and firms that collaborate with other firms and research centers were more likely to benefit from productivity shocks spillovers. A study by Calderón-Madrid et al. (2019) investigated the transmission mechanism of productivity shocks spillovers in the Spanish biotechnology sector. The authors found that the most important transmission mechanism was through labor mobility, with highly skilled workers moving between firms and bringing knowledge with them. They also found that collaborative agreements and patent citations were important mechanisms for the transmission of productivity shocks spillovers.

The existence of productivity shocks in Spanish firms is influenced by productivity shocks spillovers, and that the transmission of productivity shocks spillovers is influenced by factors such as absorptive capacity, collaboration, and R&D intensity (Aldieri, Makkonen, and Vinci 2022). The transmission mechanisms of productivity shocks spillovers vary depending on the industry and region, with labor mobility, collaboration, and patent citations being important mechanisms for transmitting productivity shocks spillovers.

Spillovers are defined as the unrestricted exchange of resources, like technological know-how, between organisations (foreign competitors and domestic businesses, for example). According to Caves (1974), foreign competitors can speed up the transfer of technology to host industry by showcasing their technological superiority and by engaging in trade and competition with domestic businesses. Using an examination of 22 Australian manufacturing sectors, he looked for these impacts and discovered a correlation between local firms' labour productivity and the proportion of foreign firms' employees in a sector (Ge and Liu 2022). This discovery offered preliminary support for FDI's beneficial effects on domestic enterprises. Subsequent research supported Caves' findings. For instance, Globerman (1979) discovered a favourable correlation between labour productivity and a

number of indicators of foreign presence in Canadian businesses, such as the percentage of value added created in facilities controlled by foreigners. Foreign investment and the relative changes in labour productivity were found to be positively correlated for Mexican industries by Blomstrom and Persson (1983) and Blomstrom (1986). According to Buckley, Clegg, and Wang's findings from 2002, foreign companies who invest in China may assist local companies with technology advances and increased access to global markets. Sinai and Meyer (2004) discovered that spillovers in Estonia were substantially predicted by the percentage of foreign workers in a sector.

Other studies, however, have not discovered any indication of technological spillovers from multinational corporations to local businesses or have found contrary results. In what may have been the first study to use a firm-level dataset, Haddad and Harrison (1993) discovered that the efficiency of local firms in Morocco's manufacturing sector was unaffected by foreign competitors. Aitken and Harrison (1999) found that, with the exception of joint ventures, the percentage of foreign ownership decreased the productivity of local enterprises using a wide sample of Venezuelan factories. Again using firm-level data, Konings (2001) discovered that in Bulgaria and Romania, FDI had a detrimental effect on the productivity of local enterprises. Additionally, this detrimental effect could exist in established markets. For instance, De Backer and Sleuwaegen (2003) discovered that foreign enterprises raised the leave rate of domestic firms and decreased the formation rate in the Belgian industrial sectors. These contradictory outcomes are the result of significant conceptual and technological issues.

To investigate the existence of productivity shocks in Spanish firms and the transmission of productivity shocks spillovers to other firms in the same industry and region, as well as to identify the transmission mechanism of firms within sectors and regions in Spain, a researcher could employ various empirical methods and data sources (Tang, Qiu, and Dou 2022). Here are a few examples, Firm-level data analysis could analyze data on Spanish firms, such as financial statements, employment data, and productivity measures, to identify patterns and trends in productivity and productivity shocks spillovers over time (Y. Xu et al. 2022). This could involve running regression analyses to identify the factors that influence productivity and productivity shocks spillovers, and to estimate the magnitude of the spillover effects. Sector-level data analysis could also analyze data on firms within specific sectors of the Spanish economy to identify patterns of productivity and productivity shocks spillovers within and across sectors (Cui and Wang 2023). This could involve clustering analysis to identify groups of firms that share similar productivity and knowledge spillover characteristics. Regional data analysis could also analyze data on firms within specific regions of Spain to identify patterns of productivity and productivity shocks spillovers within and across regions (M. Liu, Niu, and Tian 2022). This could involve spatial analysis to identify clusters of firms that are

geographically close to each other and share similar productivity and knowledge spillover characteristics. Survey data analysis could also collect data through surveys of firms in Spain to gather more detailed information on their productivity and productivity shocks spillovers (Cui and Wang 2023). This could involve designing surveys that ask specific questions about firms' investment in research and development, their collaboration with other firms, and their use of technology. A combination of empirical methods and data sources would be needed to investigate the existence of productivity shocks in Spanish firms, the transmission of productivity shocks spillovers, and the mechanisms by which these effects are transmitted within and across sectors and regions in Spain.

In the first place, the aim is to identify the productivity shocks of Spanish firms due to FDI in 20 manufacturing sectors and 17 regions of Spain from the year 1997 to 2016. Second, an attempt is made to investigate its spillover effect towards other firms in the same industry and other firms in the same region. Third, it examines the transmission mechanism / channels of these spillovers i.e. imitation and workers mobility towards other firms in the same industry and in the same region.

This work aims to be one of the unique studies of detection of productivity shocks of Spanish firms, productivity shocks spillovers transmission and its transfer mechanisms due to foreign direct investment in Spain (Friedmann 2022). Evidence suggests that productivity spillovers occur both among firms within sectors and across regions. Empirical research strongly supports the existence of spillover effects. Our hypothesis confirms that firms benefit from others within their sectors and regions. This implies that advancements or enhancements made by certain firms in an industry lead to positive spillover effects on other firms. Our analysis reveals numerous instances of positive shocks in productivity within industries and regions. The calculated coefficients are not only positive but also highly significant, even after accounting for industry/regional effects using a set of dummy variables. We investigated situations where significant productivity improvements are made by select companies within sectors and regions. This prompts other companies in the same sector/region to enhance their practices. Embracing effective management techniques contributes to improved firm productivity (as indicated by positive and statistically significant coefficients of individual variables). Furthermore, these management practices, including the recruitment of new talent, facilitate an additional boost in productivity by enhancing the ability to absorb spillovers from market-leading or exceptionally performing companies in the Spanish market.

The organization of this paper proceeds as follows: Section 2 provides a literature review of productivity shocks spillovers and transmission mechanism of productivity shocks spillovers. Section 3 discusses the research hypothesis, data, model and methodology. Section 4 presents Results and discussion and the final conclusion and policy implications are given in the final section.

3.2 Literature Review.

3.2.1 Knowledge Spillovers.

Knowledge is a key strategic asset for all firms and an essential element for an organization to develop (Jones and Rattan 2020). According to Omerzel and Antončič (2008), "Organizations are becoming more knowledge intensive and they are hiring minds more than hands". Knowledge is an influential gadget that should be managed properly (Jones and Rattan 2020). Spillovers represent transmission of resources from foreign establishments to local incumbents without contractual terms (Meyer 2004). According to (Fritsch and Fritsch 2013) foreign direct investments are highly effective channel for knowledge spillover.

Li et al. (2022) examined the role of productivity shocks spillovers in promoting green innovation in China. The authors found that knowledge spillovers had a positive effect on firms' green innovation, and that this effect was stronger for firms with high absorptive capacity and for firms located in regions with high environmental regulation. Xie et al. (2021) investigated the role of social networks in transmitting productivity shocks spillovers in the Chinese mobile internet industry. Knowledge spillovers refer to the unintentional transfer of knowledge or information from one individual or organization to another. It occurs when knowledge created by one person or organization spills over to others who may not have been involved in its creation. Knowledge spillovers can occur through various means, including collaboration, interaction, competition, and observation. There are two main types of knowledge spillovers, internal and external. Internal knowledge spillovers occur within an organization or industry and involve the transfer of knowledge between different departments or teams. External knowledge spillovers occur across organizations or industries and involve the transfer of knowledge between different firms or sectors. Knowledge spillovers can have both positive and negative effects. Positive spillovers occur when the knowledge transferred leads to improved productivity, innovation, and competitiveness. For example, a new technique developed by one firm in the construction sector could be adopted by other firms, leading to increased efficiency and reduced costs. Negative spillovers occur when the knowledge transferred leads to decreased productivity, innovation, and competitiveness. For example, if a firm in the construction sector adopts a new technique that is not appropriate for their operations, it could lead to increased costs and reduced efficiency. Knowledge spillovers are important for innovation and economic growth. They allow individuals and organizations to learn from each other and build on existing knowledge, leading to new ideas and improved products and services. Additionally, knowledge spillovers can contribute to the development of regional innovation clusters, where firms in the same industry or related industries collaborate and share knowledge, leading to increased innovation and productivity.

The authors found that social networks played an important role in transmitting knowledge spillovers, and that the effect of social networks on knowledge spillovers was stronger for firms that were more central in the network. Graff et al. (2020) examined the role of university-industry collaboration in promoting knowledge spillovers in the European biotechnology sector. The authors found that university-industry collaboration had a positive effect on knowledge spillovers, and that this effect was stronger for firms that were more research-oriented and that had a higher level of absorptive capacity. Zheng et al. (2019) investigated the effect of knowledge spillovers on the productivity of Chinese firms in the manufacturing sector. The authors found that knowledge spillovers had a positive effect on firm productivity, and that this effect was stronger for firms that were located in regions with high R&D intensity and for firms that had a higher level of absorptive capacity (Yu et al. 2022).

Knowledge spillovers can have a positive effect on firms' innovation and productivity, and that the mechanisms through which knowledge spillovers are transmitted can vary depending on the industry, region, and social network structure (Blalock and Gertler 2008). Collaboration, absorptive capacity, and regulation can all play a role in facilitating the transmission of knowledge spillovers (David B Audretsch and Belitski 2022).

Knowledge spillover believed crucial for economic growth (Griliches 1979), development in urban areas (Arrow 1962; Romer 1986) and foster the growth of modern technology industrial sector in specific regions (Saxenian 1994). Fallah and Ibrahim (2004) explained the difference between "knowledge spillovers" and "knowledge transfers". According to them, knowledge spillover is an unintentionally transmission or exchange of knowledge with other than people or firms of envisioned boundary while knowledge transfer is an intentionally transmission or exchange of knowledge with the individual or firms of intended boundary (Javorcik 2004). Knowledge spillovers happened due to protection mechanism failure of an originating firms (Fallah and Ibrahim 2004). Knowledge spillovers occurred due to knowledge exploitation by a recipient firm (Griliches 1992). The recipient firms often combined this knowledge (received from originating firms) with firm's own existing knowledge / other knowledge to generate their own new innovations (Sorenson, Rivkin, and Fleming 2006).

According to Fallah and Ibrahim (2004), there are mainly three level of knowledge spillovers. i) Individual level (among the people): In this case the knowledge is unintentionally exchanged among the people. ii) Global level (across the countries / nations): Unintentional exchange / transfer of knowledge between countries comes under this level. This may happen when a country imports the product and does reverse engineering to copy or gain insight of that product, although the exported country didn't have the intention to transmit the knowledge of their product to be copied or gain insights. iii) Enterprise level (Across the firms / organizations): Unintentional transfer or exchange of knowledge between the firms falls under this level. The firms could be the neighboring firms or the

firms that doing business together regardless of local or foreign firms. In this article, we will focus on the third level of productivity shocks spillovers.

There is an avenue of research pointing at FDI spillovers. The implicit hypothesis is that foreign investments bring increases in productivity to local industries. The positive impacts are not exclusively appropriated by the investor, as some of them spill over to other firms in the industry or in the region (Nonnis, Bounfour, and Kim 2023).

3.2.2 Knowledge Spillovers – Absorption.

According to Baskerville and Dulipovici (2006) knowledge spillover is an "absorption of knowledge by people other than originators". The notion of absorption capacity is the capability of an organization to internalize the latest external knowledge, transform it to own suitability and use it effectively (Cohen and Levinthal 1990). Firm's own R & D is very important determinant for its innovation activity and capacity to absorb external knowledge. This is the reason, R & D considered to have two reciprocal impacts on firm's innovation activity and productivity growth (Cohen and Levinthal 1989). Firstly, it raised the organization's technology level with the help of new innovations which is referred to as the innovation effect. Secondly it increases a firm's ability to locate, assimilate and exploit the external knowledge which referred as absorption effect. R & D activity is not the only factor that determine the capacity of a firm to absorb the knowledge spillovers.

Some studies investigate the role of absorption in knowledge spillovers. Almeida et al. (2021) examined the role of absorptive capacity in the transmission of knowledge spillovers in the Brazilian manufacturing sector. The authors found that absorptive capacity played an important role in the effectiveness of Knowledge spillovers, and that firms with high absorptive capacity were more likely to benefit from knowledge spillovers. Grashof et al. (2020) investigated the absorptive capacity of firms in the German wind energy industry and its role in facilitating knowledge spillovers. The authors found that absorptive capacity played a critical role in firms' ability to learn from external sources, and that firms with high absorptive capacity were more likely to benefit from knowledge spillovers. Rodríguez et al. (2019) examined the role of absorptive capacity in the transmission of knowledge spillovers in the Spanish construction sector (Gómez, Salazar, and Vargas 2022). The authors found that firms with higher absorptive capacity were more likely to benefit from knowledge spillovers, and that collaboration with universities and research centers was an important way to increase absorptive capacity. García-Quevedo et al. (2020) investigated the role of absorptive capacity in the effectiveness of knowledge spillovers in the Spanish biotechnology sector. They found that firms with high absorptive capacity were more likely to benefit from knowledge spillovers, and that collaboration with universities and research centers was an important way to increase absorptive capacity (Y. Huang et

al. 2022). These studies suggest that absorptive capacity plays an important role in the effectiveness of knowledge spillovers, and that firms with higher absorptive capacity are more likely to benefit from knowledge spillovers. Collaboration with universities and research centers is one way to increase absorptive capacity and improve the ability of firms to learn from external sources (Quintana-García, Marchante-Lara, and Benavides-Chicón, 2022).

In the previous studies it is broadly demonstrated that productivity shocks spillovers occurred when the technology gap between foreign and domestic firms is not too large and domestic firm has adequate absorptive capacity to absorb that productivity shocks spillovers (Damijan et al. 2003; Kokko 1994; Kokko, Tansini, and Zejan 1996; Kinoshita 2000). In general, advantages of knowledge spillovers for domestic firms depends on their absorptive capacity and level of technological advancement. Less advanced technology of domestic firm than that foreign investment firms / MNEs increases the potential of knowledge spillovers (Roording and Vaal 2010). The domestic firm also required to have minimum technology to absorb that Knowledge Spillovers. The smaller the technological gap, the higher the absorption capacity (Castellani, Castellani, and Zanfei 2006; Smeets 2009). The domestic firms having extremely low and extremely high absorption capacity may not get benefit from spillovers because either they are lacking in adequate competencies to absorb foreign knowledge or they already put in place state of the art technologies, so remained very little to learn (Girma 2005; L. Huang, Liu, and Xu 2012; Lai, Wang, and Zhu 2009).

Incumbent firms do not automatically profit from foreign knowledge as they have to invest on human capital (Elmawazini et al. 2013; B. Xu 2000). The absorptive capacity of domestic firms also depends on whether the local workforce is sufficiently skilled to work with the technology of foreign investment firms/MNEs. Less skilled workforce leads to less absorption capacity of a firm and less knowledge spillovers (Kokko and Blomström 1995; J.-Y. Wang and Blomström 1992). The firms that have low absorption capacity may only take advantage through demonstration / imitation effect as they lack the skilled workforce which is required to compete with foreign competitors (Demena and Murshed 2018).

3.2.3 Transmission Mechanism of Knowledge Spillovers.

Anwar et al. (2021) examined the transmission mechanism of knowledge spillovers in the Pakistani textile sector. The authors found that direct contacts between firms, as well as geographic proximity, played an important role in the transmission of knowledge spillovers. Wang et al. (2020) investigated the role of inter-firm collaboration in the transmission of knowledge spillovers in the Chinese high-tech industry. The authors found that collaboration between firms played a critical role in the transmission of knowledge spillovers, and that the effects of collaboration were stronger for firms with higher absorptive capacity. Wan et al. (2019) examined the role of industry agglomeration in the

transmission of knowledge spillovers in the Chinese pharmaceutical industry. The authors found that industry agglomeration facilitated the transmission of knowledge spillovers, and that this effect was stronger for firms that were more research-oriented and that had higher levels of absorptive capacity. Angulo-Ruiz et al. (2020) investigated the role of inter-firm networks in the transmission of knowledge spillovers in the Spanish renewable energy sector. The authors found that inter-firm networks played an important role in the transmission of knowledge spillovers, and that the effects of network structure were stronger for firms that were more innovative and that had higher levels of absorptive capacity (S. Wang, Wang, and Chen 2022a). The transmission mechanism of knowledge spillovers refers to the channels through which knowledge and ideas are transferred from one entity to another. There are several ways in which knowledge spillovers can occur, when workers move from one firm to another or from one industry to another, they bring with them the knowledge and skills they acquired in their previous positions. This can lead to the diffusion of knowledge across firms and industries. When firms collaborate on research and development (R&D) projects, they share knowledge and ideas, leading to the transfer of knowledge from one firm to another. This can lead to the development of new products and processes that are more efficient and effective. When firms patent their inventions and processes, they are required to disclose the details of their innovation. This can lead to the diffusion of knowledge, as other firms can access this information and potentially build upon it. When firms participate in industry associations or attend conferences and trade shows, they can learn from each other and share knowledge and ideas. This can lead to the development of new business relationships and partnerships, as well as the transfer of knowledge across firms and industries. When firms compete with each other, they are motivated to innovate and develop new products and processes. This can lead to the transfer of knowledge, as firms may adopt the innovations of their competitors in order to remain competitive. The transmission mechanism of knowledge spillovers is important for the diffusion of knowledge and the development of new ideas and products. By understanding how knowledge is transferred, firms and policymakers can develop strategies to promote knowledge spillovers and encourage innovation and economic growth.

These studies suggest that the transmission mechanism of knowledge spillovers can vary depending on the industry, region, and network structure. Direct contacts, geographic proximity, collaboration, industry agglomeration, and inter-firm networks can all play a role in facilitating the transmission of knowledge spillovers (S. Wang, Wang, and Chen 2022b). Absorptive capacity is also an important factor in determining the effectiveness of knowledge spillovers. Foreign investment firms are important source of knowledge spillovers. Many researchers focus on the transmission mechanism or channels of knowledge spillovers (Torrent-Sellens et al. 2022). Some researchers claim that knowledge spillovers happen in entrepreneurial activities (David B Audretsch and Belitski 2013; Agrawal,

McHale, and Oettl 2019; Del Giudice et al. 2017) and some states that trade activities particularly foreign direct investments (FDI) are the good source of knowledge spillovers (Falvey, Foster, and Greenaway 2002; Perri and Peruffo 2016). In this article, we will focus on the transmission mechanism or channel of knowledge spillovers in the FDIs. The literature focus on different knowledge spillovers transmission channels but we included the three theoretically well-established transmission channels in this study. i) Imitation of the foreign firms ii) workers mobility from foreign to domestic firms and third is competition (no real knowledge spill over).

3.2.4 Imitation of The Foreign Firms.

The first channel of knowledge spillovers is imitation of foreign firms supposed to appear via non-market mechanism (Blomström and Kokko 1998). Local incumbents get exposed with the most advanced technologies and latest processes of foreign owned firms (Demena and van Bergeijk 2019) which may lead to domestic counterparts to update their technologies or production processes (Kinuthia 2016). Prior to demonstration by foreign owned firms, local firms may not have awareness about such state-of-the-art technologies and also not thought as beneficial to at least try to access on it (Demena and van Bergeijk 2019). Demonstration of advanced technologies or processes by foreign owned firms decreases the uncertainty and encourage the domestic firms for its implementation (Demena and Murshed 2018).

Aitken et al. (2019) examined the role of imitation in the performance of domestic firms in the Canadian manufacturing sector. The authors found that imitation of foreign firms played an important role in improving the productivity of domestic firms, particularly in industries with high levels of foreign ownership. Fosfuri et al. (2020) investigated the role of imitation in the performance of domestic firms in the Spanish pharmaceutical industry. The authors found that imitation of foreign firms played a critical role in improving the technological capabilities of domestic firms, and that this effect was particularly strong for firms with low levels of prior R&D activity (Anzolin, Andreoni, and Zanfei 2022).

Hu et al. (2021) examined the role of imitation in the performance of domestic firms in the Chinese electronics industry. The authors found that imitation of foreign firms played an important role in the technological catch-up of domestic firms, and that this effect was particularly strong for firms with high levels of absorptive capacity. Nakamura et al. (2019) investigated the role of imitation in the performance of domestic firms in the Japanese automotive industry. The authors found that imitation of foreign firms played a critical role in improving the technological capabilities of domestic firms, and that this effect was particularly strong for firms with low levels of prior R&D activity. These studies suggest that imitation of foreign firms can play an important role in improving the performance

and technological capabilities of domestic firms. Foreign investment refers to the investment made by foreign individuals, companies, or governments in a business or project in a country other than their own. This investment can take various forms, including direct investment, such as the establishment of a foreign-owned subsidiary or branch, or indirect investment, such as the purchase of shares or bonds in a local company.

Imitation of foreign firms, on the other hand, refers to the practice of domestic companies in a country copying or emulating the strategies, products, or services of foreign firms. This practice can occur in various industries, such as manufacturing, technology, and services. There is a close relationship between foreign investment and imitation of foreign firms. Foreign investment can be a significant driver of imitation by providing domestic firms with exposure to new technologies, management practices, and business models that they may not have been aware of or able to access otherwise. As foreign firms enter a new market, they often bring with them new and innovative ideas that can inspire domestic firms to adopt similar strategies and practices. Moreover, foreign investment can also provide domestic firms with access to new markets and customers, which can lead to increased competition and pressure to improve their products or services. In turn, this competition may encourage domestic firms to innovate and improve their products in order to remain competitive.

Imitation of foreign firms can also have a significant impact on foreign investment. When domestic firms imitate the strategies and practices of foreign firms, it can signal to foreign investors that the domestic market is receptive to new ideas and willing to adopt them. This can create a more welcoming investment environment and attract more foreign investment to the country.

However, imitation of foreign firms can also present challenges and risks for domestic firms. For example, if domestic firms rely too heavily on imitation, they may struggle to differentiate themselves in the market and compete effectively. Additionally, if they do not fully understand the strategies and practices they are imitating, they may not be able to replicate them successfully or may implement them in ways that are not appropriate for their market or industry. Foreign investment and imitation of foreign firms are closely linked, with foreign investment driving imitation and imitation shaping the investment environment. While imitation can provide significant benefits to domestic firms, it is essential to approach it strategically and thoughtfully to ensure long-term success and competitiveness. The effectiveness of imitation may depend on factors such as industry characteristics, levels of foreign ownership, prior R&D activity, and absorptive capacity. Local firms that operate physically near to foreign firms or operating in the same region may benefitted from imitation or demonstration effect (Girma 2005). Proximity plays an important role for demonstration of new products and processes as interaction is essential (Fatima 2016). According to Demena and Murshed (2018) Spillovers from imitation of the foreign firms are large and financially more important.

3.2.5 Workers Mobility.

Javorcik et al. (2020) examined the role of worker mobility in the transmission of knowledge spillovers in the Indian software industry. The authors found that worker mobility played an important role in facilitating the transmission of knowledge spillovers, particularly for workers with higher levels of education and prior experience. Belderbos et al. (2020) investigated the role of worker mobility in the transmission of knowledge spillovers in the European biotech industry. The authors found that worker mobility played a critical role in facilitating the transmission of knowledge spillovers, particularly for workers with experience in R&D and patenting. Aldieri et al. (2019) examined the role of worker mobility in the transmission of knowledge spillovers in the Italian high-tech industry. The authors found that worker mobility played an important role in facilitating the transmission of knowledge spillovers, particularly for workers with experience in R&D and patenting. Goñi et al. (2021) investigated the role of worker mobility in the transmission of knowledge spillovers in the Spanish renewable energy sector. The authors found that worker mobility played an important role in facilitating the transmission of knowledge spillovers, particularly for workers with experience in innovation and entrepreneurship (Friedmann 2022). These studies suggest that worker mobility can be an important transmission channel for knowledge spillovers. The effectiveness of worker mobility may depend on factors such as the education and experience levels of the workers, the industries involved, and the nature of the knowledge being transmitted (Agostino et al. 2022). Worker mobility is one of the channels through which knowledge spillovers can occur. When workers move from one firm to another, they bring with them the knowledge, skills, and ideas they acquired in their previous position. This can lead to the transfer of knowledge from one firm to another, potentially improving productivity and innovation. Worker mobility can occur through various means, such as, Workers may switch jobs to gain new experiences, learn new skills, or pursue better opportunities. This can result in the transfer of knowledge and ideas from their previous employer to their new employer. Workers may gain new knowledge and skills through education and training programs, which they can then apply in their current or future jobs. This can lead to the transfer of knowledge from the educational institution or training program to the worker, and then to their employer. Workers may leave their jobs to start their own businesses, bringing with them the knowledge and skills they acquired in their previous positions. This can lead to the creation of new firms and the development of new products and processes. The mobility of workers can facilitate the transfer of knowledge across different firms and industries, potentially leading to the development of new ideas and products. However, worker mobility can also have negative consequences, such as the loss of human capital and skills from firms that experience high turnover rates. To promote knowledge spillovers through worker mobility, firms and

policymakers can develop strategies such as, offering competitive wages and benefits to retain skilled workers. Providing opportunities for training and development to enhance workers' skills and knowledge. Encouraging collaboration and networking between firms and industries. Supporting entrepreneurship and the development of new firms. Worker mobility is an important channel for knowledge spillovers, and policies that facilitate mobility can promote innovation and economic growth. Empirical literature Görg and Greenaway (2004) as well as theoretical models (Fosfuri, Motta, and Rønde 2001; Glass and Saggi 2002) shed light on the worker mobility as a transmission channel of knowledge spillovers. Access on the advanced knowledge can also be happened by acquiring the human capital (Görg and Greenaway 2004). Knowledge spillovers may occur when trained workers of the MNEs who later leave the MNEs and joins the other incumbent firms or start their own business and benefitted to domestic firms or own business with the knowledge and experience that learned from that foreign firm (Fosfuri, Motta, and Rønde 2001; Q. Liu, Lu, and Zhang 2014). Mobility of workers from foreign affiliates to incumbent firms usually take place in the developed economies as demonstrated by (Balsvik 2011) in the empirical study of Norwegian manufacturing firms and in theoretical model of (Glass and Saggi 2002). Worker's mobility channel benefitted to the host economies in two ways i.e., Enhancing the efficiency and output of domestic firms or their own businesses through movement of local workers to domestic counterparts is called technological spillovers while on the other side foreign affiliates attract the local skilled workforce by offering more wages than domestic incumbents and generating pecuniary spillovers (Demena and Murshed 2018), (Demena and van Bergeijk 2019). In order to avoid employee mobility to domestic firms and associated spillovers, foreign firms pay the higher salaries to their workers (Fosfuri, Motta, and Rønde 2001) and the salary difference between foreign and domestic firms is larger in developed economies (B. Aitken, Harrison; Lipsey 1996; Globerman, Ries; Vertinsky 1994). The gap in the salaries leaves the pressure on overall market to increase the wage rate which contribute to uplift the salary structure in the market but it also resulting decrease in the profit of domestic counterparts (Demena and van Bergeijk 2019).

Foreign firms usually invest in more trainings to their staff than incumbent firms (E. K. Y. Chen 1983; Gershenberg 1987; Görg and Greenaway 2004) and is not easy to absolutely lock such resources. Worker mobility from foreign affiliates to domestic firm is essential (Pack 1993). According to Pack (1993) setting up their own companies or businesses are another reason for mobility of trained managers. Initially the foreign firms more dependent on the expatriate workers and then gradually replaced with the properly trained local resource (get trained over the period) which is more economical and easily available in the host country (Rubin et al. 1994).

3.2.6 Competition.

The third channel of knowledge spillover is competition effect appear from market mechanism and producing pecuniary spillovers (Demena and Murshed 2018; Demena and van Bergeijk 2019). Aghion et al. (2019) investigated how competition affects innovation and knowledge spillovers among firms in the French manufacturing industry. The authors found that increased competition led to higher rates of innovation, and that this effect was mediated by knowledge spillovers from competitors (Bernal, Carree, and Lokshin 2022).

Garcia-Vega et al. (2021) examined the impact of competition on innovation and knowledge spillovers among firms in the Spanish manufacturing industry. The authors found that greater competition led to increased rates of innovation, and that this effect was due in part to increased knowledge spillovers among competitors. Doh and Kim (2019) investigated the impact of competition on knowledge spillovers among firms in the Korean biotech industry. The authors found that competition played a critical role in promoting knowledge spillovers and improving innovation outcomes, particularly in industries with high levels of patent activity. De Loecker and Eeckhout (2020) examined the relationship between competition and knowledge spillovers in the US manufacturing industry. The authors found that increased competition led to greater rates of innovation, and that this effect was due in part to the production of pecuniary externalities, such as lower prices and greater product variety (David Bruce Audretsch and Belitski 2023). The relationship between competition and knowledge spillovers is complex and multifaceted. On the one hand, competition can promote knowledge spillovers by incentivizing firms to innovate and share knowledge in order to gain a competitive advantage. In competitive industries, firms may be more willing to share knowledge in order to improve their efficiency and develop new products and services. For example, in the industry, firms often collaborate and share knowledge in order to develop new technologies and improve their manufacturing processes. This collaboration is driven in part by the intense competition in the industry, which encourages firms to share knowledge in order to gain a competitive advantage. In addition, competition can also encourage the adoption of new technologies and best practices, as firms seek to keep up with their competitors. This can lead to positive knowledge spillovers as firms adopt and build upon the innovations of their competitors.

On the other hand, competition can also limit knowledge spillovers by encouraging firms to hoard knowledge and protect their competitive advantage. In industries where intellectual property rights are strong and enforced, firms may be less willing to share knowledge for fear of losing their intellectual property or market position. In addition, in some cases, competition may lead to a "winner-takes-all" dynamic, where a small number of firms dominate the market and limit competition and knowledge

spillovers. This can occur in industries where there are significant network effects or economies of scale, such as the social media or e-commerce industries. The relationship between competition and knowledge spillovers can also depend on the nature of the knowledge itself. For example, basic scientific research may be more likely to result in positive knowledge spillovers, as the knowledge generated is often public goods that can be freely shared and built upon by other researchers. However, applied research and development may be more likely to result in negative knowledge spillovers, as firms seek to protect their proprietary knowledge and limit the diffusion of new technologies.

The relationship between competition and knowledge spillovers is complex and context-dependent. While competition can promote positive knowledge spillovers by incentivizing firms to innovate and share knowledge, it can also limit knowledge spillovers by encouraging firms to protect their intellectual property and market position. Policymakers and researchers need to carefully consider these dynamics when designing policies to promote innovation and economic growth. These studies suggest that competition can be an important channel for knowledge spillovers, both through direct interactions between firms and through market mechanisms that produce pecuniary externalities (Vujanović et al. 2022). The effectiveness of this channel may depend on factors such as industry characteristics, levels of patent activity, and the degree of competition in the market (Polidoro, Lampert, and Kim 2022). Foreign entrants induced the competitive pressure on the domestic counterparts to utilize its resources efficiently or introduce the advanced technology to remain competitive (Krasniqi, Ahmetbasić, and Bartlett 2022). Competition in the host market considered as incentive for local firms as it pushes them to use on hand technology and resources more efficiently and go for the replacement with the latest technology, hence creating positive lucrative spillovers (Demena and Murshed 2018).

Competition has the positive effect on the local firms but may also exist another effect which works in the opposite direction, known as negative competition effect or negative pecuniary spillovers. B. J. Aitken and Harrison (1999b) states that although domestic firms got benefit of positive agglomeration effect from the foreign investment firms in the form of knowledge spillovers, input sharing, labor pooling etc. but there is always a chance of losing existing market share, hence experiencing negative competition effect. In our view, this negative spillover is somewhat contradictory. Authors use this term to characterize the consequences of FDI, but it cannot be considered a spillover effect, but rather a consequence of increased competition. Increased rivalry may cause some firms to fail. At the same time, it will have a positive aggregate effect on the competitiveness of the industry and many of the incumbents. Domestic firms tend to look entry of foreign entrants as a significant threat in the host market (Dawar and Frost 1999). Foreign firms habitually possess advanced technology, strong brand loyalty and can easily get privileged treatment

from the host governments (Moran 1985), (Kim 1988). This is the reason, entry of foreign firm usually bring shock, disrupt the existing market equilibrium (M.-J. Chen 1996) and pushes the local firms for less output and less market share, experiencing the competition effect. Unproductive local firms face decline in its market share due to foreign competition (Konings 2001). Haddad and Harrison (1993) conducted a study to investigate the effect of foreign firms over local firms in the Moroccan manufacturing sector and found that there is no effect of foreign firm over domestic firms. Another study conducted by B. J. Aitken and Harrison (1999b) on Venezuelan plants and found that MNEs ownership depressed the productivity of domestic firms. Djankov and Hoekman (1998) also found that there is no evidence of spillovers of foreign firm over domestic firms. Konings (2001) evidenced negative effect of foreign firms on domestic firms in Bulgaria and Romania. De Backer and Sleuwaegen (2003) found that new foreign entrants and existing MNEs declined the launching of domestic firms and increased the exit rate of local firms.

Some domestic firms successfully competed with the foreign firms in the developing economies (Dawar and Frost 1999; Zeng and Williamson 2003). We have one example from electronic industry i.e., Nokia and Motorola leading the market until 1999 in China with exceeding 95% share. The domestic firms named Bird and TCL successfully compete with MNEs like Nokia and Motorola and successfully grabbed the 60% market share in 2003 (Luo 2005). Another example is from dairy industry, i.e., six local Chinese firms successfully compete with MNEs of fresh milk industry like Kraft and Danone and forced to shut down their operations (Carnahan, Agarwal, and Campbell 2010).

3.2.7 Productivity Shocks Spillovers.

Academic research has traditionally emphasized FDI as the driver of increases in knowledge (spillovers) in industries and countries. But, in practical terms, when measuring knowledge, researches are in fact measuring productivity, as the economic expression of knowledge or capabilities. Amin and Mattoo (2019) examined the spillover effects of foreign direct investment (FDI) on productivity levels in developing countries. The authors found that FDI can lead to productivity spillovers, which occur when the knowledge and technology gained by multinational firms is transferred to domestic firms in the same industry. This spillover effect can lead to improvements in productivity levels and overall economic growth. Acemoglu and Linn (2021) investigated the impact of productivity shocks on the performance of US manufacturing firms. The authors found that productivity shocks have significant spillover effects, particularly for firms located in the same region or industry as the firm that experienced the shock. These spillover effects can be both positive and negative, depending on the nature of the shock and the characteristics of the affected firms. Koc and Erdil (2020) examined the spillover effects of productivity shocks in the Turkish manufacturing sector. The authors found that

productivity shocks can have significant positive effects on the productivity levels of other firms in the same industry and region. The spillover effect was found to be particularly strong for firms that had similar technological capabilities to the firm that experienced the shock (Hellwig 2022). The productivity shocks can lead to spillover effects that impact the productivity levels of other firms in the same industry or region. The strength and direction of the spillover effect may depend on a variety of factors, such as the nature of the shock, the characteristics of the affected firms, and the level of competition in the market. Productivity shocks are unexpected changes in the productivity of an industry or economy, which can have important spillover effects on other industries and the broader economy. In Spain, productivity shocks in different industries can have varying spillover effects, depending on the degree of interdependence between industries and the nature of the shock.

One potential spillover effect of a positive productivity shock in a particular industry is increased demand for inputs from other industries, as the more productive industry may require additional resources to meet its increased output. This can lead to increased demand and higher productivity in the input industries, which can have positive spillover effects on the broader economy. Positive productivity shock in the manufacturing industry may lead to increased demand for inputs such as raw materials, energy, and transportation services, which can benefit industries that provide these inputs. This can lead to increased output and productivity in these industries, which can have positive spillover effects on the broader economy. Another potential spillover effect of a positive productivity shock is increased competition and innovation in other industries, as firms seek to keep up with the more productive industry. This can lead to increased investment in research and development and the adoption of new technologies, which can have positive spillover effects on the broader economy.

However, there can also be negative spillover effects of productivity shocks. For example, a negative productivity shock in a particular industry can lead to reduced demand for inputs from other industries, which can lead to decreased output and productivity in these industries. This can have negative spillover effects on the broader economy, including reduced employment and economic growth. In addition, productivity shocks can also have distributional effects, with some firms and workers benefiting more than others. For example, firms that are more closely linked to the productive industry may benefit more from positive productivity shocks than firms that are less linked. The spillover effects of productivity shocks in Spain depend on a variety of factors, including the degree of interdependence between industries and the nature of the shock. While positive productivity shocks can have positive spillover effects on other industries and the broader economy, negative productivity shocks can have negative spillover effects. Policymakers need to carefully consider these dynamics when designing policies to promote productivity and economic growth.

The relevant question is whether any productivity shock may cause the same spillover effect, as already studied by authors such us Acemoglu et al. (2012) and Lorenzoni (2009). In this study, sudden change in productivity upward due to FDI productivity shocks spillovers in a firm are referred as productivity shocks. Abrupt increase in productivity is known as positive productivity shocks while a sudden decrease in productivity would be a negative productivity shock.

FDI positive spillovers effects lead to increase in the overall productivity or output of an investment firm. According to the real business cycle theory, increase in output (Martínez-Alonso, Martínez-Romero, and Rojo-Ramírez 2022) (in this study due to exposure of FDI productivity shocks spillovers), raises the marginal product of labor which ultimately lead to rise in real wage rate.

Increase in wages leads to increase in consumption and savings. Savings lead to an increase in investment, which leads to an increase in the stock of capital, an increase in total output, and an increase in employment.

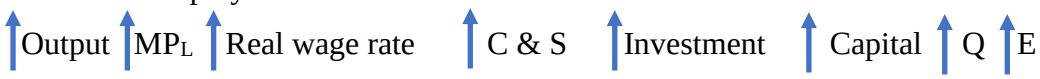

Figure 18a productivity shock

FDI negative spillovers effects lead to a decrease in the overall productivity or output of an investment firm. According to the real business cycle theory, a decrease in output leads to a decrease in overall output and employment so the cyclical fluctuations will be downward.

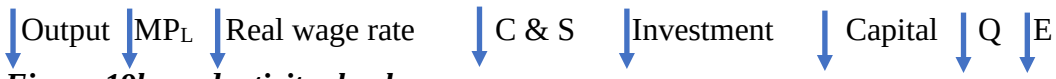

Figure 19b productivity shocks

The theoretical explanation of how productivity shocks may lead to changes in FDI was provided by (Razin and Sadka 2007). They stated in their study that when a country faces a productivity shock, then the marginal return to capital will be affected for all firms. They argued that when positive productivity shock happened, on one hand foreign firms enjoy the higher return on investment and thus involve in FDI. On the other side these shocks raise the value of these firms which facilitate for any acquisitions or mergers to count as FDI. The model by Razin, Sadka, and Tong (2008) is similar to the model of Razin and Sadka (2007) but the difference is based on assumption of worker wages. In this model, it is assumed that worker wages will be gradually increased along with increase in productivity and profit of firms. Positive productivity shocks increase the marginal profitability of a new foreign firm along with increase in demand of inputs (land & labour) and cost of inputs (wages). Positive productivity shocks raise the marginal profitability but lower down the total profitability of a new foreign firm due to increase in the cost of inputs (Razin, Sadka, and Tong 2008). The decision about how much to invest in host market will be governed by the marginal profitability and whether

or not to carry out all the new investments will be based on total profitability of that new foreign investment (Razin, Sadka, and Tong 2008). These described proposals are compatible with traditional theory of investment explained by the marginal value of investment based on Tobin (1969).

Emerging markets are marked as highly volatile in income and investment while consumption is more volatile than income (Aguiar and Gopinath 2007). Firm specific shocks make an important contribution in sales growth (Friberg and Sanctuary 2016). Aggregate productivity shocks are not only contributed to GDP fluctuations but also an important driver of macroeconomic activity (Abaix et al. 2011).

Another study conducted by Zirgulis (2015) to examine positive domestic productivity shocks, positive foreign productivity shocks and capital tax rate in relation with FDI flows. The author found that higher the domestic capital tax rate and positive domestic productivity shocks leads to less FDI inflows while positive foreign productivity shocks lead to high FDI inflows (Torrecillas and Fernández 2022). The findings of this study are that positive domestic productivity shocks leads to decrease in FDI inflows refer back to the study of Razin, Sadka, and Tong (2008) in which they stated that Positive productivity shocks raises the marginal profitability but lower down the total profitability of a new foreign firm and depress the investment.

Research Hypothesis.

Hypothesis (H1). A productivity shock in a firm can be explained (at least partially) by the firm's management practices.

Hypothesis (H2). Productivity shocks in a firm have a spillover effect towards

H2a: other firms in the same industry

H2b: other firms in the same region

Hypothesis (H3). Spillovers may be explained (at least, partially) by an imitation behavior among:

H3a: firms of the same industry

H3b: firms of the same region

Hypothesis (H4). Spillovers may be explained (at least, partially) by knowledge absorption through workers' mobility:

H4a: within the same industry

H4b: within the same region

3.3 Data.

In this study, we analyzed the homogenous firm-level data of 20 manufacturing sectors over the period of almost 20 years from 1996 to 2016. The data / information used in this study to identify the productivity shocks, detect the spillovers and the transmission channels taken from the voluntary survey of business strategies from the finance minister of Spain. Finance ministry of Spain sent the comprehensive questionnaire to 5840 firms of 20 different manufacturing sectors. The questionnaire consists o3.f 400 items on human resource management, production, innovation strategy, markets, governance and financial results. We took various steps to prepare the final sample for this study. First of all, we exclude the firms with missing values. After removal of missing values, our sample consist of 30,937 Observations of 3779 firms from the year 1996 to 2016. There are many incomplete questionnaires which is the main reason for reduction in number of firms for final estimations.

3.3.1 Model and Methodology.

The model used in this study is based on production function that contains the following functions.

$$\frac{Yj,t}{Lj,t} = f\left(\frac{Kj,t}{Lj,t}, \frac{Sj,t}{Lj,t}, \frac{R\&Dj,t}{Lj,t}\right) \ldots\ldots\ldots\ldots (1)$$

The details of the above variables used in the production function are as follows.

Y is net sale of a firm

L is the labor force / work force in a particular firm

K is the stock of capital of a firm

S is the supplies or purchases of a particular firm.

R&D is the total research and development expenses of a firm

j is the firm and t is time period.

The main variables are operationalized as:

1- GTID Total R&D expenses: Total research and development expense of an organization during the whole one year, expressed in Euros.
2- Net Sales: Total Sales of an organization throughout in one year. Sales including merchandise, sales of processed products (finished and semi-finished), provision of services and other sales (containers, packaging, by products and waste) but excluding the rebate and returns of sales, expressed in Euros.
3- Employees: Total personnel employed in the company as of 31 December of each year.
4- Purchases / Supplies: Total Purchases of an organization throughout in one year. Purchases including merchandise, raw material, other supplies and work carried out by other companies, but excluding the rappels and returns of purchases, expressed in Euros.

5- Stock of Capital: Total Value of fixed assets minus the accumulated amortization and provisions, expressed in Euros.
6- Attracting new human capital: Number of staff recruited by an organization with Business and professional experience throughout a year.

(Jannati 2020) also identify the productivity shocks of the 100 largest firms of United States which is consistent with the (Abaix et al. 2011). According to them, firm productivity can be measured by using the ratio of net sales per employee. So, the firms productivity growth can be obtained as an annual log change in the productivity of firms.

$$\text{Productivity Growth j, t} = \ln\left(\frac{Sales\ j,t}{Employees\ j,t}\right) - \left(\frac{Sales\ j,t-1}{Employees\ j,t-1}\right)$$

Here j denotes the firm at time t.

Productivity shocks of the firms measured by extracting the productivity growth $_{j,t}$ from the average productivity growth of other firms.

$$\text{Productivity Shocks j, t} = \text{Productivity Growth j, t} - \frac{1}{\text{N}}\sum_{\text{J}=1}^{\text{N}} \text{Productivity Growth j, t}$$

We adopted the different method to measure the productivity growth from (Jannati 2020) due to nature of our data. In this study we have calculated the partial productivity growth of a firm j in time t by using the net sales per employee as per following equation (2).

$$\text{Partial Productivity Growth j, t} = \left(\frac{Y\ j,t}{L\ j,t} - \frac{Y\ j,t-1}{L\ j,t-1}\right) / \frac{Y\ j,t-1}{L\ j,t-1} \quad \ldots\ldots\ldots\ldots (2)$$

We also obtained the capital intensity growth of a firm j in time t by using the stock of capital per employee of a firm as per following equation (3).

$$\text{Capital Intensity Growth j, t} = \left(\frac{Kj,t}{L\ j,t} - \frac{Kj,t-1}{L\ j,t-1}\right) / \frac{Kj,t-1}{L\ j,t-1} \quad \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Productivity growth can be estimated by subtracting the capital intensity growth from partial productivity growth as per following.

$$\text{Productivity Growth j, t} = \text{Partial Productivity Growth j, t} - \text{Capital Intensity Growth j, t}$$

$$\text{Productivity Growth j, t} = \left[\left(\frac{Y\ j,t}{L\ j,t} - \frac{Y\ j,t-1}{L\ j,t-1}\right) / \frac{Y\ j,t-1}{L\ j,t-1}\right] - \left[\left(\frac{Kj,t}{L\ j,t} - \frac{Kj,t-1}{L\ j,t-1}\right) / \frac{Kj,t-1}{L\ j,t-1}\right] \quad \ldots\ldots\ldots\ldots (4)$$

After calculation of productivity growth with to net sales per employee and stock of capital per employees as per equation (4), we removed the firms which contained the outliers smaller than -0.9 and greater than 2.00 in productivity growth. 2300 observations having the outliers smaller - 0.9 while 78 observations with greater than +2.00 in productivity growth are excluded from the sample. Total 2378 observations are excluded as an outlier which represents 7.6% exclusion from the sample. After

exclusion, the final estimation sample consists of 28,559 observations from 3,729 different firms from the year 1996 to 2016. Figure # 02 shows the histogram of productivity growth after 7.6% outlier exclusion from the sample.

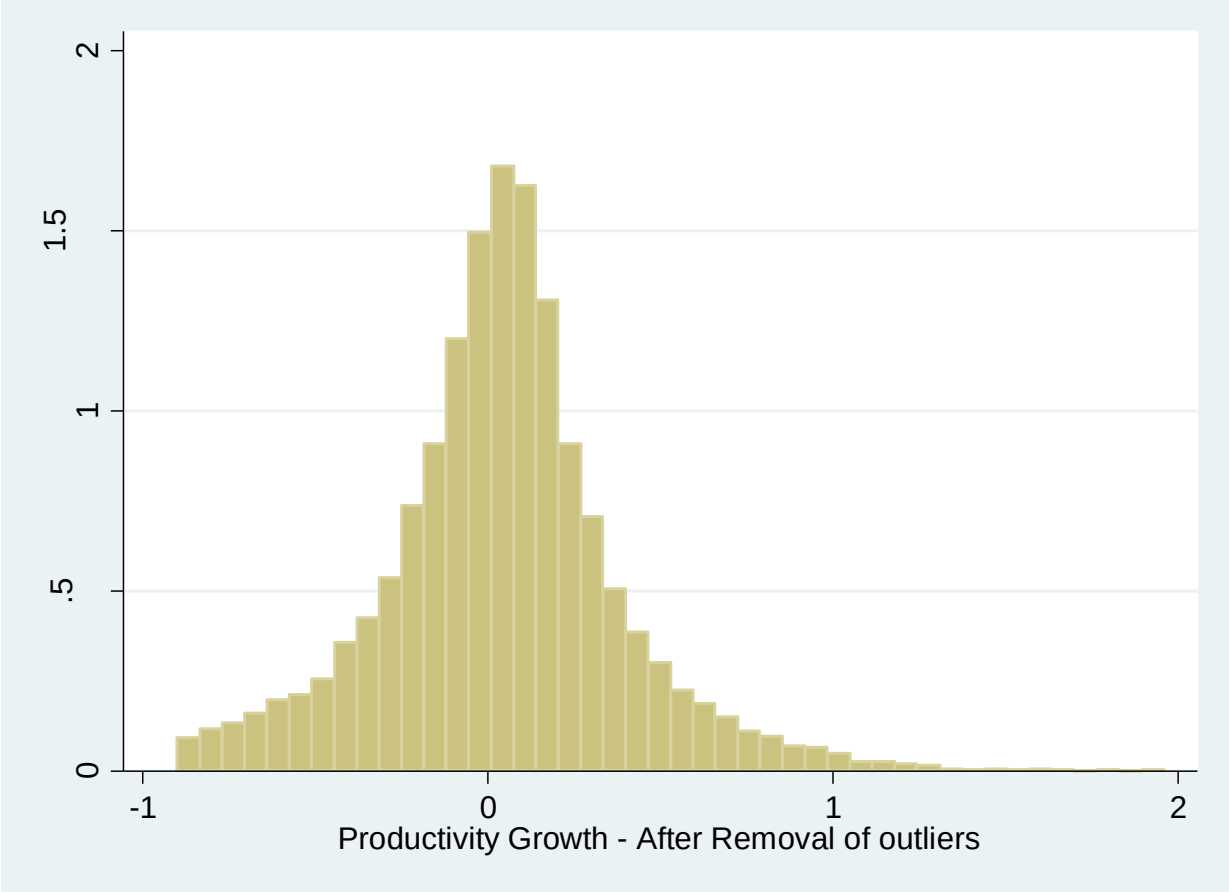

Figure 20 Histogram of Productivity Growth of total 3729 firms from the Year 1996 to 2016.

After finalization of this sample, we estimated the productivity shock of the firm J in time t in 20 sectors and in 17 regions of the Spain. For the estimation of the productivity shock, we consider that productivity growth of a firm j shall be more than 20% and remains consistent above 20% in at least two consecutive years. We did not select the firms in the final sample for estimation of productivity shock, whose productivity growth is less than 20% and was not consistently above 20% in at least two consecutive years. After calculation, a productivity shock was detected in 977 firms with 1502 observations from the year 1997 to 2016. Productivity shocks were observed in 1502 observations out of 28,559 which represents 5.25 % of the total sample. This definition of productivity shock may seem arbitrary, but it verifies a condition which is important to the purposes of this research. It must be obvious and recognizable to the rest of the firms of its context (industry or region). For this reason, we

require an important and persistent increase in productivity of a firm, to consider it a significant productivity shock (Tarifa Fernández, Cespedes-Lorente, and de Burgos Jiménez 2022).

Could this criterion ignore significant increases of productivity that might be relevant to study? We believe it is the case. Being demanding in the selection of productivity shocks ensures less error when trying to detect the spillover effect in a causal model. A laxer criterion would include a higher number of shocks non-noticeable to the rest of the firms, and this would not allow verifying hypothesis about the mechanisms of absorption of spillovers.

After calculation of productivity shock, coefficient of variable "number of productivity shocks" in the same year calculated for the sectors and regions of Spain in order to identify the spillover effect in the production function.

$$\frac{Yj,t}{L\ j,t} = f\ (\frac{Kj,t}{Lj,t}\ ,\ \ \frac{Sj,t}{Lj,t}\ ,\ \frac{R\&Dj,t}{Lj,t}\ , no.\ P.S.st) \ \ldots\ldots\ldots (5)$$

In the above equation (5), number of P.S.st refers to number of productivity shock in sector s, time t.

$$\frac{Yj,t}{L\ j,t} = f\ (\frac{Kj,t}{Lj,t}\ ,\ \ \frac{Sj,t}{Lj,t}\ ,\frac{R\&Dj,t}{Lj,t}\ , no.\ P.S.rt) \ \ldots\ldots\ldots (6)$$

Here number of P.S.rt refers to number of productivity shock in region r, time t.

In order to identify the effect of management practices implemented by firms, we added the attracting human capital and introduction of modern manufacturing techniques as a vector of variables of management practices in the production function (Ferreira et al. 2023).

$$\frac{Yj,t}{L\ j,t} = f\ (\frac{Kj,t}{Lj,t}\ ,\ \ \frac{Sj,t}{Lj,t}\ ,\frac{R\&Dj,t}{Lj,t}\ ,\ AHC\ \times number\ of\ P.S.st, VMP) \ \ldots\ldots (7)$$

$$\frac{Yj,t}{L\ j,t} = f\ (\frac{Kj,t}{Lj,t}\ ,\ \ \frac{Sj,t}{Lj,t}\ ,\frac{R\&Dj,t}{Lj,t}\ , AHC\ \times number\ of\ P.S.,rt\ VMP) \ \ldots\ldots (8)$$

Here variable AHC x number of P.S is the product of attracting human capital and number of productivity shock in sector and region wise.

3.3.2 Results and Discussion.

Firstly, we report the summary statistics of the main variables used in this study in the table 1.

Variable Name	Mean	Median	Standard Deviation	Number of Observations
Productivity Shock	0.45	0.36	0.25	1502
Productivity Growth	- 0.38	0.01	30.64	30,937

Partial Productivity Growth	0.18	0.02	17.25	30,937
Capital intensity growth	0 .57	0.00	25.38	30,937
Net sales per employee	181484.3	120336.2	270305.3	30,937
Stock of capital per employee	74737.56	34355.59	241651.9	30,937

Table 5 Summary statistics of main variables.

After that we calculated the partial productivity growth and capital intensity growth of a firm j in time t in order to measure the productivity growth of a firm j in time t. Partial productivity growth is measured by using the two variables net sales and total workforce of a firm j in time t. Partial productivity growth of a firm j in time t is estimated by using the net sales per employee as per equation (2).

After partial productivity growth, we estimated the capital intensity growth by using the variables stock of capital and total workforce of a firm j in time t. First, we calculated the stock of capital per employees and then obtained the capital intensity growth of a firm j in time t by using the equation # 03. After obtaining the partial productivity growth and capital intensity growth, we estimated the productivity growth of firms as per equation # 04.

After obtaining the productivity growth of a firms, we estimated the productivity shock. Productivity shock detected in 977 firms with 1502 observations from the year 1997 to 2016. Figure # 03 illustrate the histogram of productivity shock observed in 1502 observations out of 28,559 which represents 5.25 % of the total sample.

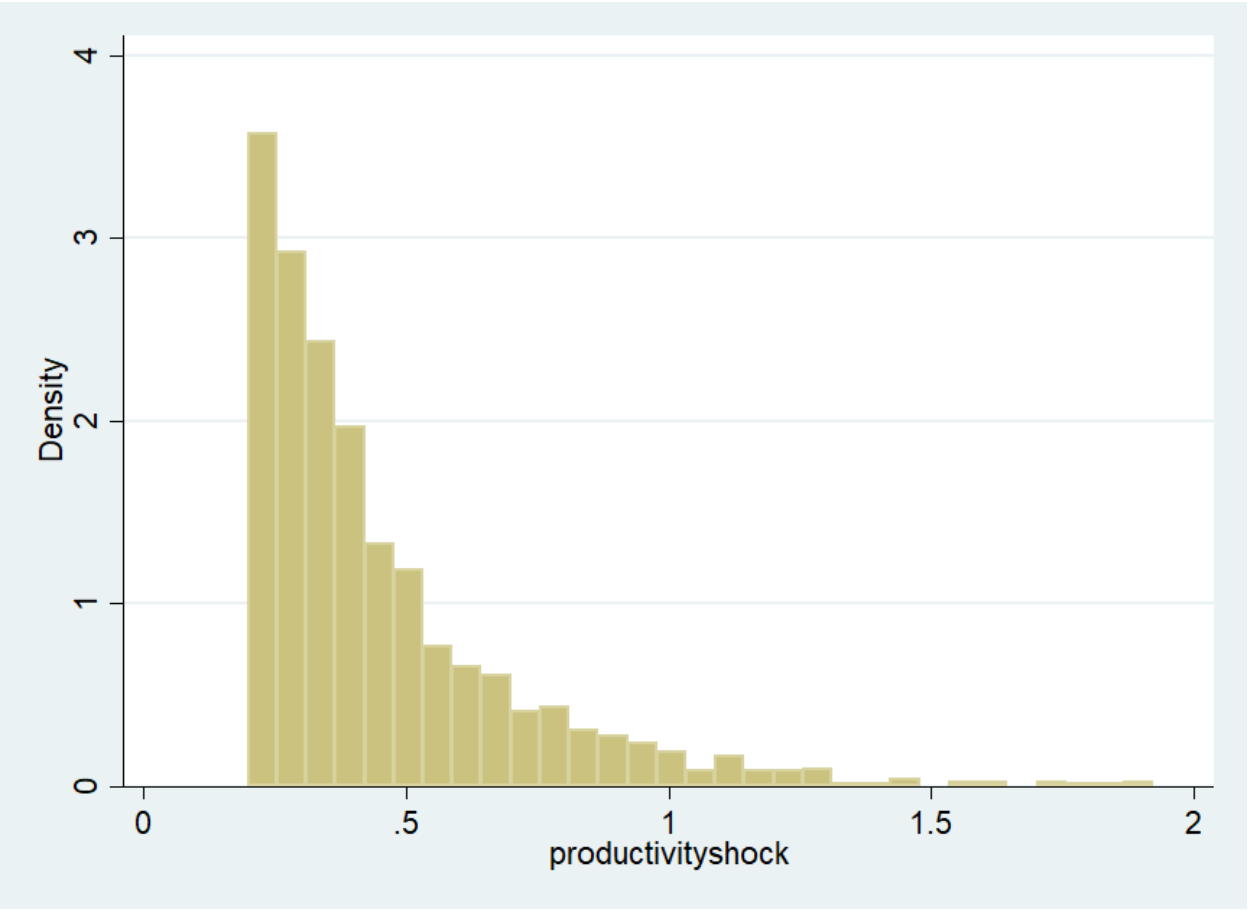

Figure 3 Productivity shock of 977 firms with 1502 observations from the year 1997 to 2016.

Once we have detected a number of productivity shocks in the firms, the relevant research question is what are the causes of this outstanding performance? Is it intended? Or is it the result of a change in the context of the firm? We have a limited number of variables of what we called management practices, particularly, New attracting human capital and Introduction of modern manufacturing techniques represent the good management practices in the firms. The first one is representative of a collection of human capital practices that are considered some of the most important drivers of competitiveness of a firm (Bloom and van Reenen, 2010). The second represents the introduction of production innovations and presents a high correlation with the introduction of new products in the market. Table 2 shows the estimations of the model PS = f(VMP). Here VMP is vector of management practices which denotes by attracting human Capital and Introduction of Modern Manufacturing techniques in our research study. Estimated coefficients as per table 2 are positive and highly significant. These results support H1. However, this estimation should not be considered as an estimation of a causal model, since the limited number of management practices is not complete enough to explain productivity shocks. The consistent estimation under heterogeneity of the function

indicates the existence of a high correlation between both management practices and productivity shocks, which is useful for the purpose of this work.

Dependent Variable: Productivity Shock		
Method: Panel Generalized Method of Moments 2SLS instrument weighting matrix		
Variables	**Coefficient**	**Prob.**
New attracting human capital	0.190851	0.0000
Introduction of modern manufacturing techniques	0.071835	0.0000

Table 2 Productivity shock of 977 firms from the year 1997 to 2016.

Variable Name	**Mean**	**Median**	**Standard Deviation**
ln Y/L	11.66	11.65	0.85
ln k/L	10.23	10.37	1.44
ln S/L	10.88	10.96	1.25
ln R & D / L	7 .22	7.31	1.50
Sector	10.05	10	5.42
Number of productivity shocks	0.24	0.00	1.49
Attracting human capital x number of productivity shock	0.22	0.00	1.44
Attracting human capital	0.93	1.00	0.24
Introduction of Modern manufacturing techniques	3.44	4.00	0.72

Table 3 Variables Summary Statistics.

To ascertain whether productivity shocks within a company lead to a ripple impact on neighboring firms within both the same industry and same region, we compute the coefficient for the "number of productivity shocks" within the same fiscal year, focusing on Spain's various sectors and regions. Table 4 vividly illustrates the inter-firm influence originating from a firm's performance across Spain's 20 sectors, as depicted in equation #05.

Dependent Variable: LN Sales over labour		
Method: Panel Generalized Method of Moments 2SLS instrument weighting matrix		
Variables	**Coefficient**	**Prob.**
LN Stock of capital over labour	0.158306	0.0000
LN Supplies over labour	0.788293	0.0000
LN GTID total RD expenses over labour	0.046585	0.0000
Number of productivity shocks	0.010519	0.0000

INDDUMMY1	0.957587	0.0000
INDDUMMY2	0.996420	0.0000
INDDUMMY3	1.053614	0.0000
INDDUMMY4	1.116065	0.0000
INDDUMMY5	1.094421	0.0000
INDDUMMY6	0.954877	0.0000
INDDUMMY7	0.982195	0.0000
INDDUMMY8	1.280550	0.0000
INDDUMMY9	1.039451	0.0000
INDDUMMY10	1.038636	0.0000
INDDUMMY11	1.231227	0.0000
INDDUMMY12	0.998419	0.0000
INDDUMMY13	1.078047	0.0000
INDDUMMY14	1.019125	0.0000
INDDUMMY15	1.141846	0.0000
INDDUMMY16	1.047505	0.0000
INDDUMMY17	0.933650	0.0000
INDDUMMY18	0.797048	0.0000
INDDUMMY19	1.127964	0.0000

Table 4 Spillover effect of firms in 20 sectors of Spain from the year 1997 to 2016.

Table 4 presents the estimations for equation (5) for sectors in Spain. The estimation of a firm's productivity as a transformed production function, adds a variable that measures the number of productivity shocks (PS) that have taken place in the sector of the firm. Our hypothesis affirms that a firm may benefit from other firm's increases in productivity. This means that innovations or any improvements in some firms of an industry may spillover towards the other firms. Our estimation selects the number of the positive shocks in productivity that take place within an industry. The estimated coefficient is positive and highly significant, even correcting for the industry effect through a set of dummy variables. This clearly supports the hypothesis H2a. Similarly, shock spillovers from 100 large dominant firms of United States of America to domestic non-dominant firms were found (Jannati. 2020).

Table 6 shows the estimation of equation (6) for Spanish regions. Similarly, the estimation of a firm's productivity as a transformed production function, adds a variable that measures the number of productivity shocks (PS) that have taken place in the region of the firm. The coefficient of the number of productivity shocks is positive and strongly significant, even when correcting for the regional effect through a set of dummy variables, which supports the hypothesis H2b.

	Equation 5 (Table 4)		Equation 7 (Table 8)	
Variable	Coefficient	p-value	Coefficient	p-value
K/L	0.15	0.0000	0.148	0.0000
S/L	0.78	0.0000	0.771	0.0000
R&D/L	0.04	0.0000	0.052	0.0000
Productivity shock (PS)	0.01	0.0000		
Hhrr (Attracting human capital)			0.111	0.0000
Hhrr*PS (Attracting human capital x Productivity shock)			0.008	0.0003
Introduction of modern manufacturing techniques			0.070	0.0000

Table 5 Dependent variable Sales/Labor. Estimation of industry spill overs in 20 Sectors

Dependent Variable: LN Salesoverlabour		
Method: Panel Generalized Method of Moments 2SLS instrument weighting matrix		
Variables	**Coefficient**	**Prob.**
LN Stock of capital over labour	0.110788	0.0000
LN Supplies over labour	0.640518	0.0000
LN GTID total RD expenses over labour	0.014656	0.0000
Number of productivity shocks	0.009065	0.0000
CCAA1DUMMY1	3.396304	0.0000
CCAA1DUMMY2	3.433932	0.0000
CCAA1DUMMY3	3.371083	0.0000
CCAA1DUMMY4	3.360240	0.0000
CCAA1DUMMY5	3.504676	0.0000
CCAA1DUMMY6	3.479372	0.0000
CCAA1DUMMY7	3.431716	0.0000
CCAA1DUMMY8	3.426318	0.0000
CCAA1DUMMY9	3.518635	0.0000
CCAA1DUMMY10	3.470789	0.0000
CCAA1DUMMY11	3.309706	0.0000
CCAA1DUMMY12	3.444241	0.0000
CCAA1DUMMY13	3.479775	0.0000
CCAA1DUMMY14	3.418649	0.0000
CCAA1DUMMY15	3.462414	0.0000
CCAA1DUMMY16	3.472212	0.0000
CCAA1DUMMY17	3.486150	0.0000

Table 6 illustrate the spillover effect of a firms in the 17 regions of Spain as per equation # 06.

The existence of the spillover effect is known and now observed in our empirical evidence. The existence of positive productivity shocks within an industry or a region, leads to increases in productivity in the rest of the firms in the industry and the region, respectively. Less well known is the mechanism through which these overflows occur (Lwesya, 2022). In order to investigate them, spillovers may be explained (at least, partially) by an imitation behaviour among firms of the same industry and firms of the same region, we introduced two variables of management practices (Attraction of new Human Capital and Introduction of more modern production techniques) to the production function. The estimated coefficients are positive and highly significant in case of Attracting the new human capital and introduction of modern manufacturing techniques as per estimation demonstrated in table 8 & 9. As H1 is true and estimated coefficients of attracting the new human capital and introduction of modern manufacturing techniques are positive and highly significant, which means H3a and H3b are true (Men, Sun, and Kou 2022). The spillover effect refers to the positive externalities or benefits that are generated by a firm's activities and investments in a particular region, which are then spread or shared with other firms or sectors in the region. In the case of Spain, the spillover effect of a firm in one of the 17 regions can have significant impacts on the local economy and other regions in the country. There are several ways in which the spillover effect of a firm can manifest in the 17 regions of Spain: A firm's investment in a particular region can create job opportunities not only for its own employees but also for other firms in the region that provide goods and services to the firm. This can lead to a multiplier effect, where the creation of one job leads to the creation of several more jobs in the region. A firm's investment in research and development can lead to the development of new technologies or products, which can benefit other firms in the region that use or adapt these innovations. This can create a culture of innovation in the region, leading to further growth and development. A firm's investment in infrastructure, such as transportation or communication networks, can improve the overall business environment in the region and make it more attractive for other firms to invest and operate there. A firm's investment in training and development of its employees can lead to the development of a skilled workforce in the region, which can benefit other firms that require similar skills or knowledge. A firm's investment in international trade can lead to the creation of export markets, which can benefit other firms in the region that produce goods or services that can be sold internationally.

The spillover effect of a firm in one of the 17 regions of Spain can have significant positive impacts on the local economy and other regions in the country. These effects can include the creation of jobs,

the development of new technologies and products, improvements in infrastructure, the development of a skilled workforce, and the creation of export markets. Therefore, it is important for policymakers and business leaders to encourage investment and growth in the regions to maximize these positive externalities. In this case, if H1 was not true then we can say that firms are taking actions to improve their competitiveness against the market firm leaders.

	Equation 6 (Table 6)		**Equation 8 (Table 9)**	
Variable	**Coefficient**	**p-value**	**Coefficient**	**p-value**
K/L	0.110	0.0000	0.110	0.0000
S/L	0.640	0.0000	0.640	0.0000
R&D/L	0.014	0.0000	0.016	0.0000
Number of Productivity shock (PS)	0.009	0.0000		
Attracting human capital (AHC)			0.030	0.0000
AHC*PS (Attracting human capital x Number of Productivity shock)			0.007	0.0000
Introduction of modern manufacturing techniques			0.009	0.0022

Table 7 Dependent variable Sales/Labour. Estimation of industry spillovers in 17 regions.

Dependent Variable: LN Sales over labour		
Method: Panel Generalized Method of Moments 2SLS instrument weighting matrix		
Variables	**Coefficient**	**Prob.**
LN Stock of capital over labour	0.148637	0.0000
LN Supplies over labour	0.771846	0.0000
LN GTID total RD expenses over labour	0.052395	0.0000
New attracting human capital x Number of productivity shocks	0.008142	0.0000
New attracting human capital	0.111453	0.0003
Introduction of modern manufacturing techniques	0.070961	0.0000
INDDUMMY1	0.924158	0.0000

IN DDUMMY2	0.948952	0.0000
INDDUMMY3	1.004752	0.0000
INDDUMMY4	1.035703	0.0000
INDDUMMY5	1.005554	0.0000
INDDUMMY6	0.877455	0.0000
INDDUMMY7	0.947604	0.0000
INDDUMMY8	1.203057	0.0000
INDDUMMY9	0.992153	0.0000
INDDUMMY10	0.979466	0.0000
INDDUMMY11	1.125318	0.0000
INDDUMMY12	0.943704	0.0000
INDDUMMY13	1.001523	0.0000
INDDUMMY14	0.949765	0.0000
INDDUMMY15	1.085593	0.0000
INDDUMMY16	0.979190	0.0000
INDDUMMY17	0.876364	0.0000
INDDUMMY18	0.751028	0.0000
INDDUMMY19	1.051842	0.0000

Table 8 Absorption capacity of firms in 20 sectors of Spain from the year 1998 to 2016 as per equation # 07.

We also introduce the product of the variables Productivity Shocks and Attraction of new human capital. This help us to measure whether the Spill overs may be explained (at least, partially) by knowledge absorption through workers' mobility within the same industry and within the same region. The absorption capacity of firms refers to their ability to effectively assimilate and use new knowledge and technologies to improve their productivity, competitiveness, and innovation. In the context of Spain, the absorption capacity of firms in 20 sectors from 1998 to 2016 can be analyzed to understand how effectively firms were able to adapt to changing market conditions and technological advances during this period. There are several factors that can impact the absorption capacity of firms, including, the education and skills of employees can impact a firm's ability to absorb and utilize new knowledge and technologies. A firm's research and development capabilities can impact its ability to innovate and develop new products or services. Competition within a particular industry or sector can drive firms to improve their productivity and innovation. A firm's ability to access financial resources can impact its ability to invest in new technologies and infrastructure. Government regulations can impact a firm's ability to innovate and adapt to new market conditions. In Spain, the absorption capacity of firms in 20 sectors from 1998 to 2016 can be analyzed using various indicators, such as the number of patents filed, R&D expenditures, labor productivity, and export intensity. These indicators can provide insights into the ability of firms to innovate, adopt new technologies, and expand into new markets.

For example, in the manufacturing sector, firms that invested in R&D and innovation improved their productivity and competitiveness, leading to higher export intensity and market share. Similarly, in the services sector, firms that invested in human capital and technology were able to expand their offerings and increase their revenue. The absorption capacity of firms in Spain can impact their ability to compete in global markets, attract foreign investment, and contribute to the country's economic growth. Therefore, it is important for policymakers and business leaders to identify and address the factors that may be hindering firms' absorption capacity, such as lack of access to capital or a weak regulatory environment, to support their growth and competitiveness in the long term. The estimated coefficients are positive and highly significant in case of AHC x number of P.S as per estimation demonstrated in table 8 & 9. Hence strongly support H4a & H4b.

Dependent Variable: LN Sales over labour		
Method: Panel Generalized Method of Moments 2SLS instrument weighting matrix		
Variables	**Coefficient**	**Prob.**
LN Stock of capital over labour	0.110059	0.0000
LN Supplies over labour	0.640531	0.0000
LN GTID total RD expenses over labour	0.016481	0.0000
New attracting human capital x Number of productivity shocks	0.007848	0.0000
New attracting human capital	0.030334	0.0000
Introduction of modern manufacturing techniques	0.009967	0.0022
CCAA1DUMMY1	3.338931	0.0000
CCAA1DUMMY2	3.376615	0.0000
CCAA1DUMMY3	3.311575	0.0000
CCAA1DUMMY4	3.297121	0.0000
CCAA1DUMMY5	3.448208	0.0000
CCAA1DUMMY6	3.424892	0.0000
CCAA1DUMMY7	3.371475	0.0000
CCAA1DUMMY8	3.365405	0.0000
CCAA1DUMMY9	3.461283	0.0000
CCAA1DUMMY10	3.411426	0.0000
CCAA1DUMMY11	3.246977	0.0000
CCAA1DUMMY12	3.383602	0.0000
CCAA1DUMMY13	3.422951	0.0000
CCAA1DUMMY14	3.361746	0.0000
CCAA1DUMMY15	3.401441	0.0000
CCAA1DUMMY16	3.413966	0.0000
CCAA1DUMMY17	3.426340	0.0000

Table 9 Absorption capacity of firms in 17 regions of Spain from the year 1994 to 2016 as per equation # 08.

3.4 Conclusion.

The main objective of this research is to detect the productivity shocks, transmission of productivity shocks spillovers occurred, a spillover effect towards other firms in the same industry and other firms in the same region and to identify the transmission mechanism of firms within the sectors and regions of Spain. The main contribution of this chapter is a design of wide scope research that covers all the relevant research questions about spillovers. First, we identify productivity shocks in a large dataset of firm-level data. Second, spillovers to other firms in the same region or industry are measured. Then, the question is: is there imitation of management practices? Or is there just a competitive improvement among competitors?

There are evidences that the productivity spillovers happened among the firms within sectors as well as with in the regions. Spill overs effect is known and well demonstrated in empirical evidence. Our hypothesis affirms that a firms benefited from other firm in the sectors and regions. This means that innovations or any improvements in some firms of an industry result in spillover towards the other firms. Our estimation witnessed the number of the positive shocks in productivity that take place within an industry and within the regions. The estimated coefficients are positive and highly significant, even correcting for the industry / regional effect through a set of dummy variables. We examined, when there are strong improvements in productivity in some of the companies in the sectors and regions, the rest of the companies in the sector / region are pushed to improve. They adopted good management practices allow to improve the productivity of their firms (positive and significant coefficients of the individual variables). In addition, the management practices themselves, such as the recruitment of new talent, allow for an additional increase in productivity, since they improve the capacity to absorb the spill overs that come from the companies that are market leaders or excelling in the Spanish market. The results clearly show that knowledge spills over and is transmitted among the firms within the sector and region through imitation and workers mobility.

Our findings support that productivity shocks, like those driven by foreign direct investments (FDIs) play an important role in overall productivity of local firms. Foreign direct investment (FDI) can play an important role in the overall productivity of local firms by providing a range of benefits that can help these firms to become more efficient and innovative. FDIs can bring new technologies and business practices to the local market, which can help local firms to become more productive. Foreign companies may have access to cutting-edge technologies that are not yet available in the local market, and they can transfer this technology to local firms through joint ventures, licensing agreements, and other means. By adopting new technologies, local firms can improve their production processes, enhance product quality, and reduce costs. FDIs can provide local firms with access to new markets, both

domestically and internationally. Foreign companies often have established distribution networks and customer bases in their home countries, which local firms can tap into through partnerships and other forms of collaboration. This can help local firms to expand their customer base, increase sales, and boost productivity. FDIs can also bring new talent and expertise to the local market, which can help to improve the quality of the local workforce. By working alongside foreign employees, local workers may learn new skills and knowledge that can help them to become more productive and innovative. In addition, foreign companies may provide training and development opportunities to local workers, which can help them to acquire new skills and advance their careers. FDIs can increase competition in the local market, which can encourage local firms to become more productive in order to compete. When foreign companies enter the market, they bring with them new products, services, and business models that may be more efficient and effective than those of local firms. This can spur local firms to innovate and improve their operations, leading to increased productivity. FDIs can play an important role in the productivity of local firms by providing access to new technologies, markets, human capital, and competition. However, it is important for policymakers to carefully manage FDI policies in order to maximize the benefits and minimize any potential negative effects, such as job losses or the transfer of profits to foreign countries. When contemplating future reform options, our findings show that Domestic firms pushed themselves to improve the productivity through imitation and workers mobility, when there are strong improvements in productivity in the sectors or regions, could all be beneficial. The result of this study helps to understand all the stakeholders about impact of FDIs on domestic firms and helpful to develop strategies for attraction and retaining the FDIs in the country.

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Chapter 4. Importance of Environment Policy on Firm Performance for the Textile Industry: A Contextual Study of Pakistan.

4.1 Introduction.

The scientific consensus is that global warming is happening, and that human activities are the primary cause (R. Wang et al., 2022). To mitigate the impacts of global warming, individuals, organizations, and governments can take action to reduce greenhouse gas emissions, increase energy efficiency, promote renewable energy sources, and support policies and technologies that enable adaptation to the changes already underway (Dreyfus et al., 2022).

Environmental protection refers to efforts made to conserve and protect the natural environment and its resources (Jeong & Lee, 2022a). This includes measures to prevent pollution and degradation of air, water, and soil, as well as efforts to protect and preserve natural habitats, wildlife, and biodiversity (Ullah et al., 2021). Environmental protection is important because the health and well-being of humans and other species depend on a healthy environment. Pollution, climate change, and other environmental problems can have significant negative impacts on human health, economies, and social well-being (Bananuka et al., 2021). Additionally, natural resources such as clean air and water are necessary for human survival and are vital to many industries, including agriculture, tourism, and manufacturing (Barón Dorado et al., 2022). Efforts to protect the environment can take many forms, including individual actions such as reducing waste and energy consumption, and collective actions such as supporting policies and regulations that promote sustainability and conservation. Governments, businesses, and organizations also play a crucial role in protecting the environment through laws and regulations, sustainable practices, and investment in green technologies and infrastructure (Underdal, 2010).

Circular economies can contribute significantly to environmental protection by reducing waste and pollution, conserving resources, and promoting sustainable practices (Andersen, 2007). In a circular economy, materials are kept in use for as long as possible, and waste is minimized through recycling, reuse, and repurposing of materials (Pomponi & Moncaster, 2017). This approach can reduce the need for new resources and decrease the amount of waste that ends up in landfills or pollutes the environment (Mhatre et al., 2021). Some ways that circular economies can contribute to environmental protection include, circular economies aim to eliminate waste by designing products for reuse and recycling (Olabi et al., 2023). This can reduce the need for landfill space and decrease the amount of pollution that is generated by waste disposal. By reusing and repurposing materials, circular economies

can conserve natural resources such as minerals, metals, and water (Charef & Emmitt, 2021). Circular economies can reduce greenhouse gas emissions by reducing the need for new resource extraction, manufacturing, and transportation. Circular economies prioritize sustainable practices such as energy efficiency, renewable energy, and responsible resource management. Circular economies can create new jobs in industries such as recycling and repurposing, which can contribute to local economic (Esposito et al., 2018) development. The circular economy model can help to reduce environmental impacts and promote sustainability by shifting from a linear "take-make-dispose" approach to a more circular, closed-loop system (Tang et al., 2022). There is an avenue of research about the positive impact of environmental policy and circular economy on the environmental results. Our research questions about the impact of this policies on firm performance. In the context of this thesis, we are interested in investigating what are the firm internal and external determinants of how a particular shock (adoption of environmental policies) may affect a firm's performance.

Enforcement of environmental protection laws can be particularly challenging in emerging economies, where there may be limited resources, weak governance structures, and a lack of public awareness and education on environmental issues (Shehata et al., 2022). However, there are several strategies that can help to improve the effectiveness of environmental law enforcement in some contexts. Establishing strong legal frameworks for environmental protection is essential for effective enforcement. This includes developing comprehensive and clear laws and regulations that are consistent with international standards, and creating mechanisms for monitoring and enforcing compliance. Developing the capacity of institutions responsible for environmental protection, including regulators and enforcement agencies, can help to ensure effective enforcement of environmental laws (Taghipour et al., 2022). This includes providing training, equipment, and resources for monitoring, investigation, and enforcement activities.

Engaging with local communities, civil society organizations, and the private sector can help to build support for environmental protection and promote compliance with environmental laws (Quintana-García et al., 2022). This can include public education campaigns, stakeholder consultations, and collaboration with industry groups to promote best practices. Establishing penalties and sanctions for non-compliance with environmental laws can help to deter violations and promote compliance (Young, 2010). This includes financial penalties, revocation of permits or licenses, and criminal sanctions where appropriate. International cooperation and support can help to strengthen environmental law enforcement in emerging economies (Babiak & Trendafilova, 2011). This includes technical assistance, capacity building, and financial support from international organizations, as well as cooperation and information sharing among countries to address transboundary environmental issues (Abbas et al., 2021).

Effective enforcement of environmental protection laws in emerging economies requires a combination of legal frameworks, institutional capacity, public participation, penalties and sanctions, and international cooperation (Ali et al., 2019). These strategies can help to address the unique challenges faced by emerging economies and promote sustainable development.

The Sustainable Development Goals (SDGs) and environmental protection laws are closely related, as both aim to promote the sustainable use of natural resources and protect the environment for future generations (Griggs et al., 2013).

The SDGs, adopted by the United Nations in 2015, are a set of 17 global goals aimed at ending poverty, protecting the planet, and ensuring prosperity for all. Several of the SDGs, including Goal 6 (Clean Water and Sanitation), Goal 7 (Affordable and Clean Energy), Goal 11 (Sustainable Cities and Communities), Goal 12 (Responsible Consumption and Production), Goal 13 (Climate Action), and Goal 15 (Life on Land), are directly related to environmental protection (Griggs et al., 2013).

Environmental protection laws, on the other hand, are laws and regulations that govern the use of natural resources and aim to protect the environment from pollution, degradation, and other harmful activities (Olabi et al., 2023). These laws can take many forms, including regulations on emissions, land use, waste disposal, and protection of natural habitats. The implementation of the SDGs and environmental protection laws requires cooperation between governments, businesses, and individuals (Ogunmakinde et al., 2022). Governments are responsible for creating and enforcing laws that promote environmental protection, while businesses and individuals have a role to play in adopting sustainable practices and reducing their impact on the environment. The SDGs and environmental protection laws are important tools for promoting sustainable development and protecting the environment for future generations (Estevão et al., 2023).

According to studies, increased public knowledge of environmental deterioration and increased fears about public health encourage residents to push governmental authority to affect environmental decisions (Malla et al., 2022). Despite the promises stated in the legislation's language, Pakistani society lacks a significant institutional structure to encourage public engagement in environmental preservation. The Pakistani government reacts to public demands on an *ad hoc* basis, with little institutional commitment to addressing citizens on environmental matters. This is sad, as public policies that do not allow for meaningful public input are constantly tainted by exploitation (Nkrumah Agyabeng et al., 2022).

The willingness of local governments to implement environmental rules and public engagement in environmental management varies greatly throughout (Agyemang et al., 2019). Most inland regions with a poor economy are more prone to disregarding environmental regulations (Nian et al., 2022).

Politicians are often more interested with local economic growth than environmental conservation. Firms' actions not only provide the intended outputs, but they also pollute the environment by generating wastewater, producing noise pollution, air pollution, and land pollution, all of which have a detrimental influence on our ecosystem. As public awareness of environmental contamination grows, the topic of environmental management becomes more significant (Jum'a et al., 2022).

The placement of polluting enterprises is also influenced by regional variances in environmental policies. According to the well-known pollution haven theory, polluting companies will seek to migrate to nations with less regulations, resulting in pollution havens (De Beule et al., 2022). On the one hand, the Heckscher–Ohlin model is principally responsible for theoretical studies of pollution havens. They developed a North–South general equilibrium model in their seminal work to explain the link between international commerce and pollution. The North, in their paradigm, is a more developed country with a better standard of living, whereas the South is a less developed country with a lower standard of living (Cuvero et al., 2022). Both countries control the environment through pollution charges. According to their findings, in a free-trade situation, the developed North will choose for a high-level environmental tax. As a result, all polluting businesses are forced to shift to the South, which has lower pollution taxes. Copeland and Taylor's model was recently extended to include a broader framework, providing strong theoretical support for the pollution hypothesis (Bashir, 2022).

The majority of empirical research on pollution havens to date has been on the inter-country migration or intra-country relocation of polluting enterprises in developed economies such as the United States. On the other hand, the influence of environmental rules on intra-country industrial mobility has received less study in developing economies such as Pakistan. Additionally, the bulk of studies concentrate only on enforcing official regulations, overlooking the critical role of public participation in environmental governance. Additionally, previous research has frequently used the cost of pollution abatement or the intensity of pollutant emissions as proxy metrics for environmental legislation (Ikram et al., 2019). These proxies may pose a worry about endogeneity into regression analysis. Avoiding pollution may enable firms to reduce energy consumption, regulate expenses, and reuse commodities through the recycling process.

The textile industry is a major contributor to Pakistan's economy, accounting for a significant portion of the country's GDP and employment. However, the industry has also been identified as a major source of pollution and environmental degradation, particularly in the areas of water and air pollution. In order to address these environmental challenges, Pakistan has implemented a number of environmental policies and regulations aimed at reducing pollution and promoting sustainable development. The importance of environmental policy on firm performance for the textile industry in

Pakistan cannot be overstated. There are several reasons why environmental policy is crucial for the industry's performance, including Environmental policies and regulations require textile firms to meet certain standards in terms of emissions, waste management, and resource use. Firms that are able to comply with these regulations are more likely to avoid fines and penalties, as well as potential damage to their reputation. Many environmental policies and regulations are designed to encourage firms to adopt more efficient and sustainable practices. By reducing waste, conserving resources, and improving energy efficiency, firms can often reduce their operating costs and improve their bottom line. Firms that adopt sustainable practices and comply with environmental regulations are often viewed more favorably by consumers, investors, and other stakeholders. This can help to improve the firm's reputation and brand value, which can translate into increased sales and market share. Increasingly, consumers and businesses are looking for environmentally sustainable products and services. Firms that are able to demonstrate their commitment to sustainability may be able to access new markets and customers that are willing to pay a premium for environmentally friendly products. Environmental policy is critical for the performance of the textile industry in Pakistan. By promoting sustainable practices and reducing pollution, these policies can help firms to comply with regulations, save costs, improve their reputation, and access new markets. In order to maximize the benefits of environmental policy, it is important for policymakers to work closely with industry stakeholders to ensure that regulations are effective, feasible, and supported by the industry.

In recent years, there has been growing concern about the environmental impact of the textile industry, and many countries, including Pakistan, have introduced environmental policies to regulate the industry and encourage firms to adopt more sustainable practices. The study "Importance of Environmental Policy on Firm Performance for the Textile Industry: A Contextual Study of Pakistan" by (Butt, 2021) examines the impact of environmental policy on firm performance in the textile industry in Pakistan. The authors argue that environmental policy can have both direct and indirect effects on firm performance (Adomako & Tran, 2022). The direct effect of environmental policy is through the imposition of regulations and standards that require firms to adopt more sustainable practices. Compliance with these regulations can lead to increased costs for firms, which may impact their profitability in the short term (Makhloufi et al., 2022). However, in the long term, firms that adopt more sustainable practices may be able to reduce their environmental impact and improve their reputation among customers, investors, and other stakeholders, which could lead to improved performance. The indirect effect of environmental policy is through the creation of incentives for firms to innovate and adopt new technologies and practices that are more environmentally sustainable. This can lead to improvements in productivity, cost reduction, and competitiveness, which can contribute to long-term improvements in firm performance (Bhatti et al., 2022).

The study found that environmental policy had a significant positive effect on firm performance in the Pakistani textile industry (R. R. Ahmed et al., 2023). Firms that were more compliant with environmental regulations and had better environmental management practices been found to have higher levels of productivity and profitability. The study also found that firms that adopted more sustainable practices, such as the use of renewable energy and water conservation measures, were more likely to have higher levels of performance. The study suggests that environmental policy can be an important factor in promoting sustainable practices in the textile industry in Pakistan and improving firm performance. It highlights the need for firms to adopt more sustainable practices and to comply with environmental regulations in order to improve their competitiveness and long-term performance (Makhdoom et al., 2023).

In democratic ideals and good governance, the accountability for individuals and their right to freedom is the key characteristics of what is required (M.H. & O.H., 2022). To effectively involve the public in decision-making processes, a government would begin by providing them with necessary information about the issues that they are concerned about, then provide venues for them to express their opinions and consider alternative viewpoints, and finally empower the public to make decisions that are in their individual and collective interests. Taking the form of a political ideal, public participation lays the groundwork for transparent administration. In addition to political philosophers, economists have advocated for more public access to environmental information as well as greater public engagement in environmental decisions. An information-seeking residual claimant should be provided with information about the contract's execution and should be empowered to make choices on the basis of such information, according to neo-institutionalism principles of access to information and decision-making in contractual partnerships. Governments enter into agreements with the people they represent with the goal of preserving the environment through the use of tax payers' (public) funds. Since pollution has a negative effect on the health of the general people, they are the remaining claimant in such circumstances. In this instance, the general public is the residual claimant since pollution has a negative impact on their health, which is a type of residual expense for them (beyond the costs covered by polluters such as pollution fees, fines, factory closures, etc.). Because of this, citizens should be educated about the environmentally friendly enactment of the management and contaminators, and they should be empowered to make environmental decisions on their own behalf (Bianchi et al., 2022).

4.2 Literature Review.

4.2.1 Public Participation.

Rammer et al.,2022 examined the impact of environmental awareness on the adoption of eco-innovations in the German manufacturing sector. The study found that firms located in regions with higher environmental awareness were more likely to adopt eco-innovations, which are innovations that aim to reduce environmental impact. The authors suggest that this is because environmental awareness creates pressure on firms to adopt more sustainable practices. It is investigated the impact of public opinion on the environmental performance of firms in the US (Ahmadova et al., 2022). The study found that firms with a higher level of environmental performance were more likely to be located in areas with a greater level of concern for the environment among the general public. The authors suggest that this is because firms may face pressure from consumers and investors to adopt more sustainable practices. It is examined that relationship between public opinion on climate change and the environmental performance of firms in the US electricity sector (Li et al., 2022). The study found that firms with a higher level of environmental performance were more likely to be located in areas where there was greater concern about climate change among the general public. The authors suggest that this is because firms may face pressure from consumers, investors, and regulators to reduce their carbon emissions.

These studies suggest that public knowledge about environmental concerns can play an important role in promoting sustainable practices among businesses. They highlight the need for businesses to be responsive to public concerns and to adopt more sustainable practices in order to improve their competitiveness and long-term performance (L. Zhao et al., 2022). The foundation of democratic values and effective administration are basis to respect the people and their right to self- determination. To involve the public in decision-making processes, a government must first provide the information that they need to understand the issues that they are concerned about, the public to voice their thoughts and evaluate alternative options then give the people the power to decide in ways that advance their own and the public's interests. The political idea of public participation creates the foundation for open government. Ideas on public participation, which emerged in the 1960s in parallel with the introduction of 'participatory democracy' and were reflected by current perspectives on public involvement in several fields, including planning, by the late 1960s(L. Zhao et al., 2022). Because of the potential benefits of exposing decision-making to a wide variety of public ideas, as interest in this topic expanded, the focus turned away from democratic involvement and toward deliberative participation.

As a way of eliminating the dominance of one type of thinking over others, Habermas' communicative action theory supports fair, free, and open discussion and dialog among all participants (Z. Ahmed et al., 2022). It is paradoxical that Habermas' theories supporting adversarial forms of deliberation that reinforce the supremacy of instrumental-technical reasoning have led to the application of these concepts supporting adversarial forms of deliberation that reinforce the dominance of instrumental-technical reasoning. There has been special interest in the potential for public contributions to enhance decision-making in the environmental sector, which has been particularly strong. In most cases, environmental problems are complicated, controversial, and well-researched issues. Jurgen Habermas's hashed significant impact on this so-called "deliberative approach" (1984, 1987). Affirming Habermas's claim that logical scientific, instrumental-technical thinking has supplanted moral and emotive-esthetic reasoning, we have seen a deterioration in the quality of our lives as well as our social, political, and economic lives.

Participation in environmental decision-making is viewed as a means of bringing a broader, more diverse range of knowledge and beliefs to bear on the complexities and ambiguity of these circumstances, as well as of reinforcing and maintaining the validity of the decisions that have already been reached (Z. Ahmed et al., 2022). It is more likely that effective solutions will be found if public concerns and recommendations are taken into consideration and implemented. It also helps to build consensus and trust, which, in turn, helps to ensure that future problem-solving efforts will be financially viable in the long run. Additionally, well-established theoretical critiques as well as widespread contemporary concern that the scale and frequency of major problems are escalating, signaling a breakdown in established "rational decision-making" processes, have sparked this interest (Hussain et al., 2022). An example of this is the debate over genetically modified crops and foods, which has been used to show the limitations of knowledge and decision-making based on a restricted rational/ technical understanding of the issues at hand. BSE (Bovine Spongiform Encephalopathy) is an example of a congenital condition. The public's confidence in institutions seen to be responsible for these worries, such as science, governments, and industry.

Official policy tools such as laws, regulations, and rules, as well as the pollution tax, are developed by the federal government; however, they are implemented by local governments. Furthermore, environmental control involves the participation of public actors, such as ordinary people, in a variety of ways (Escobedo et al., 2022). A growing number of studies suggest that raising public knowledge about environmental concerns has a positive impact on the environmental performance of polluting businesses in both developed and emerging countries, such as the United States and China.

4.2.2 Organizational EMS.

Environmental Management Systems (EMS) are structured approaches that companies use to manage their environmental impacts and comply with environmental regulations (Nguyen et al., 2023). According to a study by (Yue et al., 2023), companies that adopt EMS tend to have better environmental performance compared to those that do not adopt EMS. The study found that EMS adoption is associated with a reduction in greenhouse gas emissions and water usage, as well as an increase in energy efficiency and waste reduction. Another study by (Fuzi et al., 2022) examined the impact of EMS adoption on firm innovation in the manufacturing sector. The study found that companies that adopt EMS tend to be more innovative compared to those that do not adopt EMS. The authors suggest that EMS adoption may provide firms with the knowledge and tools to identify and implement environmentally friendly technologies, which in turn can lead to innovation (Al-Otaibi et al., 2022).

A third study by (García Alcaraz et al., 2022) investigated the factors that influence EMS adoption among small and medium-sized enterprises (SMEs) in Spain. The study found that factors such as environmental regulations, customer pressure, and financial incentives are important drivers of EMS adoption among SMEs. The authors suggest that policy interventions aimed at promoting EMS adoption among SMEs should consider these drivers. These studies suggest that EMS can be an effective tool for companies to improve their environmental performance, increase their innovation, and comply with environmental regulations. They highlight the importance of policy interventions and market incentives in promoting EMS adoption among companies, especially among small and medium-sized enterprises.

Environmental management systems (EMS) are frameworks that help organizations manage their environmental impacts and improve their environmental performance (Marrucci et al., 2022a). Here are some examples of research on EMS. A study by (Molina-Azorín et al., 2009) examined the impact of implementing an EMS on the environmental performance of small and medium-sized enterprises (SMEs) in Spain. The study found that implementing an EMS was associated with significant improvements in the environmental performance of SMEs, including reductions in energy and water consumption and waste generation. The authors suggest that EMS can be an effective tool for improving the environmental performance of SMEs. Another study by (Shah et al., 2022) investigated the impact of ISO 14001 certification, which is a specific type of EMS, on the environmental performance of firms in the US. The study found that ISO 14001 certification was associated with improvements in environmental performance, including reductions in toxic emissions and hazardous waste generation. The authors suggest that ISO 14001 certification can be an effective tool for

improving the environmental performance of firms. A third study by (Florida & Davison, 2001) examined the impact of EMS on the innovation performance of Chinese firms (Habib et al., 2022). The study found that implementing an EMS was associated with improvements in innovation performance, including increases in the number of patents filed and improvements in product quality. The authors suggest that EMS can help firms develop new technologies and processes that are more sustainable (Ehtasham et al., 2022). EMS can be an effective tool for improving the environmental performance of organizations, including reductions in energy and water consumption, waste generation, and emissions. They also suggest that EMS can help firms develop new technologies and processes that are more sustainable, which can in turn improve their long-term competitiveness and performance.

When the international organization for standardization (ISO) produced ISO 14001, an international standard on environmental management systems (EMSs), it was a watershed moment in the history of the world (de Beule et al., 2022b). The principal objectives of this standard are to enhance worldwide standards for environmental practices while also decreasing trade barriers through the reduction of taxes on imported goods. A sort of business practice and EMSs have an impact on both the environment and the performance of a firm. According to the new ISO 14001:2015 standard, an EMS is "a component of a management system that is used to manage environmental aspects, comply with regulatory requirements, and deal with risks and opportunities." Operating procedures, products, and services provided by a firm that interact with the environment or have the capacity to do so are examples of environmental factors (Journeault et al., 2021). EMSs are simply systems that identify environmental issues, determine their potential influence on the environment, assess their importance, and then provide the best feasible solution to minimize any negative environmental impact as a result of organizational actions, such as manufacturing. The ISO 14001:2015 standard now includes a new section on managing risks (threats) and opportunities (openings)(YU & BELL, 2007). Thus, prospective environmental hazards and opportunities for a firm are identified, as is the total effect of these hazards and chances. The best viable solution is then implemented to manage even minor concerns and capitalize on each opportunity. Acknowledging the needs and expectations of interested parties, as well as leadership commitment to an EMS, the establishment of an environmental policy and environmental objects, the determination of environmental aspects and their impacts and opportunities, the identification of environmental risks and opportunities, and the identification of the best possible solutions, all contribute to an organization's overall environmental performance (YU & BELL, 2007)

4.2.3 EMS and Environmental Performance.

Environmental Management Systems (EMS) are formalized frameworks that help organizations manage and improve their environmental performance (Marrucci & Daddi, 2022). Numerous studies have examined the relationship between EMS and environmental performance, and the general consensus is that EMS can have a positive impact on environmental performance, although the magnitude of the impact may vary depending on a variety of factors. A study by (Marrucci et al., 2022b) found that companies with EMS had better environmental performance than those without EMS. The study also found that the level of EMS implementation was positively correlated with environmental performance.

Another study by (Agostino et al., 2022) examined the impact of EMS on the environmental performance of Brazilian companies. The study found that companies with EMS had better environmental performance in terms of waste reduction, energy conservation, and pollution prevention compared to those without EMS. However, some studies have also shown mixed results. For example, a study by (Makhdoom et al., 2023) found that the impact of EMS on environmental performance was dependent on various factors, including the size of the company, the sector, and the level of EMS implementation.

There is substantial research indicating a positive relationship between the adoption of Environmental Management Systems (EMS) and improved Environmental Performance (EP). Some examples include, a meta-analysis of 65 studies found that the adoption of EMS was associated with a significant improvement in various measures of EP, including reduced energy consumption, greenhouse gas emissions, and hazardous waste generation (Nassani et al., 2022). A study of 176 Chinese manufacturing firms found that those with EMS certification had better EP than those without certification, as evidenced by lower levels of pollutant emissions and waste generation (Li et al., 2016). A survey of 261 European manufacturing firms found that those with EMS had better EP in terms of reduced waste and emissions, and that EMS certification was associated with greater improvements in EP over time (Paraschi et al., 2022). A study of 36 Canadian manufacturing firms found that those with EMS had lower energy and water consumption, as well as lower greenhouse gas emissions, compared to firms without EMS (Potoski & Prakash, 2022).

The research suggests that EMS can be an effective tool for improving environmental performance, but the specific impact may vary depending on the context in which it is implemented (Marrucci et al., 2022c). It is also important to note that implementing EMS alone may not be sufficient for achieving significant improvements in environmental performance, and it is often necessary to combine EMS with other environmental management practices and strategies (Haldorai et al., 2022).

One of the key objectives of an EMS is to improve the overall environmental performance of an organization. As stated by the international organization for standardization (ISO 14001:2015), "environmental performance" is defined as "performance related to the management of environmental factors" (Olabi et al., 2023). Any organization, regardless of age or size, may benefit from an EMS that is based on continual improvement in order to sustain environmental performance. EMS stands for environmental management system, and it is a problem-solving and problem-identification tool based on the principle of continuous improvement (Q.-J. Wang et al., 2022). It may be used in a number of ways in an organization, depending on the sector of activity and the perceived needs of the management team. In order to better understand, show, and enhance their environmental performance, many firms are attempting to see out how they might do so. The environmental performance of an organization should be evaluated in relation to its environmental policy, objectives, targets, and other environmental performance criteria, among other things (Rodríguez-Espíndola et al., 2022). In reality, an EMS is a well-organized and well-coordinated strategy for dealing with environmental problems in businesses in a proper manner, with the objective of enhancing their environmental performance. The measurable output of an organization's environmental management (the results may be compared to the company's environmental policy, environmental objectives, environmental targets, and other environmental performance standards, as well as other environmental performance standards). The results of an organization's environmental management (the results may be compared to the organization's environmental policy, objectives, and targets), and assessing environmental factors (components of an organization's activities, commodities, or services that have the potential to interact with the environment) is essential in any case in order to evaluate an organization's environmental performance. Environmental impacts are described as changes to the environment that are either negative or positive in nature and that are induced totally or partially by environmental variables. Environmental effects can be either negative or positive in nature (A. Zhao et al., 2022). A cause-and-effect relationship exists between environmental conditions and the impact they have on human health. Moreover, an environmental component with a significant environmental effect is one that has had or has the potential to have a significant environmental impact. When developing, implementing, and maintaining an EMS, the organization must ensure that significant environmental aspects are taken into account. Identifying significant environmental aspects and their associated impacts is necessary to determine whether and where control or improvement is required, as well as to establish management action priorities. The establishment of comprehensive, appropriate for independent inspection, replicable, and verifiable significance criteria for the organization's operations, goods, and services is required in order to determine the major environmental elements of the organization's operations, goods, and services.

4.2.4 EMS and Firm Performance.

Research has shown that there is a positive relationship between Environmental Management Systems (EMS) and firm performance (J. Wang & Liu, 2023). Some examples include, a study of 284 Korean firms found that those with EMS had higher financial performance in terms of return on assets and return on sales, compared to those without EMS (Jeong & Lee, 2022b). A meta-analysis of 52 studies found that the adoption of EMS was associated with improved financial performance, as well as improved operational performance and reduced environmental risks (Delmas & Toffel, 2021). A survey of 148 Australian firms found that those with EMS had better performance in terms of customer satisfaction, employee satisfaction, and product quality, compared to firms without EMS (Burritt et al., 2022). A study of 27 Mexican firms found that those with EMS had better overall performance, as well as improved operational and environmental performance, compared to firms without EMS (Halis & Halis, 2022). EMS (Environmental Management System) is a framework that helps organizations to identify, manage, and mitigate their environmental impacts. The implementation of an EMS can have a significant impact on firm performance, as it can improve the organization's ability to comply with environmental regulations, reduce environmental risks and costs, and enhance its reputation and stakeholder relations. Implementing an EMS can help organizations to better manage their environmental impacts, such as reducing their emissions and waste generation. This can result in a reduction in environmental incidents, which can translate into fewer fines and penalties, and a reduction in environmental liabilities. An effective EMS can help organizations to identify opportunities to reduce costs associated with energy consumption, waste disposal, and regulatory compliance. By reducing these costs, organizations can improve their profitability and enhance their financial performance. An organization's environmental performance can have a significant impact on its reputation and relationships with stakeholders, such as customers, investors, and regulatory agencies. Implementing an EMS can help organizations to demonstrate their commitment to environmental responsibility, which can enhance stakeholder trust and support. An EMS can provide organizations with a competitive advantage by enabling them to differentiate themselves from their competitors. Organizations that are perceived as environmentally responsible may be more attractive to customers, investors, and employees, which can translate into improved sales, investment, and recruitment outcomes. An effective EMS can help organizations to comply with environmental regulations and avoid fines and penalties. By complying with regulations, organizations can avoid negative impacts on their reputation and financial performance.

The relationship between EMS and firm performance is complex and multifaceted. While EMS implementation can improve environmental performance, cost savings, stakeholder relations, and

regulatory compliance, the actual impact of EMS on firm performance will depend on the specific context and implementation of the EMS.

EMS can be an effective tool for improving firm performance, as they can help firms identify and address environmental risks, reduce costs, enhance reputation, and increase stakeholder satisfaction (Halis & Halis, 2022). However, the effectiveness of EMS can depend on a variety of factors, such as the level of management commitment, employee involvement, and the specific practices implemented under the EMS. The financial performance of a firm is determined by the effectiveness of its EMS and improves the environmental performance of a company through the use of an EMS (Jeong & Lee, 2022b). When a company's environmental performance is good, it not only reduces costs by generating less waste, but it also establishes differentiation, well-recognizability, a soft image, and brand reputation among customers, consumers, and legal authorities, all of which contribute to an improvement in the firm's economic performance over time (Halis & Halis, 2022). When it comes to managing the link between the firm and the environment, the EMS is a good place to start. The purpose of an EMS is to improve the overall environmental performance of a company. Performance should be tracked and (Haldorai et al., 2022) managed *via* the use of measurements and indicators. Essentially, indicators are variables that summarize or otherwise simplify crucial information about the state of a complicated system. For an effective assessment of environmental performance, the selection of acceptable "raw" data and the establishment of relationships between "raw" data are critical (Marrucci et al., 2022c).

4.2.5 Government Regulation and Environmental Performance.

Government regulations are an important part of environmental performance. If, the government is having intention to focus on environment, then moves toward environmental litigation and induce organizations to follow them (Nassani et al., 2022). In developing nations, the tendency of developing environmental laws is under dearth. In addition, local governments in developing countries do not receive sufficient incentives to reduce environmental pollution, which is a problem in these countries (Shah et al., 2022). In fact, local governments have actively competed for input elements to create area economies and strict environmental regulations have also evolved into a policy to surpass economic growth (Wang et al., 2003; Li and Wu, 2017). This competition has resulted in an increase in the number of countries that have stricter environmental regulations (Deng et al., 2012; Lan et al., 2012). Local governments are not hesitant to adopt laxer environmental standards than those in neighboring districts in order to draw capital inflows, particularly foreign direct investment (FDI). In addition, the Porter hypothesis, which is a traditional economic theory, suggests that environmental legislation may

encourage corporations to innovate more activities of businesses, thereby improving those businesses' productivity as well as their environmental performance and their ability to compete (Florida & Davison, 2001). Despite this, there is still a lack of consensus regarding the presence of such an effect in China. Furthermore, the majority of related studies focus on examining the connection between governmental regulation and growth in (environmental) total factor productivity while taking into account total pollutant emissions in developing nations (Marrucci et al., 2022a). Government regulation can have a significant impact on environmental performance, as it establishes legal requirements and standards that organizations must follow to mitigate their environmental impacts. The relationship between government regulation and environmental performance is multifaceted and can be explained by some important factors as Government regulations establish minimum environmental standards that organizations must meet. These standards are designed to reduce harmful environmental impacts and protect public health. Compliance with these standards can result in improved environmental performance, as organizations are required to implement measures to mitigate their environmental impacts. Government regulations are typically enforced through inspections, monitoring, and penalties for noncompliance. Enforcement can encourage organizations to improve their environmental performance, as they face financial consequences for failing to meet environmental standards.

In addition to penalties, government regulations may also provide incentives for organizations that exceed environmental standards. For example, organizations that implement environmentally friendly technologies or practices may be eligible for tax credits or other financial incentives. Government regulations can encourage innovation by creating a market for new technologies and products that help organizations comply with environmental standards. This can drive the development of new technologies and practices that improve environmental performance. Government regulations can raise public awareness about environmental issues and the need for organizations to reduce their environmental impacts. This can create pressure on organizations to improve their environmental performance, as stakeholders become more aware of the environmental consequences of their actions. Government regulation plays a crucial role in improving environmental performance by setting standards, enforcing compliance, providing incentives, encouraging innovation, and raising public awareness. However, the effectiveness of government regulation in improving environmental performance depends on the quality of the regulations, the degree of enforcement, and the willingness of organizations to comply with environmental standards.

However, no specific study has yet been done on how environmental regulation affects environmental performance while taking into account both carbon and air pollutant emissions (Nguyen et al., 2023). European researchers have also found a positive relationship between Environmental Management

Systems (EMS) and firm performance (Paraschi et al., 2022). Prajogo & Hong, 2008 state that European manufacturing firms found that those with EMS had better environmental performance in terms of reduced waste and emissions, and that EMS certification was associated with greater improvements in environmental performance over time (Jeong & Lee, 2022a).

Herremans et al. found that those with EMS had higher levels of innovation and product quality, as well as improved environmental and financial performance, compared to firms without EMS. A study of 243 French firms found that those with EMS had better environmental and financial performance, as well as better relations with stakeholders, compared to firms without EMS (Gond et al., 2006). A study of 24 Finnish firms found that those with EMS had better environmental performance and competitive advantage, as well as improved employee morale and stakeholder relations, compared to firms without EMS (Klassen & McLaughlin, 1996). The research from European studies suggests that EMS can be an effective tool for improving environmental and financial performance, as well as stakeholder relations and employee morale. However, the effectiveness of EMS can depend on factors such as the level of management commitment, employee involvement, and the specific practices implemented under the EMS (Halis & Halis, 2022).

4.2.6 Public Participation and Environmental Performance.

There is a growing body of research demonstrating a positive relationship between public participation and environmental performance. Public participation can be defined as involving stakeholders, such as community members, NGOs, and other interested parties, in decision-making processes related to environmental issues. Larsson & Simonsson, 2018 found that those with higher levels of public participation in environmental decision-making had better environmental performance, including lower greenhouse gas emissions and better waste management. Reed, 2008 state that on public participation in natural resource management found that it can result in more sustainable outcomes, as it can help to identify and address environmental issues, and engage stakeholders in finding solutions. Sun et al., 2018 found that those with higher levels of public participation in environmental decision-making had better environmental performance, including reduced emissions and improved waste management. According to Bebbington et al., 2017 developing countries those with higher levels of public participation in environmental decision-making had better environmental governance and higher levels of environmental protection. Jogesh et al., 2021 identified the relationship between public participation and air quality in 29 European countries and found that public participation is positively associated with better air quality.

The research suggests that public participation can be an effective tool for improving environmental performance, as it can help to identify and address environmental issues, engage stakeholders in finding solutions, and improve environmental governance. However, the effectiveness of public participation can depend on factors such as the level of stakeholder engagement, the type of decision being made, and the level of support from policymakers and other stakeholders. The use of public engagement strategies to address environmental problems is one area in which non-governmental organizations (NGOs) have a history of improving through time. According to Thapa et al. (2013), nongovernmental organizations are the primary actors in promoting and campaigning for empowered participation. Public participation is a key component of environmental management, as it involves engaging stakeholders in the decision-making process related to environmental issues. The relationship between public participation and environmental performance can be explained by the following factors, public participation can improve environmental performance by incorporating the perspectives and concerns of a broad range of stakeholders into the decision-making process. This can result in better decisions that balance environmental protection with other economic and social considerations. Public participation can enhance stakeholder support for environmental initiatives by increasing transparency and accountability in the decision-making process. This can lead to greater trust and cooperation between stakeholders, which can facilitate the implementation of environmental policies and programs. Public participation can increase compliance with environmental regulations by encouraging stakeholders to take ownership of environmental issues and to play an active role in their resolution. This can result in improved environmental performance by fostering a sense of shared responsibility and commitment among stakeholders. Public participation can stimulate innovation by bringing together diverse perspectives and expertise to identify new solutions to environmental challenges. This can result in the development of new technologies and practices that improve environmental performance. Public participation can increase public education and awareness about environmental issues, which can lead to improved environmental performance. By providing opportunities for stakeholders to learn about environmental issues and to participate in decision-making, public participation can foster a sense of environmental responsibility and a commitment to sustainable practices.

Public participation can contribute significantly to improved environmental performance by improving decision-making, enhancing stakeholder support, increasing compliance, stimulating innovation, and raising public awareness. However, the effectiveness of public participation in improving environmental performance depends on the degree of inclusivity, transparency, and accountability in the process, as well as the willingness of stakeholders to engage and participate.

Hasana et al. (2018) evaluates public participation in EIA by comparing environmental projects led by governmental organizations and NGOs. They claim that NGO-led projects play a crucial role in ensuring participation in all stages of EIA, as well as smoothing stakeholders' expectation conflicts. This research was published in Environmental Impact Assessment. Over the past few years, a multitude of researchers have carried out comparable work using data from China. Wu et al. (2018) investigate the impacts of public participation on environmental performance using panel data from 31 Chinese provinces over the period of 2004–2015. They claim that environmental petitions are significantly correlated with non-binding environmental pollutants. Their findings were published in Environmental Research Letters. According to the findings of Li L. et al. (2018), the publication of the China Air Pollution Map reduces the industrial pollution emission, but not in a consistent manner. This suggests that government policies, public participation, and enterprise involvement should all be involved in the process of resolving environmental issues. Li G. et al. (2018) use a difference-in-differences (DID) model to investigate the role of environmental non-governmental organizations (ENGOs) in China's urban environmental governance model. They come to the conclusion that the influence of ENGOs is more prevalent in eastern and central China than in western China.

4.2.7 Environmental Performance and Organizational Performance.

There have been a number of investigations into the relationship between environmental responsibility and organizational performance; nevertheless, the findings of these studies have been inconclusive (Jo et al., 2015). The findings of an investigation on the causal connection between a reduction in environmental pollution and organizational performance that was carried out by Hart and Ahuja (1996) revealed that there was no consensus regarding the existence of this causal linkage. In addition, a number of researchers have stated that substantial investments made by businesses in environmental management will result in increased costs and diminished benefits. As a consequence of this, it is essential that businesses evaluate the potential benefits against the costs associated with these investments (Palmer et al., 1995). On the other hand, other academics have pointed out that stricter environmental regulations might motivate businesses to invest in innovative production equipment in order to reduce environmental pollution and production expenses, which ultimately results in increased profitability (Lee et al., 2016). According to Hutchinson (1992), businesses need to rely on environmentally friendly activities in order to achieve possible benefits. Some of these benefits include an improved organizational reputation, attracting customers who are concerned about environmental pollution, reducing production expenses by conserving power, developing positive relationships with local communities, and producing environmentally friendly products. Businesses

have the potential to increase their competitiveness by making early investments in environmentally friendly technology. This is due to the fact that environmentally sound technology is likely to result in lower unit costs of production as well as the development of successful organizational practices (Nehrt, 1996). Environmental performance and organizational performance are closely related, as environmental considerations can have significant impacts on an organization's financial, social, and environmental outcomes. The relationship between environmental performance and organizational performance can be explained by some factors; Environmental performance can contribute to cost savings by reducing resource consumption, waste generation, and regulatory compliance costs. By implementing environmentally friendly practices, organizations can reduce their operating costs, which can improve their financial performance. Environmental performance can provide a competitive advantage by differentiating organizations from their competitors. Organizations that are perceived as environmentally responsible may be more attractive to customers, investors, and employees, which can result in improved sales, investment, and recruitment outcomes. Environmental performance can impact an organization's reputation and relationships with stakeholders, such as customers, investors, and regulatory agencies. By demonstrating a commitment to environmental responsibility, organizations can enhance stakeholder trust and support, which can translate into improved business outcomes. Environmental performance can contribute to risk management by reducing the potential for environmental incidents and liabilities. By implementing effective environmental management systems, organizations can identify and mitigate environmental risks, which can reduce the potential for negative impacts on their financial performance. Environmental performance can stimulate innovation by creating a market for new technologies and products that improve environmental performance. This can drive the development of new products, services, and processes that enhance organizational performance.

Environmental performance can have significant impacts on organizational performance by contributing to cost savings, competitive advantage, reputation and stakeholder relations, risk management, and innovation. The relationship between environmental performance and organizational performance is complex and depends on the specific context and implementation of environmental practices within the organization. In addition, regulations concerning the environment require businesses to upgrade their production technology and, as a result, improve their competitive advantages over a longer period of time. This is because environmentally friendly machinery has the potential to reduce costs as a result of increased production efficiency, which, in turn, enables businesses to achieve improved levels of competitive advantage (Porter, 1998).

4.3 Research Methodology.

The purpose of this research is to address three difficulties and examine other concepts that are related to them. To begin, what drives individuals to become involved in environmental decision-making is unclear. People with an interest in environmental issues are more likely to participate in decision-making processes or to respond to decisions that have already been made when they have a stake in those decisions. Those who are not affected by a project could be against it because they care more about the ecological than the economic value of natural resources, but local residents may oppose it because they are concerned about their own livelihood. Those who are attached to an area through ownership, having a family, or having a career are more likely to be concerned about the project's environmental and health effects and to participate more actively than those who are not tied to the location. Second, who are the individuals or organizations in charge of supporting public participation? In Pakistan, environmental protection agency employees are responsive to public environmental concerns and serve as important facilitators of public participation in environmental conservation efforts. The important are the contributions of ENGOs and other civic organizations, such as homeowner associations (HOAs). And last, to what degree have the laws made it simpler for citizens to take part in the political process? The legislation establishes a legislative context that supports public involvement in environmental protection and provides legal support for their arguments. As a result, they create an environment that is favorable to environmental action. In order to select instances for the study from among the many environmental issues that exist in Pakistan, we used the following three criteria: (1) public engagement; (2) government restrictions at three levels: community, regional, and national; and (3) occurred in areas with varying levels of economic growth. As a result, we picked three cases of environmental campaigning that were well-known across the country for the research. With the vast range of geographic scopes and administrative levels available, it is possible to have a thorough picture of why various groups of people are worried about different environmental concerns, as well as the conditions that motivated them to take action in the first place. Furthermore, the geographic and socioeconomic inequalities that exist between individuals allow for the investigation of variances in organizational strategies to be conducted. The information for the three instances was gathered from different academic sources both private and public sources. Data analysis was done through the use of analytical narratives and the approach of comparative case studies. We are able to move past attempts to define a globalized, harmonious society and to connect with "local knowledge's," or components of experience that are specific to the actors and case contexts and tell us something crucial about the driving forces behind certain claims as well as social interactions, by recovering the stories of how the cases have developed over time (Bennett and James, 1998). Using

the case study approach, you would do so because you consciously wanted to cover contextual elements, and you assumed that they may be enormously relevant to the phenomena under examination," the author writes (Yin, 2003, p. 13). If we discover that the drivers and agents differ depending on the context by comparing the three cases, the findings would be a promising first step toward theoretical replication that significantly improved when compared to findings. The next section includes a summary of the study objectives and procedures, followed by the accounts of three environmental activism occurrences that occurred in Pakistan.

In light of this, the purpose of this article is to investigate the link between drivers (government regulations, environmental performance, and organizational performance), government regulation, and performance (environmental and organizational performance). The relevant constructs were measured using a survey-based technique, and the hypothesized correlations were tested using structural equation modeling. From three perspectives, this work will add to important research. First, this research elucidates the unique roles of EMSs, government laws, and public engagement in the execution of environmental policy, enhancing knowledge of how to improve organizational and environmental performance. Second, using empirical testing on a large sample dataset, this study reveals a substantial link between public engagement, government rules, organizational EMS, and environmental and organizational performance. The findings support the efficacy of environmental policies. Third, this research focuses on the Pakistani textile sector in the context of a rising economy. Pakistan's textile industry is now undergoing fast growth.

4.3.1 Methodology.

The research approach is determined by the study's goal and problem (Hillary, 2004) and appropriate approaches are required for accurate results. The quantitative strategy to research was chosen after assessing the problem and purpose of the current study, and the data were collected using a cross-sectional method. The researchers utilized a questionnaire to gather data for this study. For the current research project, it is desirable to utilize a survey questionnaire since it enables data collection in a reasonable period of time and is a financially advantageous data collection method (Richter et al., 2016). Furthermore, this strategy ensures respondent confidentiality and allows sensitive data to be easily obtained. The scale items were adapted from previous research.

The technique includes information on the study design, population, sampling, composition, questionnaire reliability, and data collecting, as well as valuation processes. The findings of the construction information were determined by analyzing the obtained data. The quantitative technique,

which is based on primary data, was employed since it is a tool for studying and investigating the subject matter for research. The population in this study is made up of lower to upper-level employees who work in Pakistan's textile industry. The data were collected using a technique called convenient sampling. A total of 500 questionnaires were issued, with 460 being collected from responders. Out of 500 questions, 57 are unconfined, making it impossible to analyze the data. The remaining 403 questionnaires are subjected to statistical analysis. The surveys were designed using an adaptive technique, with a structured questionnaire based on a seven-point Likert scale, with "7" representing robust agreement and "1" representing robust disagreement with the topic. The questions were chosen based on previous high reliability in Pakistan and other nations. Table 1 lists the questions and their Bibliography. We have been used a causal melding approach and descriptive analysis by Smart PLS (Partial Least Squares).

4.3.2 Results.

A total of 500 questionnaires have been issued. Four hundred and sixty questionnaires were gathered from respondents, and 57 surveys were left unbound, making it impossible to analyze the data. As a result, we submitted 403 questionnaires into Smart Pls 3 to conduct descriptive analysis and examined demographic features of textile industry respondents. Gender, age, education, designation, and experience are all demographic factors in this study (Figure 1).

Table of Construct.

Sr. No	Construct	Items	Bibliographys
1	Public participation	3	Langpap and Shimshack (2010)
2	Govt. regulation	5	Kathuria (2007)
3	Organizational EMS	4	Dao et al. (2011)
4	Environmentalism	5	Hillary (2004)
5	Environmental performance	5	Eccles et al. (2014)
6	Organizational performance	4	Rawashdeh (2018)

Table. 1 Table of Construct.

Hypotheses Development.

Hypothesis (H1): Public participation has a positive impact on environmental performance and organizational performance in textile sector of Pakistan.

Hypothesis (H2): Govt regulations have a positive impact on organizational performance and EP implementation in textile sector.

Hypothesis (H3): Organizational EMS in Textile Sector has a positive impact on environmental performance and organizational performance.

Hypothesis (H4): Environmental performance has a positive impact on organizational performance.

Hypothesis (H5): Environmentalism positively strengthens the relationship between environmental performance and organizational performance.

4.3.3 Measurement Model Assessment.

The PLS-SEM measurement model was employed to examine the data's reliability and validity (Serda, 2013). Factor loading, Cronbach's alpha, composite reliability, and average extracted variance were used to assess construct reliability (AVE). The measuring model was also used to assess discriminant validity. The findings of the measurement model are shown in Figures 2, 3 and Table 2.

The values of convergent validity of variables are shown in Table 2. The values of alpha's value, composite reliability, and AVE may be measured according to the directions of convergent validity (Hsu, 2008). Because all of the numbers in this study are over the threshold levels, all of the variables have convergent validity. The threshold value for Cronbach's alpha is 0.6 or greater than that. Additionally, the AVE value should be greater than 0.5, and the composite reliability value should be greater than 0.7 (Table 3).

4.3.4 Analysis and Results.

This study used Smart PLS 3 (SEM) for data analysis and used a two-step process to provide analytical results (Gliem and Gliem, 2003).

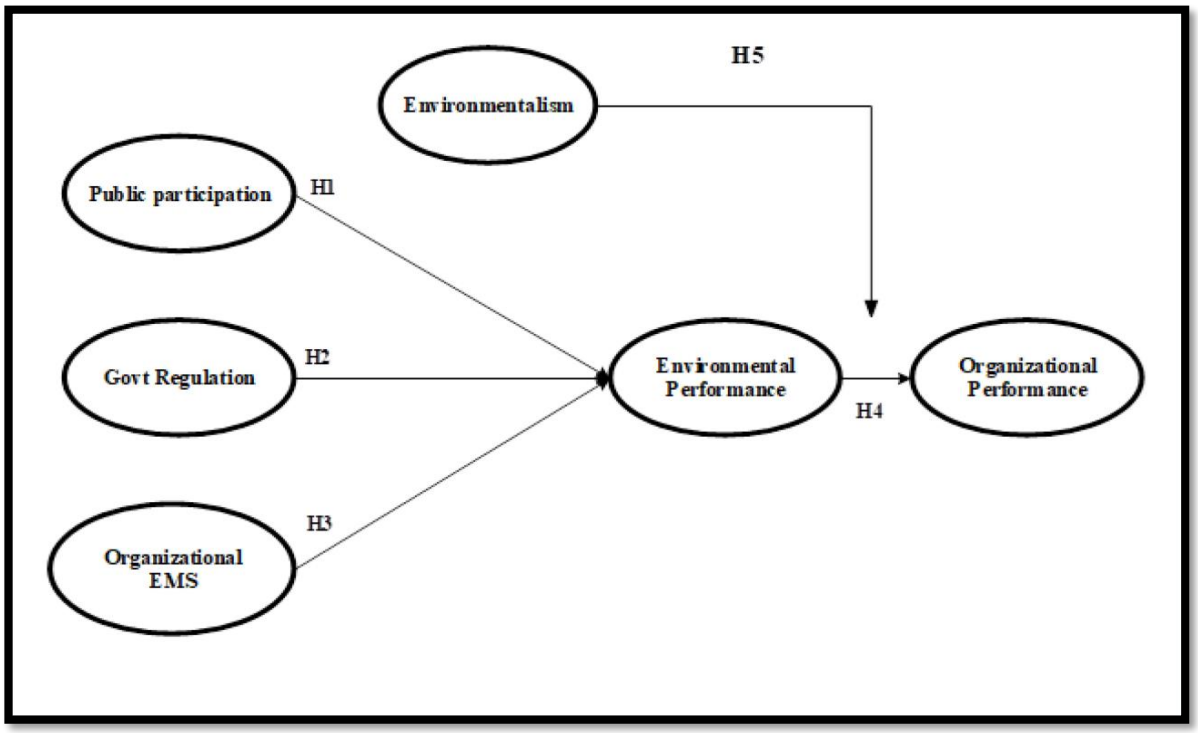

Figure 1. Theoretical Model.

4.3.5 Structural Model Assessment.

SEM-PLS structural model analysis was used to estimate the study's hypotheses. According to the results of structural model research, public participation has a significant effect on company performance ($\beta = 0.540$, $t = 13.202$). As a consequence, the findings of the analysis support H1. Furthermore, this analysis found that government restrictions have a substantial positive association with company performance ($\beta = 0.158$, $t = 3.645$), and H2 is statistically acceptable (Table 4).

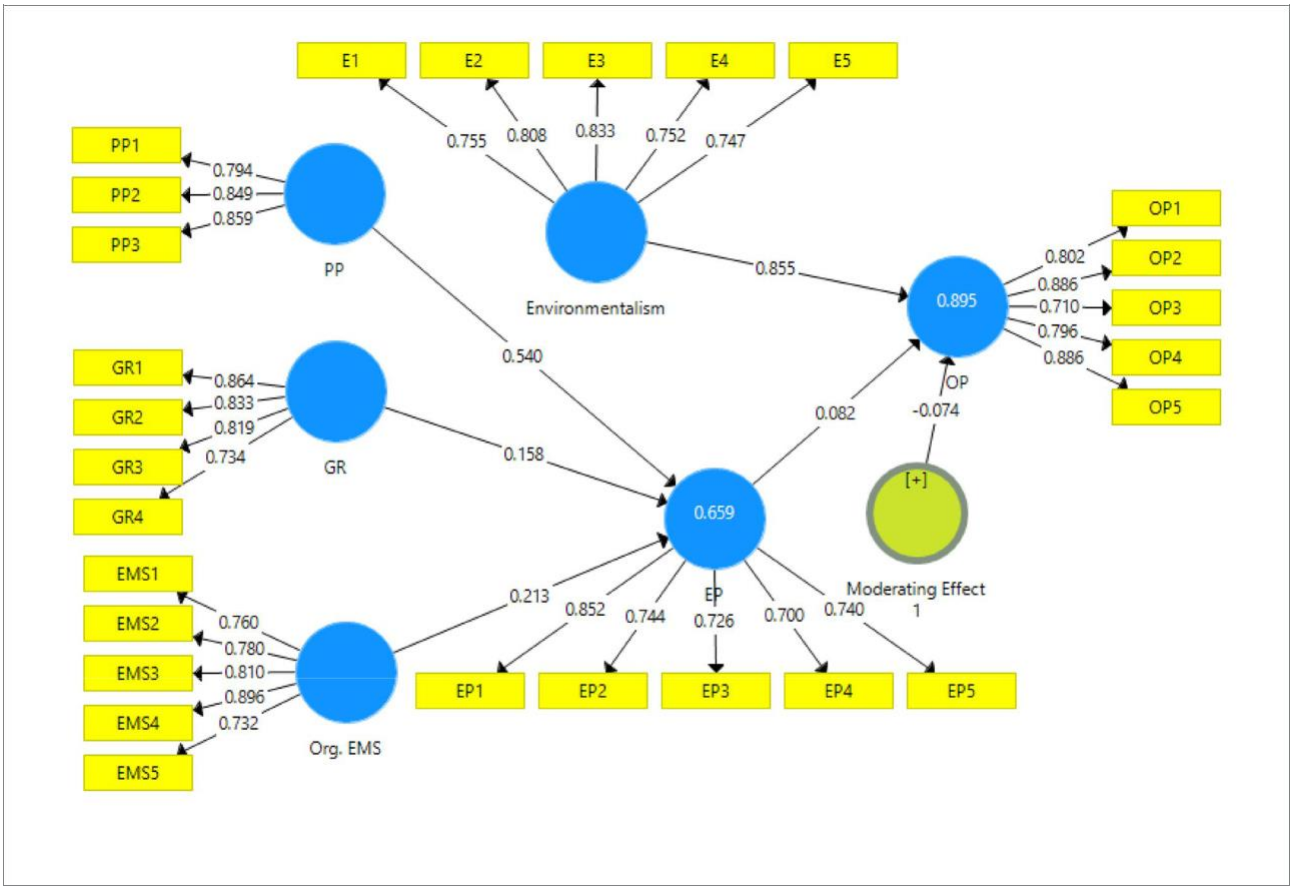

Figure. 2 PLS Algorithm.

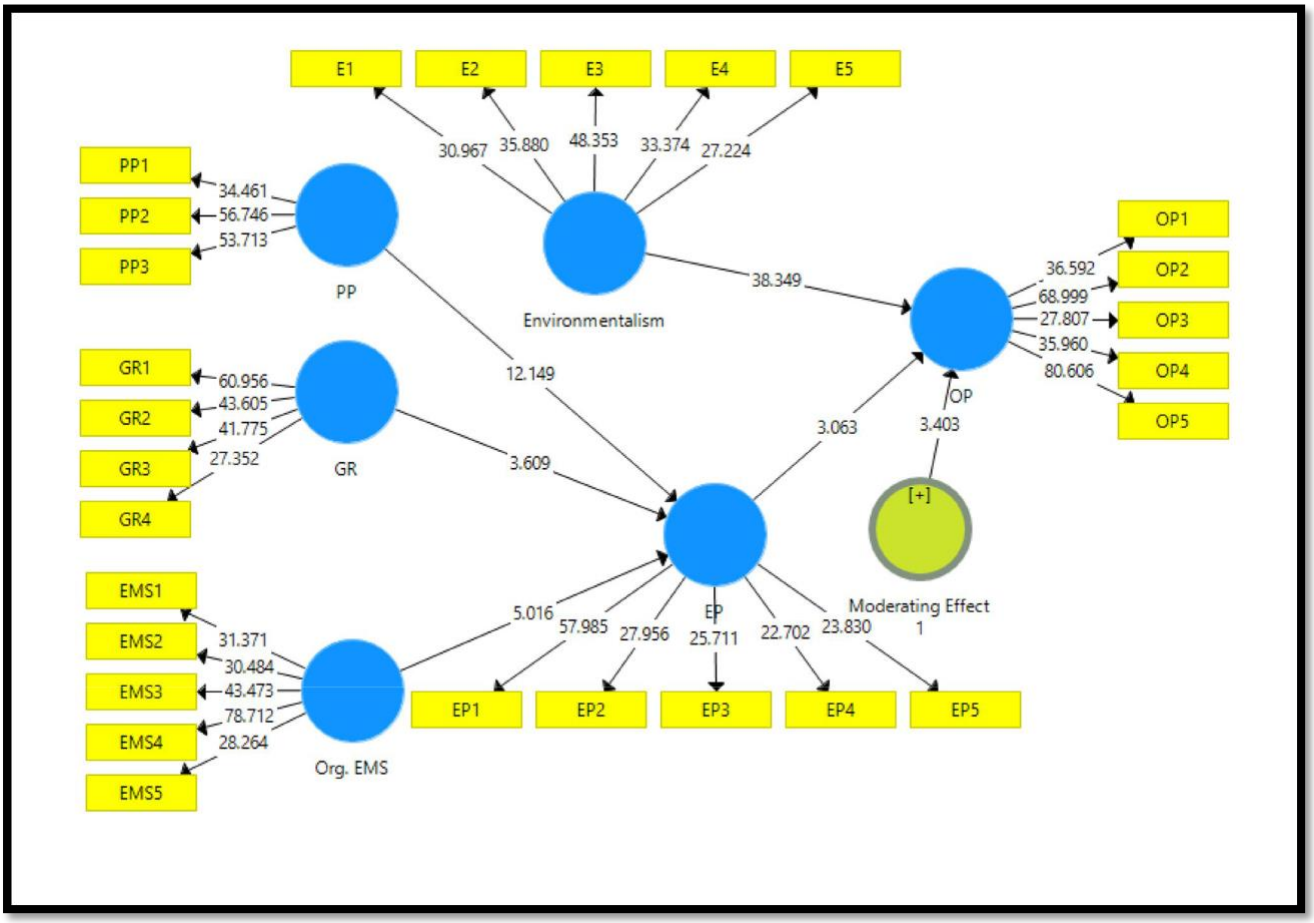

Figure. 3 PLS Bootstrapping.

Evaluation of the Measurement Model.

Variables	Items	FL	AVE	CR	Cronbach's alpha
PP					
	PP1	0.794	0.697	0.873	0.781
	PP2	0.849			
	PP3	0.859			
GR	GR1	0.864		0.887	0.829
	GR2	0.833			
	GR3	0.819			
	GR4	0.734			
OEMS	OEMS1	0.760	0.636	0.897	0.856
	OEMS2	0.780			
	OEMS3	0.810			
	OEMS4	0.896			
	OEMS5	0.732			
Environmentalism	E1	0.755	0.608	0.886	0.839
	E2	0.808			
	E3	0.833			
	E4	0.752			
	E5	0.747			
EP	EP1	0.852	0.569	0.868	0.809
	EP2	0.744			
	EP3	0.726			
	EP4	0.700			
	EP5	0.740			
OP	OP1	0.802	0.670	0.910	0.875
	OP2	0.886			
	OP3	0.710			
	OP4	0.796			
	OP5	0.886			

Table 2. Evaluation of the Measurement Model.

Structural Model Assessment.

	EP	Environmentalism	GR	E* OP	OP	Org. EMS	PP
EP	**0.754**						
Environmentalism	0.793	**0.780**					
GR	0.645	0.726	**0.841**				
E* OP	−0.306	−0.193	−0.204	**1.00**			
OP	0.790	0.939	0.696	−0.286	**0.819**		
Org. EMS	0.655	0.751	0.659	−0.107	0.712	**0.798**	
PP	0.774	0.706	0.642	−0.239	0.724	0.626	**0.835**

Table. 3: Mean, SD, *T*-values, and *p*-values. The bold value means satisfying the standard value.

Discriminant Validity at Construct Level.

	Original sample (O)	Sample mean (M)	Standard deviation (SD)	*T* statistics (|O/SD|)	*p*-Values
EP - > OP	0.082	0.084	0.026	3.132	**0.002**
Environmentalism	0.855	0.856	0.022	38.184	**0.000**
GR - > EP	0.158	0.159	0.043	3.645	**0.000**
Environmentalism - > OP	−0.074	−0.076	0.023	3.347	**0.001**
OEMS - > EP	0.213	0.212	0.041	5.177	**0.000**
PP - > EP	0.540	0.541	0.041	13.202	**0.000**

Table. 4: The bold value means satisfying the standard value.

Structural Model Assessment (Direct Relation Effect and Results).

Hypotheses	Relationship	Beta	SD	*T* statistics	*p*-Values
H1	PP - > OP	0.540	0.041	13.202	0.000
H2	GR - > OP	0.158	0.043	3.645	0.000
H3	EMS - > OP	0.213	0.041	5.177	0.000

Table. 5: Source: Estimates made by the authors using data.

Table 5 shows the value of the square root of AVE, which is used to evaluate construct discriminant validity. The value of AVE square root should be higher than the value of other variables to obtain discriminant validity (Eccles et al., 2014).

Structural Model Assessment (Indirect Mediation).

Hypotheses	Relationship	Beta	SD	*T* statistics	*p*-Values
H4	PP- > GR - > OP	0.082	0.026	3.132	0.002

Table. 6: Source: Estimates made by the authors using data.

The bootstrapping approach is used to estimate the mediation effect using PLS-SEM. The results of the research showed that corporation completely mediates the relationship between environmentalism and organizational performance ($\beta = 0.147$, $t = 4.567$) and supported H4 (Table 6).

Structural Model Assessment (Moderation Effects).

Hypotheses	Relationship	Beta	SD	*T* statistics	*p*-Values
H5	EP*E - > OP	−0.074	0.023	3.347	0.001

Table. 7: Source: Estimates made by the authors using data.

Table 7 summarizes the results of the moderation analysis. The data demonstrated that environmentalism had a significant and favorable moderating influence on the connection between environmental performance and organizational performance ($\beta = -0.074$, $t = 3.347$), supporting H5 (Table 8).

8 R^2 Value of Endogenous Structural.

Predictor construct	Target construct	R2	R2 adjusted	Predictive accuracy
PP, GR, OEMS, EP, and E	EP	0.659	0.656	Substantial
	OP	0.895	0.894	Substantial

Table. 8

4.4 Discussion and Conclusion.

The goal of this research is to look into the function of public participation, government regulations, and organizational EMS in organizational success, with the environmental performance as a mediating factor. The goal of this study was to look at the moderated mediation impact of environmental performance, as well as the function of environmentalism as a moderating factor. According to the conclusions of the investigation, public engagement, government regulations, and OEMS have a favorable and substantial relationship with environmental performance. Public engagement, government regulation, and OEMS, on the other hand, are sector-specific and confirm a long-term economic edge in a competitive context. Furthermore, the findings of the study demonstrated that Environmental Performance has a crucial influence in the relationship between public engagement, government laws, and OEMS and organizational performance (Li, 1998). Companies that are more sustainable, according to research, excel in terms of environmental performance, both in the short and

long term. Environmentalists strongly alter the association between public engagement, government regulation, and OEMS and organizational performance, according to the findings.

From a practical standpoint, the findings of a recent study have a number of consequences for senior management in the textile industry. A healthy environment is critical for a company's success. and environmentalism is one of the most significant components that boosts the beneficial impact of environmental performance on company performance. For improved performance in a competitive market, top management of companies must set environmental policies and build a knowledge-sharing atmosphere inside the company. Firms can also increase their performance by focusing on environmental sustainability.

This study has some limitations that need to be studied in the future. The study's sample was initially restricted to those working in Pakistan's small- and medium-sized textile industries that make it challenging to extrapolate the findings to new businesses or production facilities. Second, this study only looked at a tiny group of people from a certain region of Pakistan, ignoring the rest of the country. The textile industry is one of the largest industries in Pakistan and plays a significant role in the country's economy. However, the industry is also known for its environmental impacts, particularly in terms of water pollution and the release of hazardous chemicals. In this context, the development and implementation of effective environmental policies can have significant implications for firm performance in the textile industry. The importance of environmental policy on firm performance in the textile industry can be discussed from several perspectives: the implementation of environmental policies can help textile firms in Pakistan to comply with environmental regulations and standards. Compliance with environmental regulations can help to avoid fines and penalties, which can impact a firm's financial performance. Moreover, compliance can help to avoid negative impacts on the reputation and brand image of the firm. Environmental policies can help textile firms to improve their resource efficiency by reducing their consumption of water, energy, and other inputs. By implementing sustainable production practices, firms can reduce their operational costs, which can improve their profitability. Consumers, investors, and other stakeholders are increasingly demanding environmentally responsible practices from companies. The implementation of environmental policies can help textile firms to meet these expectations, which can enhance their reputation and brand image, and attract new customers and investors. The implementation of environmental policies can stimulate innovation in the textile industry. By investing in research and development, firms can develop new technologies and processes that improve their environmental performance. These innovations can also provide a competitive advantage for the firms in the market. Environmental policies can help firms to identify and mitigate environmental risks. By conducting environmental impact assessments, firms can identify potential environmental risks associated with their operations and take necessary

measures to mitigate them. This can help to avoid potential environmental liabilities, which can impact the firm's financial performance.

In conclusion, the implementation of effective environmental policies can have significant implications for firm performance in the textile industry in Pakistan. The textile firms should take proactive steps to develop and implement environmental policies to improve their environmental performance and meet the expectations of stakeholders. By doing so, the firms can improve their regulatory compliance, resource efficiency, stakeholder expectations, innovation, and risk management, which can positively impact their financial performance and contribute to sustainable development.

The literature lists various other types of public participation and government regulations besides public participation and govt regulations that are both revolutionary and transformational in relation to public participation, government regulations, and OEMS selected to represent the effect of these on environmental performance and organizational performance. Furthermore, the study concentrated on the influence of public engagement, government legislation, and OEMS on a particular environmental sustainability practice. Likewise, public engagement may not be the main determinant of environmental stewardship and corporate effectiveness. Other factors may play a role in interpreting this link, and they should be taken into account. Finally, the primary method of data collecting was quantitative, which may be viewed as a study restriction. In order to achieve the goals of the study more qualitative techniques should be used to gather more accurate data and findings as questionnaires and other self-reporting data collection processes may cause bias in responses. Finally, because this study was conducted in the context of Pakistani culture, its conclusions might only be applicable to Pakistani workers' values, ethics, and beliefs in the workplace. To accurately identify developing businesses, future research should replicate our findings across a sample of different businesses. Furthermore, a study should aim to collect samples from different locations across the nation in order to strengthen the generalizations made in the previous studies. It would also be interesting to check if the results matched or diverged from other studies if the researcher measured the various study components using various dimensions. Future studies on this connection should work to increase discernment by assessing novel traits in addition to leadership philosophies or that might affect how future leaders behave in organizations and other systems. Finally, applying mediating and moderating links to the literature and offering more clarification should be the main goals of future research. To obtain data that accurately depicts the study's variables, researchers should use both quantitative and qualitative data collection techniques. Future researchers should employ structural equation modeling as an analytical strategy because it is thought to be the most effective at hastening the development of the study's core model.

Data availability statement.

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

TI collected and analyzed the data, and had a major contribution in this article. MS, MA-N, and JR-M reviewed the article and contributed to conclusion and provided significant
suggestions. All authors contributed to the article and approved the submitted version.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Chapter 5. Implications and Recommendations

In the early 2000s, Spain experienced a construction sector boom fueled by easy credit, foreign investments, and a thriving real estate market. The surge in activity, concentrated in coastal and urban regions, featured ambitious projects driven by speculative optimism. Liberal credit facilitated this growth, attracting both domestic and international investors. However, the 2008 global financial crisis triggered by Lehman Brothers' collapse exposed the sector's vulnerabilities, freezing credit, halting projects, and increasing unemployment. The crisis's impact extended to interconnected industries, highlighting the construction sector's integral role within the broader economy. In response, the Spanish government took steps to revive the sector and boost the economy, injecting funds into struggling financial institutions for credit stability and initiating public infrastructure projects to revitalize construction and employment. The aftermath of the 2008 crisis significantly impacted Spain's construction sector, causing plummeting property values and a slow real estate market recovery. This experience prompted a reconsideration of overreliance on a single industry and a focus on sustainable economic growth. In conclusion, the sector's 2000s growth, driven by speculation and accessible credit, was disrupted by the 2008 global financial crisis, halting projects and underlining the sector's ties to the economy. Spain's response aimed at recovery through financial intervention and emphasized diversification and resilience.

The study's primary objective is to comprehensively analyze the intricate economic consequences arising from the unprecedented COVID-19 pandemic within Spain's construction sector. By delving into numerous dimensions, it aims to gauge immediate disruptions like project halts, supply chain intricacies due to lockdowns, and workforce challenges. Additionally, it seeks to quantify economic losses encompassing declines in construction activity, revenue, and employment opportunities. Simultaneously, the research evaluates labor market impacts, including rising unemployment and challenges faced by construction workers. By exploring supply chain disruptions, the study illuminates the sector's ability to procure essential resources. Ultimately, the study contributes to understanding the pandemic's economic aftermath, encompassing immediate impacts and insights for the construction sector's future. into potential strategies for recovery, the efficacy of government interventions, and possible directions for policy formulation. In sum, the objective is to establish a robust foundation of knowledge that can underpin evidence-based decision-making for stakeholders, policymakers, and industry leaders

striving to navigate the intricate challenges presented by the pandemic within the construction sector of Spain.

Alongside the primary goal of evaluating COVID-19's economic impact on Spain's construction sector, this study conducts a parallel investigation into the comparable economic consequences stemming from the 2008-2009 global financial crisis within the same sector. This dual analysis aims to unveil parallels and disparities between these crises, illuminating the sector's underlying dynamics. By closely examining immediate disruptions during the financial crisis, including project cancellations and delays, the research identifies recurring patterns and sector-specific challenges in times of economic turbulence. Moreover, it quantifies economic losses caused by the financial crisis, encompassing declines in construction activities, revenues, and employment. Simultaneously, the study assesses labor market repercussions, analyzing unemployment surges and challenges for construction workers. An in-depth exploration of supply chain aftershocks reveals material procurement disruptions. Overall, the study's objective is to provide a comprehensive comparative analysis, yielding insights into the sector's resilience, response mechanisms, and lessons from prior crises. By juxtaposing the impacts of these distinct but impactful crises, it contributes to a deeper understanding of vulnerabilities, strengths, and potential avenues for future resilience strategies.

A key component of this study, aligned with its primary and secondary goals, involves an extensive comparison between the economic effects of two distinct yet transformative crises—the COVID-19 pandemic and the 2008-2009 global financial crisis—on Spain's construction sector. This comparative analysis aims to uncover nuanced insights into both shared and divergent impacts, enhancing understanding of the sector's adaptability and vulnerabilities during unprecedented economic challenges. By exploring immediate disruptions such as project halts and supply chain constraints during the crises' peaks, the study seeks to extract valuable lessons about sector responsiveness and coping strategies. Moreover, the research quantitatively and qualitatively compares economic losses, including declines in construction activities, revenues, and labor market repercussions, revealing diverse patterns characterizing crisis impacts. The analysis aims to discern whether lessons from the 2008-2009 crisis influenced the construction sector's response to the unique challenges posed by the COVID-19 pandemic. Additionally, the study evaluates labor market shifts, uncovering whether past crisis experiences informed adaptability in confronting the pandemic's challenges. By delving into supply chain disruptions, the research aims to uncover the sector's resiliency and adaptive mechanisms, identifying potential lessons from the 2008-2009 crisis for navigating supply chain challenges during the COVID-19 pandemic. Ultimately, this comparative investigation contributes to a nuanced understanding of

the construction sector's historical dynamics and its capacity to address unparalleled economic hardships.

The data for this comprehensive study was sourced from prominent databases including the National Statistics Institute of Spain, the Ministry of Development of Spain, and the World Bank Development Indicators. Employing Excel for analysis, the study aimed to visually elucidate the influence of Spain's construction industry on vital facets such as GDP, employment, housing market, and public works. Through a comparative approach, the research delved into the repercussions of two major events, namely the global financial crisis and the COVID-19 pandemic, on Spain's construction sector. The study's findings underscore the pivotal role played by the Spanish construction industry in shaping the nation's economic landscape. During periods of robust growth within this sector, a ripple effect is observed, fueling economic expansion, generating employment opportunities, and invigorating diverse sectors of the economy. Conversely, downturns within the construction realm can cast a pall over economic well-being.

Notably, the research leveraged an array of specific data points. The study's findings emphasize the significant role that the Spanish construction industry plays in shaping the country's economic landscape. During periods of robust growth in this sector, a cascading impact is observed, driving economic expansion, creating job opportunities, and revitalizing various sectors of the economy. Conversely, downturns in the construction sector can have adverse effects on overall economic health. Noteworthy is the study's utilization of specific data points, including GDP at market price, the number of houses sold in Spain, housing starts and completions, total public works tenders issued, annual variation in the construction sector's employment rate, and the overall unemployment rate in Spain. These metrics collectively provide insights into Spain's economic dynamics and the interplay between construction and broader economic indicators. The study also brought to light the substantial impact of external forces on the Spanish construction landscape. Both the global financial crisis and the COVID-19 pandemic elicited a contraction in construction endeavors, thereby exerting a negative influence on the larger economy. Notwithstanding, the construction sector showcased resilience, rebounding from these setbacks and reestablishing itself as a pivotal driver of the Spanish economic engine.

The analysis of this research delves into the profound implications of the global economic crisis brought about by the emergence of the novel coronavirus, positioning it as the paramount challenge of the 21st century. With the pandemic's reverberating economic impact worldwide, the study focuses on Spain's construction sector and its connection to GDP and various growth indicators. Analyzing data trends, the research reveals a noteworthy decline of up to 19% in

construction growth during the second quarter of 2020, paralleling the severe economic consequences triggered by the pandemic. This decline is mirrored in GDP growth, which plummeted to -20.67% during the same period. The study also emphasizes the nuanced interplay between these metrics, suggesting that factors like increased construction costs, unchanged housing prices, and reduced public work tender prices have influenced the observed patterns.

Furthermore, the study scrutinizes the effects on the housing market, uncovering a fluctuating trajectory in the number of houses sold and housing starts and completions. The COVID-19 crisis initially induced a decline in house sales, attributed in part to lockdown measures and shifting consumer priorities. However, a temporary reversal was observed due to investment from savings, a trend whose sustainability remains uncertain. Similarly, housing starts and completions were impacted, showing a less drastic decline than during the 2008-2009 financial crisis, attributed in part to the Spanish government's introduction of mechanisms to safeguard employment rates. The analysis also highlights a discernible pattern in the trend of public works tendering, marking shifts related to economic crises. The discussion concludes with an exploration of the employment landscape, detailing the annual variation in the construction sector's employment rate and the overall unemployment rate in Spain. The study draws comparisons between the 2008-2009 financial crisis and the current pandemic, spotlighting the Spanish government's interventions through mechanisms like ERTE to alleviate the impact on employment.

The COVID-19 recession is projected to have a smaller impact than the 2008-2009 financial crisis, particularly on emerging and newly developed markets. Indicators from the study suggest that Spain's construction sector faced a less severe economic hit from COVID-19 compared to the earlier crisis. The construction industry currently grapples with supply-side challenges, such as difficulty in hiring qualified personnel due to concerns stemming from the previous crisis. The pandemic's economic impact mirrors that of the 2008-2009 crisis, resulting in decreased economic activity and job losses in Spain's construction sector. While both crises led to declines in economic growth and construction employment, there were differences in government support and shifts in consumer behavior. Recovery in emerging markets is expected to be slower than in developed economies. The path forward for Spain's construction sector and overall economic growth hinges on factors such as the effectiveness of COVID-19 vaccines against new strains and government policies. These findings offer insight to investors and policymakers, suggesting potential for investment and growth stimulation in Spain's construction sector to improve the country's GDP. Calls for future research underline the need for improved tools to study Spain's real estate market and assess its situation effectively.

The concept of productivity shocks pertains to sudden shifts in a company's efficiency, influencing other firms or industries within the same economy, commonly known as spillovers. Empirical research focused on Spain's manufacturing sector reveals productivity spillovers from large manufacturing to smaller businesses, driven by intensified competition that prompts efficiency improvements among SMEs. These effects are more pronounced in economically advanced and globally integrated regions, indicating that policies promoting competition and reducing entry barriers could bolster overall productivity in Spain's economy. The attention garnered by foreign direct investments (FDI) spans both developing and developed nations, often resulting in capital inflow, employment opportunities, technology infusion, and management expertise. FDI-driven knowledge spillovers are crucial, but their presence can be elusive and context-dependent, varying across industries and sectors. Studies suggest FDI's capacity to foster positive outcomes, including productivity, technology transfer, and innovation.

Research examines the spillover impact of FDI on industrial productivity, emphasizing factors like labor, capital, and innovation. Spain's manufacturing landscape exemplifies productivity heterogeneity across firms, where absorptive capacity and regional research intensity play vital roles in determining productivity shocks' spillover effects. In the construction sector, high R&D investment firms are found to influence neighboring firms' productivity positively. Similarly, spillovers are stronger within the same industry and region, with collaboration, R&D intensity, and skill mobility being crucial in transmitting such effects. While FDI-induced spillovers have been shown to bolster productivity, contradictory evidence exists, suggesting complex contextual dynamics. Some studies underscore FDI's technology transfer, while others find no significant impact or even negative effects on local firms' productivity. These mixed findings highlight conceptual and technical challenges underlying spillover research. To explore productivity shocks in Spanish firms, their spillover transmission, and mechanisms behind these effects, researchers can utilize diverse empirical methods and data sources. Methods include firm-level data analysis, sector-level data analysis, regional data analysis, data analysis to capture patterns and trends in productivity and spillovers across industries and regions.

A comprehensive approach is crucial to understand these dynamics within Spain's sectors and regions. This study focuses on three key objectives. First, it aims to identify productivity shocks in Spanish firms across 20 manufacturing sectors and 17 regions from 1997 to 2016. Second, it investigates spillover effects from these shocks, both within the same industry and region, probing into the imitation and worker mobility channels. Third, the study sheds light on the mechanisms driving these spillovers due to foreign direct investment (FDI) in Spain. The research contributes to the understanding of productivity shocks and their spillover effects within Spanish industries

and regions. Empirical evidence strongly supports the existence of spillover effects, both within and across sectors. Positive coefficients, even after accounting for industry/regional effects, highlight the significance of spillover benefits among firms. The study underscores the influence of effective management practices and talent recruitment in enhancing firm productivity, triggered by advancements made by leading companies in the Spanish market.

This study utilizes firm-level data from 20 manufacturing sectors spanning nearly two decades (1996-2016) to examine productivity shocks, spillovers, and mechanisms in Spain. The data source is a comprehensive voluntary survey conducted by the Spanish Ministry of Finance among 5840 firms across these sectors. After cleaning the data and excluding outliers, the final sample 1502 consists of 28,559 observations from 977 firms. The model employed centers on a production function that integrates variables such as net sales, labor force, capital stock, supplies, and R&D expenses. Productivity growth is calculated by comparing net sales per employee and stock of capital per employee. Productivity shocks are identified if growth surpasses 20% and remains consistent above this threshold for at least two consecutive years. This criterion ensures notable and sustained productivity spikes. After detecting shocks, their coefficients are incorporated into the production function to capture spillover effects. Management practices are considered, incorporating attracting human capital and modern manufacturing techniques. The study offers insights into the influence of these factors on productivity shocks and spillovers across sectors and regions within Spain.

The study's results and discussions revolve around the analysis of key variables and their implications. Table 1 provides a summary of main variable statistics, including Productivity Shock, Productivity Growth, Partial Productivity Growth, Capital Intensity Growth, Net Sales per Employee, and Stock of Capital per Employee. The study proceeds by calculating partial productivity growth and capital intensity growth using net sales, total workforce, and stock of capital variables. This aids in measuring the productivity growth of firms. The productivity shock is then estimated, with 977 firms exhibiting 1502 observations from 1997 to 2016. These shocks, representing 5.25% of the total sample. Further investigations examine the causes of exceptional performance, specifically focusing on the role of management practices. The introduction of new human capital and modern manufacturing techniques are considered as good management practices. These practices are incorporated into the production function, with estimated coefficients showing strong support for these practices positively impacting productivity shocks.

The spillover effect is also explored, indicating that positive productivity shocks in an industry or region result in increased productivity for other firms within that domain. This effect is supported by the inclusion of dummy variables and management practices, emphasizing the positive

correlation between such practices and productivity shocks. Moreover, the study introduces the concept of "absorption capacity," measuring firms' effectiveness in assimilating new knowledge and technologies to improve productivity and innovation. The positive coefficients associated with the interaction of productivity shocks and attracting new human capital demonstrate that the spillover mechanism may be partially attributed to knowledge absorption through workforce mobility. In conclusion, the study reveals the intricate relationships between variables, management practices, and spillover effects, shedding light on the dynamics of productivity shocks and their impact on firms, industries, and regions in Spain. The findings underscore the importance of effective management practices and knowledge absorption for enhancing overall productivity and economic growth.

This research aims to detect productivity shocks and analyze their spillover effects within sectors and regions of Spain. The primary contribution lies in addressing key research questions concerning spillovers. Firstly, the study identifies productivity shocks in a comprehensive dataset of firm-level data. Secondly, it measures the transmission of these shocks to other firms within the same region or industry. The investigation then delves into whether imitation or competitive improvement drives management practices. The findings affirm the occurrence of productivity spillovers among firms within sectors and regions. The evidence strongly supports the hypothesis that firms benefit from industry and regional peers, where advancements in some firms lead to positive spillovers to others. These positive effects are observable even after controlling for industry and regional factors through dummy variables. Moreover, the study demonstrates that the adoption of good management practices enhances productivity, with significant coefficients for individual variables. Notably, the recruitment of new talent amplifies this effect, aiding in absorbing spillovers from market-leading companies. This research highlights that knowledge is transmitted through imitation and worker mobility within sectors and regions.

The study also underscores the role of foreign direct investments (FDIs) in driving productivity shocks. FDIs can enhance local firms' efficiency and innovation by introducing advanced technologies and practices, expanding market access, and fostering competition. Policymakers must carefully manage FDI policies to maximize benefits while mitigating potential drawbacks. The findings suggest that promoting domestic firms' self-improvement through imitation and workforce mobility, particularly in response to productivity improvements in sectors or regions, can be valuable. This insight informs stakeholders and contributes to strategies for attracting and retaining FDIs in the country.

The consensus is that human-induced global warming is a reality, requiring actions to lower greenhouse gas emissions, enhance energy efficiency, support renewable energy, and adapt to

changing conditions. Environmental protection involves safeguarding the natural environment from pollution, degradation, and habitat loss to ensure human and ecological well-being. Addressing pollution, climate change, and resource conservation is pivotal for human health, economies, and sustainable industries. Circular economies play a key role by minimizing waste, conserving resources, and fostering sustainability. Such models encourage material reuse, resource conservation, and reduced greenhouse gas emissions, offering economic benefits and environmental progress. Enforcing environmental protection laws in emerging economies is complex but vital, requiring strong legal frameworks, institutional capacity building, public engagement, penalties, and international cooperation. These efforts align with the Sustainable Development Goals (SDGs), aiming for sustainable resource use and a healthier environment. However, gaps in public involvement and institutional commitment hinder effective implementation in some regions.

In emerging economies, like Pakistan, public awareness and health concerns are driving demands for improved environmental decision-making. Environmental preservation requires meaningful public input, but many governments respond sporadically, lacking institutional support. Regional economic disparities often lead to weaker environmental rule enforcement, and some businesses prioritize growth over conservation. Pollution haven theory suggests that companies move to regions with lax regulations, resulting in pollution disparities between nations. Despite theoretical support, empirical studies on pollution havens are often limited to developed economies, with less focus on developing nations like Pakistan. Notably, public participation's role in environmental governance is underexplored, and past studies have relied heavily on pollution-related indicators. The textile industry is a vital contributor to Pakistan's economy, but it also poses environmental challenges due to pollution. Pakistan has implemented environmental policies to mitigate these issues, which impact firm performance positively. These policies necessitate compliance with emissions and waste standards, driving firms to adopt efficient and sustainable practices. Such practices not only prevent penalties and reputational harm but also cut costs and attract eco-conscious consumers, boosting sales. Moreover, environmental policies incentivize innovation, technology adoption, and resource efficiency, ultimately enhancing long-term competitiveness and performance within the industry.

The study "Importance of Environmental Policy on Firm Performance for the Textile Industry: A Contextual Study of Pakistan" explores the influence of environmental policy on Pakistani textile firms. This policy's direct effects involve regulations and standards that induce sustainable practices, impacting short-term costs but improving long-term reputation and performance. Indirect effects manifest through innovation driven by sustainability incentives, bolstering

productivity and competitiveness over time. The study reveals that firms adhering to environmental regulations and adopting sustainable practices exhibited better performance. Thus, environmental policy drives sustainable practices and enhances competitiveness, underscoring the need for compliance and sustainable strategies to elevate long-term firm performance. In democratic governance, public participation is crucial, allowing informed decisions and transparency. Scholars advocate for increased public engagement in environmental decisions, aligning with economic principles of information access and decision-making in contractual partnerships. Governments should empower citizens as residual claimants, given their stake in environmental outcomes and public health. Educating citizens about environmentally sound practices and involving them in decision-making can create a more eco-conscious society.

The research aims to address three key challenges related to public engagement in environmental decision-making, focusing on what motivates involvement, the roles of relevant actors, and the impact of regulations. To investigate this, the study selected three prominent environmental activism cases in Pakistan based on criteria such as public engagement, government regulations, and varying economic contexts. Data from academic and public sources were analyzed through comparative case studies, enabling an in-depth understanding of the driving forces and interactions in different cases. The study contributes to understanding the roles of environmental management systems, government regulations, and public engagement in influencing organizational and environmental performance. The research methodology employs a quantitative approach through a cross-sectional survey. A questionnaire was used to gather data from employees in Pakistan's textile industry, aiming to explore the relationships between government regulations, environmental performance, organizational performance, and public engagement. The study population included lower to upper-level employees, with 460 usable responses out of 500 collected. Statistical analysis was conducted using the Smart PLS (Partial Least Squares) method, allowing for causal modeling and descriptive analysis. The study contributes to the understanding of how various factors interplay in the context of environmental decision-making and performance within the Pakistani textile industry.

In this study, 500 questionnaires were distributed, with 460 collected for analysis after discarding 57 due to incomplete data. Demographic factors such as gender, age, education, designation, and experience were examined in the textile industry respondents. The study employed a PLS-SEM measurement model to assess construct reliability and validity, including factor loading, Cronbach’s alpha, composite reliability, and average extracted variance. Convergent validity was confirmed as values exceeded threshold levels for all variables. The structural model analysis,

using Smart PLS 3, revealed that public participation positively influences company performance, and government regulations have a significant positive association with company performance, confirming the respective hypotheses. The square root of AVE was used to evaluate construct discriminant validity. The bootstrapping approach was utilized to estimate the mediation effect, revealing complete mediation between environmentalism and organizational performance. Furthermore, moderation analysis demonstrated that environmentalism has a significant and favorable moderating influence on the connection between environmental performance and organizational performance. The study contributes to the understanding of how various factors interplay in the context of environmental decision-making and organizational performance in the Pakistani textile industry.

This research focuses on public participation, government regulations, and organizational EMS in relation to organizational success, with environmental performance as a mediating factor. The study found favorable and substantial relationships between public engagement, government regulations, OEMS, and environmental performance. Moreover, the study highlighted the moderating role of environmentalism in influencing the relationship between these factors and organizational performance. The findings underscore the importance of environmental policies set by top management to enhance company performance and sustainability in the competitive textile industry. However, the study's limitations suggest the need for further research. The sample was limited to a specific region and sector, potentially affecting generalizability. The study's focus solely on public engagement may overlook other influential factors. Qualitative data collection methods and broader geographic representation could provide a more comprehensive understanding. Future research should explore additional dimensions, leadership philosophies, and clarify mediating and moderating links to deepen insights.

In the context of the provided studies, "shocks" refer to significant events, changes, or realizations that have had a transformative impact on Spain's economic and industrial landscape. These shocks highlight vulnerabilities, stimulate policy responses, and often prompt adaptations to ensure economic resilience, growth, and sustainability in the face of unforeseen challenges. Let's break down the shocks presented in each study:

First Study - Impact of 2008 Global Financial Crisis and COVID-19 Pandemic on Spain's Construction Sector, the shock in the first study is the 2008 global financial crisis, which had a profound negative impact on Spain's construction sector. This event exposed vulnerabilities within the industry and prompted the need for government interventions to revive the sector. The COVID-19 pandemic is the second shock explored in this study. This unprecedented event

disrupted the construction sector similarly to the 2008 crisis, but with unique characteristics. It revealed the sector's ability to adapt to different types of shocks, emphasizing the importance of crisis management strategies and the role of policies in mitigating such impacts.

The 2008 global financial crisis is the initial shock discussed in this study. This crisis had a severe negative impact on Spain's construction sector. The construction industry was heavily reliant on easy credit, speculative optimism, and foreign investments, which came to a halt when the crisis hit. The collapse of Lehman Brothers triggered a freeze in credit, leading to halted projects, plummeting property values, and rising unemployment within the construction sector. This shock exposed vulnerabilities in the sector's overreliance on credit-driven growth and speculative projects. It prompted a reassessment of the industry's sustainability and a need for government intervention to stabilize the sector and revive the broader economy.

The second shock explored in this study is the COVID-19 pandemic. This unprecedented event disrupted the construction sector in a similar fashion to the 2008 crisis, but with distinct characteristics. Lockdowns, supply chain disruptions, and workforce challenges caused project halts and declines in construction activity. The pandemic highlighted the construction sector's ability to adapt to a different type of shock—one driven by health concerns and mobility restrictions. The study underscores the importance of crisis management strategies and the role of policies in mitigating the impacts of such shocks. The pandemic's shock emphasized the need for resilient supply chains, digitalization, and adaptability within the construction industry.

Second Study - Productivity Shocks and Spillover Effects in Spain's Manufacturing Sectors, the shock in the second study refers to productivity shocks occurring within Spain's manufacturing sectors. These shocks stem from factors such as technological advancements or shifts in management practices, leading to changes in firm productivity. The study explores how these shocks influence neighboring firms, creating spillover effects within the same industry or region. This highlights the dynamic nature of industries and the interconnectedness of firms' performance.

A productivity shock refers to a sudden and significant change in a company's efficiency, productivity, or output. These shocks can be triggered by various factors, such as technological advancements, shifts in management practices, changes in workforce skill levels, or alterations in external conditions. When a productivity shock occurs, it results in a notable change in a firm's output or productivity level. These shocks can be positive, leading to increased efficiency and output, or negative, causing a decrease in productivity.

In the context of the second study, productivity shocks are disruptions that impact the efficiency and productivity of firms within Spain's manufacturing sectors. These shocks are brought about

by various factors, such as the introduction of new technologies, changes in production processes, improvements in management techniques, or shifts in market demand. Productivity shocks can have a transformative effect on a firm's operations, leading to changes in its competitive position, profitability, and overall performance. Spillover effects occur when changes in one entity's behavior, actions, or performance impact the behavior, actions, or performance of other entities within the same industry, region, or ecosystem. These effects can be both positive and negative and often reflect the interdependence and interconnectedness of different parts of a system. In the context of the study, spillover effects refer to the phenomenon where productivity shocks experienced by one firm within Spain's manufacturing sectors influence the performance of neighboring firms operating within the same industry or region. When a firm experiences a positive productivity shock and improves its efficiency or output, this can lead to positive spillover effects for other firms nearby. These neighboring firms might learn from the innovative practices of the successful firm, adopt similar technologies or techniques, and consequently improve their own productivity. On the other hand, a negative productivity shock in one firm could lead to adverse spillover effects, where neighboring firms might experience challenges due to decreased demand or increased competition. The study's focus on productivity shocks and spillover effects highlights the dynamic nature of industries and the intricate connections between firms. Industries are not isolated entities; they exist within complex ecosystems where changes in one part of the system can have ripple effects on others. Productivity shocks and their subsequent spillover effects illustrate how firms within an industry can influence and impact each other, either positively or negatively.

In the context of Spain's manufacturing sectors, understanding these dynamics is crucial for policymakers, industry leaders, and researchers. By studying productivity shocks and spillover effects, they can gain insights into how innovations and changes within firms can drive broader economic growth and competitiveness. Furthermore, identifying mechanisms that facilitate positive spillover effects can inform strategies to promote knowledge sharing, innovation diffusion, and collaboration within industries. The study focuses on the concept of productivity shocks and their spillover effects in Spain's manufacturing sectors. Productivity shocks represent significant changes in firm efficiency, often triggered by technological advancements or management practices. Spillover effects illustrate how these shocks can influence neighboring firms, emphasizing the interconnectedness and dynamics of industries. This understanding contributes to insights about how industries evolve and adapt over time and provides valuable information for fostering innovation and growth within the manufacturing sector.

Third Study - Environmental Protection and Policy Changes, the shock in the third study involves a series of significant events related to environmental protection. These shocks include the scientific consensus on global warming, awareness of environmental degradation's negative impacts, adoption of circular economy approaches, challenges in enforcing environmental protection laws, and realization of inadequate public engagement and institutional structures for environmental preservation. The study's findings regarding the impact of environmental policies on firm performance and the recognition of the textile industry's contribution to pollution also represent transformative shocks that influence policy-making and business practices.

In the context of the third study, "Environmental Protection and Policy Changes" refers to a series of significant events and realizations related to safeguarding the environment and addressing environmental challenges. These events and realizations serve as "shocks" because they have transformative impacts on how society, industries, and governments perceive and address environmental issues. One of the significant shocks discussed in the study is the scientific consensus on global warming. This refers to the widely accepted understanding within the scientific community that human activities, particularly the emission of greenhouse gases, are contributing to the warming of the Earth's climate. This consensus has led to a paradigm shift in how policymakers, industries, and the general public perceive climate change as a pressing global issue that requires urgent action. Another shock is the growing awareness of the negative impacts of environmental degradation on ecosystems, public health, and the economy. As information about pollution, habitat loss, and resource depletion becomes more widely understood, it triggers a realization of the urgent need to protect and preserve the environment for current and future generations. The adoption of circular economy approaches is another transformative shock. Circular economy principles focus on minimizing waste, maximizing resource efficiency, and reducing the environmental impact of production and consumption. The shift from a linear "take-make-dispose" model to a circular model challenges traditional business practices and calls for innovative approaches to minimize environmental harm. The study also addresses the challenges in enforcing environmental protection laws. This shock highlights the realization that the effectiveness of environmental policies depends on robust enforcement mechanisms. Weak enforcement can lead to non-compliance and continued environmental degradation.

A significant realization is that environmental protection requires the active engagement of the public and the establishment of effective institutional structures. This shock underscores the importance of involving citizens in decision-making processes related to the environment and establishing institutions capable of overseeing and regulating environmental policies. The study's findings regarding the impact of environmental policies on firm performance represent another

transformative shock. These findings reveal that environmental policies and practices can have far-reaching effects on business performance, influencing factors such as profitability, reputation, and long-term sustainability. The recognition of the textile industry's contribution to pollution serves as a transformative shock that prompts a reevaluation of industry practices. This realization emphasizes the need for sustainable practices within the textile industry to mitigate its environmental impact. The third study explores a series of transformative shocks related to environmental protection. These shocks include shifts in scientific understanding, heightened awareness of environmental degradation, adoption of circular economy principles, challenges in policy enforcement, recognition of inadequate public engagement, and insights into the impact of environmental policies on firm performance. Each of these shocks serves as a catalyst for policy changes, shifts in business practices, and a broader recognition of the importance of environmental preservation. The study underscores the interconnectedness of environmental issues, economic considerations, and policy responses in shaping a sustainable future.

These studies represent pivotal moments or changes that have prompted shifts in policies, strategies, and societal awareness. These shocks have wide-ranging implications for Spain's economic trajectory, industries, and overall resilience. Whether stemming from financial crises, health emergencies, technological advancements, or environmental concerns, these shocks emphasize the need for adaptive strategies, policy responses, and collaborations to ensure sustainable growth, stability, and competitiveness. The studies collectively underscore the significance of understanding and effectively managing these shocks to shape positive outcomes for Spain's economy and industries.

In each study, the term "performance" refers to the effectiveness, outcomes, results, or achievements of specific entities, sectors, or policies being discussed

In the context of the construction sector studies, "performance" mainly pertains to the economic outcomes, productivity, and resilience of the construction industry and its impact on the broader economy. The studies assess the performance of the construction sector in terms of growth, employment generation, contribution to GDP, and responses to economic shocks. Performance is evaluated by analyzing data on housing market trends, housing starts and completions, public works tenders, employment rates, and the overall economic growth. The studies also examine how the construction sector's performance has been influenced by external factors such as the global financial crisis and the COVID-19 pandemic. The provided text presents a comprehensive analysis of the impact of the COVID-19 pandemic on the Spanish construction sector, with a focus on its economic consequences and associated challenges. The analysis highlights the significant

downturn in the Spanish economy due to the pandemic, resulting in severe disruptions in various sectors, including construction. The pandemic's effects on GDP growth, industrial growth, production, unemployment, and other macroeconomic indicators are examined, reflecting the multifaceted nature of the crisis's impact. The construction sector is identified as a crucial pillar of the Spanish economy, with its contributions to GDP growth and intermediate consumption of other sectors emphasized. The construction industry's intricate interconnections with other economic sectors are outlined, emphasizing its role in driving economic growth by procuring outputs from other sectors. The text discusses the sector's significance as a driver of employment, its role in infrastructure development, and its contribution to urbanization, communication infrastructure, and tourism. Additionally, the article underscores the sector's historical importance as a preferred destination for financial investment, while also acknowledging the sector's past volatility, as evidenced by the housing bubble burst in 2008.

The research goes on to discuss the pandemic's specific impact on the Spanish construction sector. It highlights the disruptions faced by construction companies, including site closures, supply chain disruptions, and financial strain. The negative repercussions on employment, particularly for vulnerable workers and those on temporary contracts, are outlined. The text also delves into the economic transmission channels through which the pandemic's shocks impacted the economy, including confidence, direct hit to consumer behavior, and supply-side shocks. The analysis recognizes the challenges that governments faced in balancing pandemic containment measures with economic consequences. Furthermore, the study outlines the objectives of the research, which involve determining the economic impact of both the COVID-19 pandemic and the 2008-2009 financial crisis on the Spanish construction sector. By examining a range of variables such as GDP growth, employment rates, housing activity, and public works tenders, the research aims to shed light on the direct and indirect effects of these crises on the construction sector. The comparison of the two crises provides valuable insights into Spain's recovery prospects and the potential strategies to address the challenges faced by the construction industry. The analysis provides a detailed overview of the impact of the COVID-19 pandemic on the Spanish construction sector from an economic perspective. It underscores the sector's significance for the Spanish economy, the challenges posed by the pandemic, and the need for comprehensive research to understand the extent of the crisis's effects and formulate effective recovery strategies.

The concept of "performance" is central in the studies that explore productivity shocks, spillover effects, and their impact on firms and industries. Here, "performance" refers to the efficiency, effectiveness, and competitiveness of firms and sectors within the Spanish economy. The studies analyze productivity shocks and their propagation to neighboring firms, evaluating how certain

factors like foreign direct investments (FDI) and good management practices influence firm performance and spillover effects. The term is used to quantify the positive outcomes resulting from these factors and how they enhance the overall economic performance of firms and industries. The "Performance" perspective discussed in the provided text focuses on the effects of productivity shocks and spillovers in the context of foreign direct investment (FDI) and its impact on Spanish firms. This perspective highlights the potential positive outcomes of FDI on various aspects of the host country's economy. The analysis is primarily centered around the Spanish manufacturing industry and industrial companies, examining the transmission mechanisms of productivity spillovers and their implications.

In the Spanish manufacturing industry, empirical evidence suggests that productivity spillovers occur from large manufacturing to small and medium-sized enterprises (SMEs). The presence of larger firms creates competition, forcing smaller manufacturing to enhance their efficiency and productivity in order to compete effectively. This spillover effect becomes more pronounced in regions with higher economic development and greater integration with global markets, indicating that policies aimed at fostering competition and reducing entry barriers could lead to enhanced overall productivity in the Spanish economy. The study also emphasizes the potential beneficial effects of FDI on the host country's economic growth and development. FDI is noted for its ability to channel capital inflows, create jobs, transfer technology, and improve management practices. The positive spillover effects of FDI are seen in areas such as productivity, export performance, and technological progress. These effects can benefit not only the foreign investors but also local businesses, particularly small and medium-sized enterprises.

The investigation of productivity shocks and spillovers in Spanish firms involves understanding factors that influence productivity, such as labor, capital, innovation, and absorptive capacity. The text highlights the importance of absorptive capacity, collaboration, and R&D intensity in influencing the transmission of spillover effects. The study also delves into the mechanisms of labor mobility, collaboration, and patent citations as avenues for transmitting productivity shocks spillovers. Furthermore, the research underscores the mixed findings in the literature regarding the presence and extent of technology spillovers from foreign firms to local firms. While some studies show a positive relationship between foreign presence and local firm productivity, others find contradictory evidence. The complex nature of these effects may be attributed to various conceptual and technical challenges. To investigate the existence of productivity shocks, spillovers, and transmission mechanisms, the text suggests employing empirical methods and data analysis. The analysis could involve firm-level, sector-level, and regional-level data to identify patterns, trends, and relationships. The study aims to provide insights into how FDI affects

productivity shocks, spillovers, and mechanisms within various sectors and regions of Spain. Performance perspective emphasizes the multifaceted nature of productivity shocks and spillovers and their potential impact on the Spanish economy, particularly within the manufacturing industry and industrial sectors. It underscores the importance of understanding the mechanisms and channels through which these effects are transmitted and the potential benefits they offer to host countries.

In the context of the study on environmental protection, "performance" is used to describe the effectiveness and outcomes of environmental policies, regulations, and management practices. The study examines how environmental policies impact the performance of firms, especially in the textile industry, by fostering sustainable practices, compliance with emissions standards, and innovation. The term "performance" also encompasses the evaluation of public engagement in environmental decision-making processes and its potential to improve environmental governance and outcomes. The provided text discusses the concept of "performance" from various perspectives, primarily focusing on environmental protection, the role of environmental policy in firm performance, and the relationship between public engagement and environmental decision-making. From an environmental protection standpoint, the text highlights the scientific consensus on global warming and its causes, emphasizing the importance of mitigating its impacts through individual, organizational, and governmental actions. The text underscores the significance of protecting the environment due to its essential role in human health, economies, and overall well-being. It mentions that addressing environmental challenges necessitates collective efforts encompassing individual actions, policy support, and sustainable practices. Moreover, circular economies are introduced as a means to contribute to environmental protection by minimizing waste, conserving resources, and promoting sustainable practices through product reuse and recycling.

Shifting to the context of firm performance and its relationship with environmental policy, the text elaborates on how environmental policies and regulations can influence the behavior of firms within industries, using the example of Pakistan's textile industry. It explains that environmental policies require firms to meet specific standards regarding emissions, waste management, and resource usage. Complying with these regulations can potentially lead to short-term costs, but in the long term, firms that adopt sustainable practices are likely to reap benefits through improved reputation, reduced operating costs, and access to environmentally conscious markets. The study conducted on the Pakistani textile industry demonstrates that environmental policy has a positive impact on firm performance, both directly by encouraging sustainable practices and indirectly by incentivizing innovation. Additionally, the text delves into the challenges of enforcing

environmental protection laws in emerging economies and highlights strategies for effective enforcement, including cooperation, capacity-building, and public engagement. It also explores the interconnectedness between the Sustainable Development Goals (SDGs) and environmental protection laws, emphasizing their shared objective of promoting sustainable resource use and safeguarding the environment for future generations. Lastly, the text touches on the significance of public participation in environmental decision-making and the need for transparent administration to ensure individuals' accountability and freedom, aligning with the principles of democratic governance.

"Performance" is crucial for understanding how different sectors, industries, and policies are functioning within the Spanish context. It is used to measure the effectiveness of actions taken, the outcomes achieved, and the overall impact on economic, social, and environmental aspects. The term helps quantify and qualify the success or challenges faced by various entities in each study, providing valuable insights for policymakers, researchers, and stakeholders.