UNIVERSIDAD DE GRANADA

Facultad de Ciencias Económicas y Empresariales
Departamento de Organización de Empresas I
Programa de Doctorado en Ciencias Económicas y Empresariales

TESIS DOCTORAL

ESSAYS ON HOW INFORMATION TECHNOLOGIES CREATE BUSINESS VALUE IN ORGANIZATIONS

MENCIÓN DE DOCTORADO INTERNACIONAL

Tesis doctoral presentada por:
Laura Ruiz Santiago

Dirigida por:
Prof. Dr. Francisco Javier Lloréns Montes
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A mis padres,
que me han brindado unas oportunidades educativas inestimables,
amor infinito, apoyo y coraje.

To my loving parents,
who have given me invaluable educational ooportunities,
endless love, support and encouragement.

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1. Introducción

Introducción

Hace una década, el término digital se usaba como sinónimo de Tecnologías de la Información (TI), la figura del *Chief Information Officer* (CIO) no era considerada un líder estratégico, la tecnología se empleaba para mejorar la productividad de una forma aislada, y la falta de alineamiento entre la estrategia de TI y la estrategia de negocio era un aspecto bastante común en la gestión de la empresa (Curran et al., 2017). Una década después, el alcance y la escala de las transformaciones facilitadas por lo digital ha crecido de forma inmensurable, considerándose la inversión en Tecnologías de la Información uno de los pilares más importantes para la creación de valor de negocio y la obtención de una ventaja competitiva (Mikalef et al., 2020). La encuesta realizada por Gartner a 465 directores ejecutivos de más de 30 países en 2021 mostró que lo relacionado con la tecnología constituía la segunda prioridad estratégica para los *Chief Executive Officers* (CEOs) en el periodo 2021-2022, mientras que el desarrollo de capacidades digitales era la única área en la que un mayor porcentaje de ejecutivos se comprometía a incrementar la

inversión[1]. Por otro lado, International Data Corporation (IDC), el principal proveedor mundial de inteligencia de mercado y servicios de consultoría para empresas tecnológicas, de telecomunicaciones y tecnología de consumo, ha anticipado que el gasto global en transformación digital alcanzará los 2.8 trillones de dólares en 2025, más del doble del que se destinó en 2020 y siendo una de las partidas más importantes del gasto en TI (IDC Media Center, 2021). Estos datos anticipan que el creciente interés por la inversión en tecnología viene acompañado inevitablemente por un proceso de transformación digital de la empresa (Westerman et al., 2011) y un cambio en las estrategias de negocio tradicionales (Ross et al., 2017). La transformación digital se entiende como el uso de tecnologías digitales (medios sociales, analítica de datos o tecnología móvil) para transformar y mejorar la experiencia del cliente, los procesos operativos y/o para crear nuevos modelos de negocio que mejoren radicalmente el desempeño de la empresa (Fitzgerald et al., 2013; Wessel et al., 2021). Este proceso de transformación digital aparece forzado, en parte, por las continuas amenazas que los nuevos entrantes digitales están introduciendo en los distintos sectores (Sia et al., 2016). Este fenómeno, conocido como disrupción digital (*digital disruption*), se entiende como aquellos cambios en el entorno competitivo resultantes del uso de tecnologías digitales por nuevos entrantes o por competidores establecidos de forma que se mine o debilite la viabilidad del portfolio de productos del resto de empresas o su forma de aproximarse al mercado (Bughin y van Zeebroeck, 2017). De hecho, se estima que casi el 50% de las empresas de Standard and Poor's 500 sean reemplazadas en los próximos 10 años (Yokoi et al., 2019). En definitiva, las tecnologías digitales (ej., medios sociales, tecnología móvil, computación en la nube, internet de las cosas o inteligencia artificial) están penetrando cada

1 https://www.gartner.com.com/smarterwithgartner/ceos-see-growth-in-2021-marked-by-3-shifts

vez más profundamente y radicalmente en las organizaciones, desafiando modelos de negocio tradicionales, e impulsando cambios significativos en la forma de competir, crear, y capturar valor de negocio (Benitez et al., 2020; Schneckenberg et al., 2021).

Al mismo tiempo, la pandemia provocada por la COVID-19 ha generado uno de los escenarios más competitivos que se recuerdan, donde las empresas se han visto forzadas a competir y sobrevivir en una situación de extrema incertidumbre. La pandemia ha creado situaciones únicas para industrias y países, que a su vez ha requerido esfuerzos significativos en la forma de usar las tecnologías (Chakravorti y Chaturvedi, 2020). En este sentido, el papel de la tecnología durante esta crisis ha sido clave, desde conectar a personas y compartir información, hasta facilitar y permitir la realización del trabajo remoto (Marabelli et al., 2020). En esta situación, la tecnología ha sido más vital que nunca para muchas empresas. Por lo tanto, aunque la tecnología en sí solo suponga una parte del complejo puzle que implica ser competitivo en el actual entorno digital, puede ser considerada como uno de los activos estratégicos más importantes para crear capacidades de negocio y competitividad (Benitez et al., 2018b).

Todos estos aspectos relacionados con el uso y la explotación de la tecnología se enmarcan en el campo de Sistemas de Información. A pesar de los esfuerzos y el considerable progreso del campo, investigadores de Sistemas de Información aún trabajan en esclarecer cómo la tecnología puede crear una ventaja competitiva para las empresas (Pavlou y El Sawy, 2006). ¿De qué forma las inversiones en tecnología pueden contribuir y ayudar a

sobrevivir y progresar en un contexto tan complejo, dinámico y disruptivo? Investigadores de la disciplina han contribuido significativamente a esta línea de investigación, relacionando variables de tecnología con una serie de medidas del desempeño (Santhanam y Hartono, 2003; Mithas et al., 2012; Mikalef et al., 2020). Esta línea de investigación, denominada valor de negocio de la TI, ha sido y todavía es, uno de los temas de investigación más predominantes y relevantes del campo. Identificar cómo y qué tipo de inversiones en TI crean nuevas oportunidades de negocio es todavía un desafío para muchas empresas. Por lo tanto, aunque la pregunta de cómo la tecnología contribuye a un mejor desempeño ha suscitado gran interés por parte de la comunidad científica, el paradigma actual del valor de negocio de la TI sigue promoviendo un sinfín de oportunidades de investigación que permiten profundizar y esclarecer este complejo fenómeno (Wade y Hulland, 2004; Mithas et al., 2011; Nwankpa y Datta, 2017). La presente tesis doctoral tiene como último objetivo contribuir a la literatura previa sobre el valor de negocio de la tecnología a través del estudio de cómo recursos y capacidades tecnológicas ayudan a las empresas a transformar sus actividades de negocio para generar valor y mejorar los resultados empresariales.

1.1. Marco general de la tesis doctoral

Esta tesis doctoral se enmarca en el campo y la literatura de Sistemas de Información. El impacto de los recursos y las capacidades de TI en el desempeño y los resultados de las empresas ha recibido una atención y un interés considerable dentro del campo (Wade y Hulland, 2004; Kohli y Grover, 2008; Chen et al., 2013). En particular, esta tesis doctoral se

contextualiza en la creación de valor de negocio mediante las inversiones en TI, una línea de investigación que ha generado un importante debate en las últimas décadas. Un número creciente de estudios han abordado el concepto de valor de negocio de los recursos de TI, entendido como el grado en el que las empresas son capaces de generar y capturar valor mediante el uso eficiente de la tecnología (Melville et al., 2004). Algunos investigadores de la disciplina incluso sugieren que demostrar el valor de las inversiones en TI es esencial para la contribución del campo (Agarwal y Lucas, 2005). Esta línea de investigación sugiere que la tecnología, entendida como un recurso o una capacidad, puede contribuir a mejorar el desempeño de la empresa y, por lo tanto, los resultados empresariales (Pavlou y El Sawy, 2006; Devaraj et al., 2007). Sin embargo, los postulados teóricos de esta línea de investigación argumentan que los recursos y capacidades de TI no son capaces de mejorar de una forma directa los resultados empresariales, sino que es necesario el desarrollo de otras capacidades organizativas intermedias o complementarias que ayuden a la realización de dicho valor (Benitez y Walczuch, 2012; Benitez et al., 2018a). En resumen, se pone de manifiesto que la clave en la generación de valor a partir de la inversión en tecnología no va a depender del montante invertido, sino de la capacidad de la empresa de desarrollar y usar eficientemente los recursos de TI con otras capacidades y procesos organizativos.

Siguiendo esta literatura, por un lado, la perspectiva de las capacidades organizativas facilitadas por la tecnología se ha considerado una de las líneas de investigación más relevantes y una de las perspectivas teóricas más sólidas para explicar la creación de valor por parte de la TI (Benitez y

Walczuch, 2012). Esta perspectiva sugiere que los recursos y capacidades de TI afectan indirectamente al desempeño de la empresa a través del desarrollo de otros procesos y capacidades organizativas intermedias (Braojos et al., 2020; Castillo et al., 2021). Estudios previos han identificado algunas de estas variables intermedias, como por ejemplo el aprendizaje organizativo, las prácticas de gestión del conocimiento (Braojos et al., 2020), la flexibilidad estratégica (Benitez et al., 2018a) o la agilidad (Sambamurthy et al., 2003). Esta línea de investigación se ha considerado como la "hipótesis de la mediación" del valor de negocio de la TI (Benitez y Walczuch, 2012).

Por otro lado, la misma literatura sobre la creación de valor motivado por el uso y la inversión en tecnología también apoya una alternativa a la forma de creación de este valor de negocio. Esta alternativa se fundamenta en los postulados teóricos de la teoría de la complementariedad de recursos y capacidades (Ennen y Richter, 2010). En este sentido, esta otra línea de investigación complementaria sostiene que los recursos de TI también pueden generar valor y mejorar los resultados empresariales cuando interactúen con otros recursos o capacidades tecnológicas o de negocio (Benitez y Walczuch, 2012). Esto implica que la relación positiva entre los recursos de TI y el desempeño de la empresa puede reforzarse por la existencia de otros recursos o capacidades. Esta corriente de investigación basada en la teoría de la complementariedad de recursos y capacidades es a lo que se ha referido en la literatura previa como la "hipótesis de la moderación" del valor de negocio de la TI (Benitez y Walczuch, 2012).

De forma consistente con las líneas de investigación mencionadas, parece racional pensar que la simple adopción de la TI no garantizará la

obtención de una ventaja competitiva, sino que esto dependerá de cómo la empresa es capaz de usar eficientemente sus recursos de TI junto con otros recursos y capacidades organizativas que faciliten o interactúen con las variables tecnológicas (Benitez et al., 2018a; Braojos et al., 2019). Esta tesis doctoral hace uso de la literatura previa de Sistemas de Información y se construye en base a los postulados teóricos de la creación de valor de negocio motivado por el uso de la TI para explorar y examinar cómo los recursos y las capacidades tecnológicas mejoran el desempeño de la empresa.

1.2. Delimitación del tema objeto de estudio

La creación de valor de negocio mediante el uso de las tecnologías ha sido una de las líneas de investigación que más interés ha captado en el campo de Sistemas de Información en las últimas décadas. Considerando los gaps detectados en esta literatura previa, esta tesis doctoral tiene la oportunidad de realizar diversas contribuciones al campo de Sistemas de Información, así como de proporcionar respuestas de interés a directivos de TI y de negocio.

Esta investigación doctoral parte de los fundamentos teóricos que la literatura sobre la creación de valor de negocio de la TI ha proporcionado en las últimas décadas para estudiar teóricamente y empíricamente cómo ciertos recursos y capacidades de TI ayudan a las empresas a mejorar su desempeño organizativo desde distintas perspectivas. En primer lugar, esta tesis doctoral estudia el poder amplificador de uno de los recursos de TI más adoptados y explotados por el tejido empresarial: los medios sociales externos (Facebook, Twitter y blogs) (Culnan et al., 2010). La alta

popularidad y efectividad de estos recursos tecnológicos ha provocado que las empresas busquen la forma de generar valor de negocio mediante su uso y explotación (Aral et al., 2013). Más allá de objetivos puramente de marketing, las empresas hacen uso de los medios sociales para fomentar la colaboración interna, gestionar el talento e incluso los procesos operativos (Kane, 2015). Estudios previos en el campo de Sistemas de Información han contribuido significativamente a esclarecer el potencial de los medios sociales en la creación de valor de negocio (Braojos et al., 2015; Castillo et al., 2021a, 2021b; Lin et al., 2021). En concreto, la literatura previa ha entendido el concepto de valor de negocio de medios sociales como el grado en que las empresas crean valor mediante su uso (Melville et al., 2004; Dong y Wu, 2015). Sin embargo, numerosos estudios previos en la literatura sobre valor de negocio de los medios sociales se han centrado en identificar cuáles son aquellas variables intermedias que median la relación entre el uso de medios sociales y el desempeño de la empresa (Braojos et al., 2019; Song et al., 2019), prestando relativa poca atención al rol moderador de estos recursos (Benitez et al., 2018c). La presente tesis doctoral otorga a la capacidad de medios sociales un rol de variable moderadora en la relación entre el desarrollo de actividades de responsabilidad social corporativa y la reputación como empleador de la empresa.

En segundo lugar, esta investigación doctoral estudia el rol de la TI desde una perspectiva facilitadora. La perspectiva de las capacidades organizativas facilitadas por la TI argumenta que los recursos y capacidades de TI influyen sobre el desempeño de la empresa a través de otras capacidades intermedias (Joshi et al., 2022). En este sentido, existen capacidades o procesos

organizativos que median la relación entre las variables de tecnología y el desempeño de la empresa. Entre estas variables mediadoras, especial interés se muestra hacia las prácticas de gestión del conocimiento. Estudios previos han mostrado el poder y la capacidad de la tecnología en la gestión del conocimiento para conseguir una ventaja competitiva (Alavi y Leidner, 2001). La gestión del conocimiento se ha referido como la identificación y el uso del conocimiento colectivo dentro de la organización para ayudarla a competir en el mercado e incrementar su capacidad de innovación y respuesta (von Krogh, 1998). Esta línea de investigación ha mostrado como la tecnología es capaz de facilitar la creación de conocimiento, su almacenamiento, su recuperación, su transferencia o su aplicación a otros procesos organizativos (Pinjani y Palvia, 2013). En definitiva, para mejorar el desempeño organizativo, es imprescindible gestionar de una forma eficiente el conocimiento al que la empresa tiene acceso. La presente tesis doctoral tiene como objetivo analizar cómo una capacidad de TI muy concreta tiene un impacto en el desempeño organizativo a través de dos capacidades de transferencia de conocimiento.

Por último, la tecnología también ha demostrado ser un factor clave en el desempeño innovador de la empresa (Benitez et al., 2018c; Benitez et al., 2022). De hecho, la obtención de resultados de innovación constituye una de las mayores motivaciones de los ejecutivos para la inversión en tecnología (Gibson, 2017). El campo y la literatura de innovación ha estado tradicionalmente ligada al de Sistemas de Información, habiendo reconocido ampliamente la existencia de una relación positiva entre tecnología e innovación de una forma u otra (Joshi et al., 2010; Jha y

Bose, 2016; Benitez et al., 2018c). Tal es la penetración de las tecnologías digitales en los procesos de innovación de las empresas, que ha surgido el término de innovación digital (Nambisan et al., 2017). La innovación digital ha sido definida como la creación de productos, servicios, procesos o modelos de negocio resultantes del uso de tecnologías digitales por parte de las empresas (Nambisan et al., 2017). Este fenómeno ha dado lugar a los llamados lugares de trabajo digitales o *digital workplaces*, donde la interacción del empleado con tecnologías se ha convertido en la norma (Dery et al., 2017). Sin embargo, estos lugares de trabajo digitales también han sido partícipes de una corriente de literatura de carácter negativo sobre el uso de la tecnología, denominada el lado oscuro o *dark side* del uso de TI (Califf et al., 2020). Esta corriente argumenta que el ritmo constante y acelerado en el que la tecnología está siendo usada y adoptada en el lugar de trabajo trae consigo consecuencias negativas para los empleados en forma de fatiga en el trabajo o altos niveles de tecnoestrés (Tarafdar et al., 2007). Tal es la importancia de estos aspectos negativos para otras variables como la satisfacción en el trabajo o el desempeño del empleado, que la literatura sobre el valor de negocio de la TI también ha sostenido que aquellos empleados que realizan mejor sus tareas se caracterizan por un aspecto en común: la felicidad (Lester et al., 2022). La presente investigación doctoral tiene como objetivo estudiar cómo una serie de iniciativas de innovación digital en el seno de la empresa tienen la capacidad de transformar la experiencia del empleado, y, por tanto, su desempeño. Para ello, se consideran algunas variables críticas de la literatura de Recursos Humanos, tales como la satisfacción en el trabajo o el *engagement* del empleado.

1.3. Justificación e interés de la investigación

Las Tecnologías de la Información están cambiando el estilo de vida de los individuos y el comportamiento de la empresa contemporánea, convirtiéndose en uno de los motores más importantes para el tejido empresarial y la sociedad del siglo XXI. Las tecnologías han cambiado radicalmente la forma en que los individuos, las organizaciones y las sociedades operan, interactúan y se comunican, creando desafíos críticos para todas las partes de interés. Por un lado, la sociedad tiene un acceso cada vez más ilimitado a información, los consumidores, más exigentes que nunca, esperan que las empresas conozcan sus gustos y se anticipen a ellos sin cruzar el límite de la privacidad, mientras que casi la totalidad de los sectores se ven disrumpidos digitalmente por los nuevos entrantes al sector. Por otro lado, los procesos productivos, cada vez más automatizados, crean desafíos para el empleado que merman su desempeño y su bienestar (Ayyagari et al., 2011). Todos estos aspectos se enmarcan en lo que se conoce como el lado oscuro o *dark side* de la tecnología (Cheng et al., 2021). A pesar de todos esos desafíos, la literatura sobre el lado bueno o *bright side* de la tecnología ha reconocido que las organizaciones también han obtenido grandes beneficios con su uso en forma de transmisión de información o conocimiento entre la empresa y sus *stakeholders*, permitiendo a la empresa ser más ágil y más flexible, o haciendo más productivos sus procesos operativos y sus empleados. Por lo tanto, la disciplina de Sistemas de Información es de crucial importancia para ejecutivos, académicos, y educadores, de forma que se comprenda el potencial y las posibilidades que la tecnología puede brindar con el objetivo de aprovecharla de la mejor forma posible.

A pesar de que la literatura previa de la disciplina de Sistemas de Información ha contribuido con numerosos estudios que abordan la compleja idiosincrasia de cómo la tecnología contribuye a mejorar el desempeño organizativo, esta misma literatura también reconoce que los mecanismos subyacentes a través de los que se produce esta relación no están claros (Mithas et al., 2011; Nwankpa y Datta, 2017). Partiendo de la literatura sobre la creación de valor de negocio de la TI y desde el punto de vista del lado bueno de la TI, esta tesis doctoral se centra en analizar cómo recursos y capacidades tecnológicas específicas contribuyen a la creación de valor desde distintas perspectivas. Esta tesis doctoral también se justifica por las contribuciones significativas a ejecutivos proporcionando respuestas a preguntas de interés.

1.4. Objetivos de la investigación

El objetivo principal y general de esta tesis doctoral es analizar si y cómo distintos recursos y capacidades de TI ayudan a las empresas a mejorar su desempeño organizacional y crear valor de negocio. A pesar de que la literatura previa sobre el valor de negocio de la TI ha mostrado un avance significativo en las últimas décadas, esta tesis doctoral identifica algunos gaps en la literatura a los que dar respuesta y que contribuyen significativamente al campo de Sistemas de Información. Este objetivo general puede ser escindido en los siguientes objetivos específicos:

- *Examinar si y cómo los medios sociales ayudan a las empresas a generar valor fortaleciendo el efecto positivo de actividades de responsabilidad social corporativa en el atractivo de la empresa como empleador.*

- *Analizar cómo la capacidad de la empresa de integrar sus sistemas con aquellos de los miembros de la cadena de suministro ayuda a mejorar el desempeño organizativo mediante la gestión del conocimiento.*
- *Estudiar cómo una serie de iniciativas de innovación digital crean valor transformando la experiencia del empleado y mejorando su desempeño en el trabajo.*

Con respecto a estos objetivos, algunas de las preguntas de investigación sobre las que se fundamentan los mismos son las siguientes:

- *¿Podemos afirmar que el desarrollo de actividades de responsabilidad social corporativa en el seno de la empresa trae consigo una mayor reputación de la empresa como empleador?*
- *¿Es la capacidad de usar medios sociales capaz de fortalecer la relación entre el desarrollo de actividades de responsabilidad social corporativa y la reputación como empleador?*
- *¿Influye la capacidad de integración de la TI en el desempeño de la empresa?*
- *¿Cómo puede influir la capacidad de integración de la TI en el desempeño de la empresa?*
- *¿Cómo pueden las iniciativas de innovación digital generar valor para el empleado?*

Dar respuesta a estas preguntas de investigación no solo supone una contribución al campo de Sistemas de Información y, en concreto, a la literatura sobre creación de valor de negocio de la TI, sino también al desarrollo y avance de otras literaturas, tales como la ética, la gestión del conocimiento o la innovación digital.

En las siguientes subsecciones, los objetivos específicos se detallan de forma más minuciosa. Estos objetivos forman el cuerpo central de esta tesis doctoral y se tratarán en los capítulos 2, 3 y 4 respectivamente.

1.4.1. El rol amplificador de los medios sociales en la relación entre actividades de responsabilidad social corporativa y la reputación de la empresa como empleador

Como se ha mencionado en el marco teórico de esta investigación, existe una corriente de investigación alternativa y complementaria a la perspectiva de las capacidades organizativas facilitadas por la TI, que apoya la idea de que los recursos y las capacidades de TI pueden generar valor mediante la interacción con otros recursos o capacidades, la cual se refiere a la hipótesis de la moderación del valor de negocio de la TI (Benitez y Walczuch, 2012). Siguiendo esta línea de investigación referida a la teoría de la complementariedad de recursos y capacidades (Ennen y Richter, 2010), este objetivo específico argumenta que la capacidad de medios sociales es capaz de interactuar con otros recursos, como son las actividades de responsabilidad social corporativa, con el fin de mejorar la reputación de la empresa como empleador, es decir, su atractivo desde el punto de vista de la persona que emplea.

Este objetivo específico se fundamenta, por tanto, en la literatura previa sobre capacidad o competencia en medios sociales (Braojos et al., 2015; Castillo et al., 2021a, 2021b). La capacidad en medios sociales se ha definido como la habilidad de la empresa para explotar y usar los medios sociales para ejecutar actividades de negocio (Braojos et al., 2015). Estos estudios previos han sugerido y demostrado que los medios sociales son unas de las tecnologías más disruptivas que las organizaciones pueden usar para transformar sus actividades y crear valor. Siguiendo esta línea de pensamiento, nos preguntamos cómo los medios sociales pueden afectar a la relación entre las actividades de responsabilidad social corporativa llevadas a cabo por la empresa y su reputación como empleador. Sin embargo, la literatura previa sobre la que se fundamenta este objetivo en concreto, también sugiere que de hacer un mal uso o un uso ineficiente de los medios sociales, estos pueden llegar a ser un arma de doble filo y resultar en acciones totalmente contrarias a lo esperado. Esto es precisamente lo que se pretende esclarecer y explorar en este primer objetivo específico. ¿La capacidad de uso de medios sociales es capaz de fortalecer o debilitar la relación entre el desarrollo de actividades de responsabilidad social corporativa y la reputación como empleador de la empresa? ¿Cómo y por qué?

1.4.2. El rol facilitador de la capacidad de integración de la TI en el desempeño de la empresa y su impacto en la absorción y desorción de conocimiento

El segundo objetivo de esta tesis doctoral pretende contribuir a la perspectiva de las capacidades organizativas facilitadas por la TI, una de las perspectivas teóricas más sólidas en la literatura sobre el valor de negocio de la tecnología. Este segundo objetivo explora el rol de la capacidad de integración de la TI

en la mejora del desempeño organizativo a través de dos variables críticas de gestión de la transferencia de conocimiento.

La habilidad de la empresa de integrar sus sistemas con aquellos de sus *partners* de la cadena de suministro se ha convertido en una capacidad crítica para la creación de valor en un contexto de innovación abierta, donde la empresa no compite de forma aislada, sino en continúa interacción con agentes externos (Chesbrough, 2006). El contexto actual de continua interacción donde los procesos de innovación de las empresas son cada vez más transparentes y abiertos al resto de *stakeholders* implica que, aquellas empresas que son capaces de crear y mantener relaciones cercanas con su cadena de suministro o sus clientes, estarán en una posición más ventajosa para identificar y asimilar nuevo conocimiento externo y, por tanto, mejorar su desempeño (Setia y Patel, 2013).

En este sentido, este objetivo contempla el continuo de actividades de transferencia de conocimiento entre la empresa principal y su cadena de suministro; en concreto, se centra en dos capacidades críticas de gestión del conocimiento: la absorción y desorción de conocimiento. La literatura previa relacionada con estas capacidades se ha centrado principalmente en examinar el impacto de las inversiones en TI en la capacidad de la empresa para absorber conocimiento y lograr ciertos objetivos (Roberts et al., 2012). Sin embargo, dadas las nuevas reglas del panorama empresarial, la integración de los sistemas resulta una habilidad crítica e inexplorada en la literatura que puede traer consigo beneficios para la organización principal. Además, la literatura sobre gestión del conocimiento e innovación abierta

ha reconocido que las empresas pueden estar interesadas en transferir conocimiento secundario a otras empresas de su entorno con distintos objetivos como, por ejemplo, obtener ingresos por la venta de licencias (Roldan et al., 2018). Esta habilidad se denomina desorción de conocimiento y supone una actividad crítica y complementaria a la capacidad de absorción para mejorar el desempeño de la empresa. El segundo objetivo específico de esta tesis doctoral es explorar el rol de la capacidad de integración de la TI de la empresa en la mejora del desempeño organizativo a través de la absorción y desorción de conocimiento.

1.4.3. El poder transformador de la innovación digital en la experiencia del empleado

El último objetivo específico de esta tesis doctoral trata de explorar el impacto de una serie de iniciativas de innovación digital en el desempeño del empleado. Las literaturas de Innovación y Sistemas de Información han estado tradicionalmente ligadas, habiendo enfatizado el potencial de la tecnología en la consecución de objetivos de innovación. Dada la estrecha relación entre ambos términos, ha surgido el concepto de innovación digital, entendido como el uso de tecnologías digitales en los procesos de innovación de la empresa (Nambisan et al., 2017). Sin embargo, la literatura previa sobre innovación digital aún se encuentra en sus etapas iniciales, habiendo autores que animan y fomentan la realización de estudios que avancen este fenómeno de forma teórica y empírica (Fichman et al., 2014; Vega y Chiasson, 2019).

La literatura existente sobre innovación digital se ha limitado al estudio de cómo tecnologías específicas facilitan los procesos de innovación y su impacto en el desempeño de la empresa (Hanelt et al., 2021) o consideran los resultados de innovación como la variable desempeño (Hensen y Dong, 2020). Esta literatura previa muestra dos limitaciones principales. En primer lugar, la innovación digital supone el uso de tecnologías digitales en los procesos de innovación de la empresa, lo que afecta directamente a los empleados de la misma. El impacto de la innovación digital en la experiencia del empleado no ha sido explorado en el campo de Sistemas de Información de una forma adecuada. En segundo lugar, en los estudios sobre el uso de tecnologías ha predominado el llamado *single-IS paradigm*, que implica el estudio del uso de tecnologías de manera aislada y específica. En los lugares de trabajo digitales, los usuarios se enfrentan a una multitud de sistemas diferentes, aspecto que no está recogido de forma adecuada por la literatura previa. Este último objetivo específico intenta avanzar en este aspecto teniendo en cuenta el portfolio de tecnologías más usadas y accesibles para las empresas (Sebastian et al., 2017).

1.5. Estructura del trabajo de investigación

La presente tesis doctoral está estructurada en tres bloques que representan los cinco capítulos de la tesis. El primer bloque se corresponde con el Capítulo 1 e incluye la introducción, el cuerpo central de la tesis lo componen los Capítulos 2, 3, y 4, y suponen los trabajos de investigación de la tesis doctoral. Finalmente, las conclusiones quedan reflejadas en el último bloque, que corresponde al Capítulo 5.

En el Capítulo 1 se presenta de una forma general el contexto en el que la tesis doctoral se posiciona, exponiendo el objetivo general y también los específicos de la misma. Se presenta la literatura sobre la creación de valor de negocio mediante el uso de la tecnología y sus postulados teóricos sobre los que se construye la tesis doctoral. Igualmente, se justifica el interés por los estudios de investigación propuestos explicando brevemente por qué es necesario seguir contribuyendo al campo.

El Capítulo 2 supone el primer artículo de investigación en el que se otorga a la variable tecnológica un rol moderador. En concreto, se estudia el rol amplificador de los medios sociales en la relación entre actividades de responsabilidad social corporativa y reputación como empleador. El modelo propuesto se contrasta con una muestra de las 100 mejores empresas para trabajar en España usando datos secundarios.

En el Capítulo 3, motivado por la perspectiva de las capacidades organizativas facilitadas por la TI, se presenta el segundo artículo de investigación de esta tesis doctoral, donde se explora el rol facilitador una capacidad de TI, la capacidad de integración de los sistemas de la empresa principal con los sistemas de agentes externos, en la mejora del desempeño de la empresa. Esta relación se analiza a través del papel mediador de dos capacidades de transferencia de conocimiento: la absorción y desorción de conocimiento. La teoría propuesta se ha testado empíricamente con una muestra de 151 empresas españolas de sectores con altos niveles de inversión en tecnología, usando datos de encuesta.

El Capítulo 4 de esta tesis doctoral incluye el último trabajo de investigación, donde se presenta una serie de iniciativas de innovación digital y donde se testa su poder transformador en la experiencia del empleado. Motivado por literatura previa sobre innovación digital y variables de recursos humanos, este trabajo propone que las iniciativas de innovación digital mejoran el desempeño del empleado en el trabajo a través de tres variables clave: la satisfacción en el trabajo, el *engagement* del empleado, y su intención de abandonar la empresa. Este modelo es testado con una muestra de 134 empresas españolas usando datos de encuesta.

Por último, el capítulo 5 incluye las principales conclusiones derivadas de los resultados de los trabajos de investigación, donde se expone tanto las contribuciones teóricas como empíricas. También se presentan una serie de implicaciones de carácter práctico para los ejecutivos de TI y de negocio, junto con las principales limitaciones y las futuras líneas de investigación que esta tesis supone. El capítulo termina con un breve apartado sobre consideraciones finales.

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2 HOW CORPORATE SOCIAL RESPONSIBILITY ACTIVITIES INFLUENCE EMPLOYER REPUTATION:

THE ROLE OF SOCIAL MEDIA CAPABILITY

2. How corporate social responsibility activities influence employer reputation: The role of social media capability

Abstract

This study analyzes the relation between the firm's corporate social responsibility (CSR) activities, employer reputation, and social media in the academic conversation on business value of technology. Motivated by the controversy over the function of social media in the firm's generation of value from CSR activities, this study hypothesizes that firms that perform CSR activities may become better employers and that this positive relationship may be stronger when firms leverage social media technologies. We explain this effect of social media by arguing that these social technologies enable *higher social visibility* and *exposure/credibility*. We tested our research model with data from 100 organizations in Spain. The results provided two key insights: 1) CSR activities enable firms to build greater employer reputation; and 2) social media capability amplifies the effect of CSR activities on employer reputation. This study contributes to Information Systems and Business Ethics research by arguing theoretically and demonstrating empirically that leveraging a technology such as social media generates business value through maximization of the positive impact of CSR activities on employer reputation of the firm.

Keywords: *Corporate social responsibility activities, social media capability, employer reputation, business value of information technology*

2.1 Introduction

Corporate social responsibility (CSR) is increasingly important for firms (Hsu, 2012). Firms perform CSR activities to gain competitiveness, generating wealth (Garriga & Mele, 2004; Saeidi et al., 2015), responding to societal demands (Porter & Kramer, 2006), and supporting individuals and society. Many firms implement CSR activities deliberately to build and improve their corporate reputation in order to attract customers (McWilliams et al., 2006; Lai et al., 2010) and to build employer reputation to attract talent (Turban & Greening, 1997; Bhattacharya et al., 2008).

Employer reputation indicates the firm's image as an employer as perceived by potential applicants and current employees, specifically, the firm's reputation as a good place to work. The better the employer's reputation is, the greater the firm's ability to attract, recruit, and retain talent. Firms with poor talent management practices face serious risk of talent war and increased hiring cost, as extra cost becomes necessary to compensate for poor reputation and convince candidates to work for them despite the risk of problems (Burgess, 2016). For example, harsh criticism of Amazon's recent business practices has damaged its employer reputation. Amazon encouraged employees to criticize each other ruthlessly by sending information to their bosses, leading to sabotage among employees, overtime, stressful conditions, and high pressure. Bad employer reputation may have caused Amazon problems attracting talent, giving the company one of the highest turnover rates among Fortune 500 firms (Bhatnagar & Jaiswal, 2016). Auger et al. (2013) refer to this phenomenon as workplace reputation and examine its role in the war for talent. Although more scholars are studying employer reputation,

very little is known about this corporate phenomenon, and even less in the field of Information Systems (IS). Some studies have begun to analyze the particularities of employer reputation. For example, Helm (2011) investigates how pride, job satisfaction, affective commitment, and perceived corporate reputation influence employees' awareness of their impact on employer reputation. Jones et al. (2014) study how involvement with the community and pro-environmental practices affect workplace attractiveness. Similarly, Iseke and Pull (2019) investigate whether women executives influence perceived employer attractiveness for female job seekers.

As to CSR activities, prior studies have concentrated primarily on how CSR activities relate to brand value and firm performance (Lee et al., 2012), and on the relation between CSR activities and corporate image (e.g., Lai et al., 2010; Stanaland et al., 2011). With a few exceptions (Turban & Greening, 1997; Dogl & Holtbrugge, 2014), few studies have been performed on the impact of CSR activities on employer reputation. Turban and Greening (1997) demonstrate that corporate social performance influences corporate reputation and the firm's attractiveness as an employer. Dogl and Holtbrugge (2014) reveal that corporate environmental responsibility activities influence the firm's environmental reputation as employer and employee commitment.

In the era of the digital revolution, firms utilize social media to transform and perform business activities (Aral et al., 2013; Benitez et al., 2018a). Specifically, firms leverage social media—both external (e.g., Facebook, Twitter) and internal (e.g., Facebook Workplace, Microsoft Yammer, Ding—

Talk)to acquire and share knowledge from the market/customers and employees (Kane, 2015; Song et al., 2019). This knowledge enables them to manage relationships with potential and current customers and other stakeholders to improve their online corporate reputation (Mandviwalla & Watson, 2014). Academic research echoes this importance of social media, focusing on three main areas (Braojos et al., 2015). The first is oriented to IT and business managers and describes behavioral patterns of social media usage in organizations (e.g., Culnan et al., 2010; Kiron et al., 2012). The second examines so-called social media marketing, that is, the firm's use of social media to run marketing activities (Goh et al., 2013; Rishika et al., 2013). The third line of research compares the effects of social media to those of conventional online media (e.g., web traffic, Google search) (Luo et al., 2013; Yu et al., 2013). For instance, Zhang's (2015) study of information disclosure investigates how companies disclose voluntary information on new social media as compared to traditional media or company websites. Research shows that social media are one of the most disruptive technologies that organizations use to transform business activities and create business value. Based on this research, we examine the possible role of social media in amplifying the impact of CSR activities on employer reputation.

How do social media affect the relation between CSR activities and corporate reputation? If wrongly leveraged, social media can be a double-edged sword. They may exert negative, positive, or no influence on the impact of CSR activities on firm reputation. Currently, they are often used to disclose sensitive information (e.g., financial information, environmental, and social policies), which may include misleading information (Delmas

& Burbano, 2011). Customers and potential employees may be reluctant to believe what companies publish on social media (Zhang, 2015). In fact, some firms use social media to greenwash their social reputation, a technique that customers view as fake (Lyon & Montgomery, 2013). For example, hotels may use social media to greenwash their green initiatives to save water and avoid producing chemical waste by reusing towels while in fact masking their unique true intention, to save costs. Similarly, General Electric's green campaign "Ecomagination" has been viewed as a social media-driven greenwashing campaign, since General Electric publicized its green initiatives at precisely the same time it was advocating against the EPA's new clean air requirement (Delmas & Burbano, 2011). Such phenomena have led customers to question whether firms' CSR activities reflect true engagement with society or are simply a façade. Since social media messages on CSR activities are subject to greater exposure and social visibility, firms that lack proficiency in using social media may find that the absence of CSR activities (e.g., Volkswagen and the Dieselgate scandal) or the presence of fake CSR activities has disastrous consequences for their reputation. One could argue, however, that social media exert little influence on CSR activities' impact on corporate reputation because many customers and potential employees do not read most messages published in external social media (Fieseler et al., 2010; Cervellon & Lirio, 2017).

When properly managed and leveraged, social media can enable firms to maximize the impact of CSR activities on corporate reputation, suggesting that social media can play a positive role in this equation. Thanks to dialogue and interactivity as a two-way communication channel with, as well as

exposure to, the large audience that they enable, social media scanning and engagement of customers and potential employees provide additional credibility and visibility to the CSR activities that influence corporate reputation. The same may hold for the positive role social media play in the impact of CSR activities on employer reputation (a subdomain of corporate reputation). We believe that using social media makes communications more credible than purely company-controlled messages, as the firm exposes its messages to criticism (Eberle et al., 2013) and the firm's social media capability can manage such criticism appropriately. This study focuses on social media capability, that is, *"the firm's ability to leverage the social media platforms of Facebook, Twitter, and corporate blogs to execute business activities"* (Benitez et al., 2018a, p. 135). The key research question it attempts to answer is: Does social media capability amplify the impact of CSR activities on employer reputation? Our central thesis is that social media can amplify the positive impact of CSR activities on employer reputation if the firm is capable of leveraging the social media presence generated by *the greater visibility and credibility* of CSR activities that these media enable. Figure 2.1 presents the theory proposed. We tested this theory on a sample of 100 firms from Spain, employing secondary data, and the empirical analysis supports our model.

This manuscript makes several contributions to the fields of IS and Business Ethics. Our study pioneers in theorizing how social media capability positively increases the impact of CSR activities on employer reputation. We theorize and demonstrate empirically how social media capability enables firms to generate business value by amplifying the positive effect of

CSR activities on employer reputation. This is the primary contribution of our research to the IS research on business value of information technology (IT). Second, signaling theory suggests that firms signal their values and activities such as CSR activities to the talent market. Social identity theory suggests that talent use these signals to evaluate person-firm fit and their current/potential organizational affiliation. This study contributes to developing both theories by adding social media capability as a talent touchpoint capability that strengthens the firm's ability to amplify signals and their potential use to evaluate perceived organizational affiliation, which in turn affects employer reputation.

The rest of the paper is organized as follows. In section 2, we present the study's theoretical framework and conceptualization of the key concepts, and develop the hypotheses. The third section explains the research design. In section 4, we perform the empirical analysis and report the results. The final section presents the discussion and conclusions.

2.2 Theoretical framework, conceptualization of constructs, and development of hypotheses

2.2.1. Theoretical framework: Signaling theory and social identity theory

This study grounds the proposed research model in signaling theory and social identity theory. Signaling theory seeks to explain how individuals use signals to reduce the uncertainty associated with deciding or undertaking

actions in an environment of asymmetric information (Connelly et al., 2011). Signaling often occurs in competitive environments where firms compete for resources such as talented employees (Dogl & Holtbrugge, 2014), as in the case of the war for talent in business analytics, a scarce resource on the market. According to signaling theory, since applicants and current employees usually have incomplete information about a firm, the only way of knowing and evaluating the firm is to interpret the signals the firm transmits to the market about its strategic plan, vision, core values, and concept of workplace. Applicants thus consider observable actions to obtain information about unobservable attributes (Spence, 1974). As signals that companies provide to the talent market, CSR activities can affect employer reputation. Prior research has used signaling theory to explain the potential benefits firms can reap from adopting and engaging in socially responsible initiatives (Turban & Greening, 1997). We use signaling theory to explain theoretically the connection between CSR activities and employer reputation, and to justify how social media capability may enable firms to disclose this information and disseminate these signals.

Social identity theory involves how individuals perceive their belonging to a particular group and act to favor this group, *"classifying themselves and others into several social categories (e.g., organizational membership, religious affiliation, gender, and age cohort)"* (Ashforth & Mael, 1989, p. 20). Organizational affiliation has been shown to be one of the most important membership groups for individuals, meaning that staying with a firm constitutes a public expression of one's values. According to this theory, individuals choose activities congruent with their identities, supporting the firms that

embody those identities (Ashforth & Mael, 1989; Helm, 2011). Specifically, current employees and potential talent with socially responsible values identify with companies that implement CSR activities. We use this theory to explain how the firm's CSR activities affect employer reputation by aligning the company and individual values associated with CSR.

If we combine signaling theory and social identity theory, we can understand CSR activities as signals that firms send to the talent market to improve current employees' and potential applicants' identification of their CSR values, thus improving employer reputation. Social media capability can affect signaling of CSR activities and individuals' identification with the company because these signals acquire greater visibility and exposure to current employees and potential applicants. These theories form the main theoretical grounding for this study's primary argument.

2.2.2. Conceptualization of key concepts

The key concepts examined in this organization-level study are CSR activities, employer reputation, and social media capability. CSR activities are social, environmental, ethical, and philanthropic activities performed voluntarily by the firm to meet the expectations of individuals and society (Lai et al., 2010; Shum & Yam, 2011). The societal rationale underlying why companies should implement CSR activities is that, since companies benefit from society, they should give something back, something other than provision of products, labor, and capital payment. CSR activities are a way for companies to build their identity and the image they wish their internal

and external stakeholders to perceive (Bravo et al., 2011; Martinez et al., 2014). For instance, although Fortune considered Wal-Mart as the *"most admired company in America"* in 2003 and 2004, its reputation was damaged by its low score in the ethical dimension. To solve this problem, Wal-Mart developed a strategy based on CSR activities that combined social, political, and legal components to avoid jeopardizing its future growth and financial success (Hemphill, 2005). Overall, we believe that companies usually invest in CSR activities to improve corporate reputation.

Employer reputation refers to the firm's image as employer, as perceived by potential applicants and current employees, that is, to the firm's reputation as a (good) place to work. Employer reputation is the job seeker's perceived proficiency of the firm in advanced and superior human resources management practices (Stahl et al., 2012; Benitez et al., 2018b). Firms are aware that they must strengthen their employer reputation due to intense market competition to attract the most talented employees. For example, being ranked the best firm in which to work in Spain by *Actualidad Económica's* Great Place to Work 2017 will enable Mutua Madrileña (a leading insurance company in Spain) to attract the best employees in the short and middle term (Oleo et al., 2017).

Social media capability is the firm's ability to use and leverage social media to develop business activities (Benitez et al., 2018a). Drawing on Benitez et al. (2018a), this study focuses on the firm's proficiency in using and leveraging three external social media: Facebook, Twitter, and corporate blogs. Organizations' social media usage is top-of-mind for IT, business executives,

and organizations. Although most companies worldwide try to learn, use, and exploit social media, firms' proficiency in using and leveraging social media varies greatly. Social media capability is the firm-level capability to lead, explore, and capitalize on external social media to develop business activities.

2.2.3. Hypothesis development

2.2.3.1. CSR activities and employer reputation

We hypothesize a positive relationship between CSR activities and employer reputation. The firm's CSR activities serve as a signal of job conditions at the firm (Turban & Greening, 1997). Current employees may use this signal when deciding to stay in a company. Similarly, potential applicants can reduce information asymmetry by using CSR signals to decide whether to apply for a job. As signals that companies provide to employees and the talent market (Spence, 1974), CSR activities may affect employer reputation (Aguilera et al., 2007).

CSR activities can improve employer reputation due to better firm-person fit, organizational identification, employee's self-concept, and self-esteem. We argue these relationships using the literature on social identity theory. Both firms and individuals seek good firm-person fit (Chatman, 1989). Firms with CSR activities will recruit and select potential candidates who share CSR values and help the company to implement these CSR activities. For example, Baylor University recruits and hires world-class faculty members that share the university's Christian and social values to help it to accomplish its Christian mission. Employees and potential talent with CSR values will select socially responsible companies (Jones et al., 2014),

improving their organizational identification and in turn the employee's self-concept, and self-esteem (Ashforth & Mael, 1989; Williamson et al., 2010). This argument also applies to the Baylor example. Better firm-person fit, organizational identification, employee self-concept, and self-esteem lead to a better employer reputation (Deephouse & Jaskiewicz, 2013). Prior research supports some of these arguments. For example, Ng and Burke (2005) demonstrate that women and minorities find firms with diversity management practices (CSR activities) to be great places to work. Therefore, we hypothesize that:

Hypothesis 1 (H1): *A positive relationship exists between CSR activities and employer reputation.*

2.2.3.2. The amplifier role of social media capability in the impact of CSR activities on employer reputation

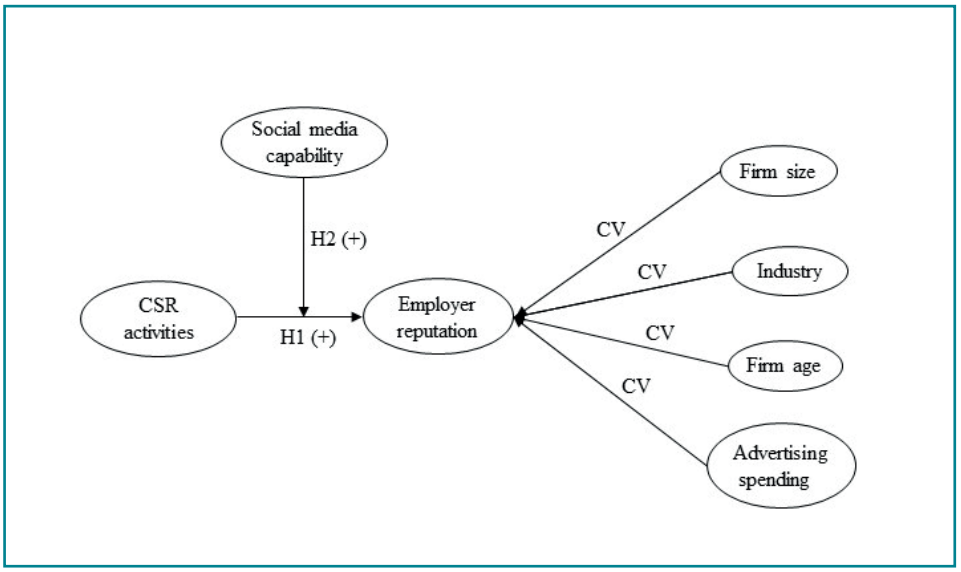
This study hypothesizes that social media capability performs an amplifier role in the relationship between CSR activities and employer reputation. That is, the relationship between CSR activities and employer reputation may be stronger in the presence of social media capability. This is the key thesis our study aims to explain and test empirically. Social media capability may positively amplify the impact of CSR activities on employer reputation due to the *higher social visibility* and *greater exposure/credibility* of social media-enabled posts of the firm's CSR activities. The firm's proficiency in using, handling, and leveraging social media may allow the firm to give its CSR activities more *social visibility* to build stronger employer branding, thus

maximizing business value from CSR activities. Posts on social media may amplify the CSR signals companies send to the talent market to improve their employer reputation (Balaji et al., 2016; Oh et al., 2017). In addition, we expect that social media positively amplify the impact of CSR signals on organizational affiliation (social identity) of employees and potential talent, thus improving employer reputation.

Moreover, social media may amplify the impact of CSR activities on employer reputation because the firm's posts on CSR activities will be more credible. Social media enable open dialogue, criticism, and interactivity in companies' communication with employees and potential applicants, generating greater credibility through the greater impression of trust (Eberle et al., 2013; Korschun & Du, 2013). For instance, Santander Group (a global leading bank) leverages Facebook to announce scholarships, sponsorship, funding, and job openings to university students (CSR activities). Based on the greater exposure/social visibility, credibility, and trust of these social media posts, Santander capitalizes better on CSR activities to build a good employer reputation. As we expect CSR activities and social media capability to interact to improve employer reputation, we hypothesize that:

Hypothesis 2 (H2): *Social media capability positively amplifies the relationship between CSR activities and employer reputation*

Figure 2.1: Research model (CV = Control variable)



2.3. Research methodology

2.3.1. Sample

We tested the theoretical model empirically using a sample composed of the 100 firms from Actualidad Economica's "Great Place to Work 2015" database. Actualidad Economica (*http://www.actualidadeconomica.com/)* is a top business magazine that provides several databases every year with information on *"sales, innovation effort, employer brand value, and executive compensation for the most admired firms in Spain"* (Benitez et al., 2018d, p. 512). These databases have been used in prior IS research (e.g., Benitez & Walczuch, 2012). Actualidad Economica's "Great Place to Work 2015" database (hereafter, the Actualidad Economica database) includes the 100 best firms in which to work in Spain in 2015, based on fine-grained evaluation conducted by independent human

resources experts and consultants. This evaluation was based on a survey and multiple interviews that measured and evaluated compensation, talent management, work environment, training, and employee opinion for each firm. All firms included in the Actualidad Economica database were used in this study. The firms come from 19 different industries: food (14, 14%), IT (14, 14%), insurance (12, 12%), consulting (11, 11%), energy (9, 9%), finance (9, 9%), pharmaceuticals (6, 6%), tourism and transport (5, 5%), and others (11 industries) (20, 20%). The firms in the sample had more than 100 employees and had run the business for at least five years in Spain. Our method of sample selection is sound. Prior IS research focuses on samples of firms included in reputable rankings like the one employed in the present study (Bharadwaj, 2000; Joshi et al., 2010; Benitez & Walczuch, 2012). We used convenience sampling due to the rich data available. The firms in the sample averaged 84164 employees [standard deviation (S.D.) = 111768.020]. As a context of study, Spain is particularly interesting because Spanish companies have a high maturity level and social media usage. In 2017, 49.6% Spanish firms used social media for business activities. Specifically, 94.4% firms used Facebook or LinkedIn, and 40.6% microblogs (e.g., Twitter) and corporate blogs (INE, 2017). Conversely, 83% of users in Spain interact with firms via social media (IAB Spain, 2017).

2.3.2. Data and measures

2.3.2.1. Composite model

IS research includes complex research questions that can be answered by conceptualizing, operationalizing, and estimating constructs. Two main

types of constructs exist: latent variables and artifacts (Benitez et al., 2020). Latent variables cannot be observed directly and must thus be inferred from observable variables through a measurement model (Borsboom et al., 2003). They can be operationalized as reflective and causal-formative (Henseler, 2017) and are usually used to operationalize behavioral concepts (individual behavior, attitude, and personality traits) (Henseler, 2015). In reflective measurement models, the latent variable reflects/causes the indicators. The causal-formative measurement model changes the direction of causality between the construct and the indicators. In contrast to the reflective measurement model, the causal-formative model's indicators cause the latent variable. Artifacts or design constructs refer to a combination of ingredients in which the indicators compose the construct (not cause the artifact) (Henseler, 2015, 2017; Benitez et al., 2020). Artifacts are usually considered as objects created by top managers that represent *"emergent, strong, complex, and man-made concepts"* (Lokuge et al., 2019, p. 448). Composite modeling is the usual way to model artifacts (Benitez et al., 2020). This study assumes that all constructs included in the conceptual model are artifacts (composite constructs).

2.3.2.2. CRS activities

The CSR activities construct was measured as the natural logarithm of the firm's score of CSR activities, with information collected from the *"Monitor Empresarial de Reputacion Corporativa"* (MERCO) database *(http://www.merco.info/es/)* in 2014. MERCO is one of the best-known databases and tools worldwide to evaluate the reputation of Spanish and Latin American firms based on a multi-source methodology composed of 5 evaluations

and 12 information sources. This database assigns CSR activities scores from 1 to 10000 based on careful examination of CSR activities in the firm. The MERCO database adopts a multidimensional approach, constructing the CSR activities score from five dimensions: ethical commitment, transparency and good governance, employee relations, commitment to environmental and climate change, and community contribution. Our measure of CSR activities is consistent with that used by Lee et al. (2013) and Tang et al. (2018), which has seven domains: *"community, corporate governance, diversity, employee relations, environment, human rights, and product"* (Lee et al., 2013, p. 797). MERCO includes information from a large number of firm stakeholders (steering committees, financial analysts, non-governmental organization agents, union members, customer association members, business and IT professors, chief communication officers, and CSR experts). Our unique manipulation was to estimate the natural logarithm of the CSR activities score. The construct CSR activities refers to the social, environmental, ethical, and philanthropic activities performed voluntarily by the firm. We measure CSR activities through natural logarithm of each firm's score for CSR activities from MERCO database. The MERCO database determines this score by evaluating employee relations (social activity), ethical commitment, transparency, and good governance (ethical activities), environmental and climate change commitment (environmental activities), and community contribution (philanthropic activities) for each firm. Conceptualization and measurement of the construct CSR activities thus align well.[1]

1 We also measured CSR activities through the environmental, social, and governance performance score (alternative measure) with information collected from the KLD database in 2014. We evaluated the relationship between the two measures (i.e., our original measure and the alternative measure). The results show that both measures correlate significantly ($\beta = 0.296$, $p_{one\text{-}tailed} < 0.010$), adding legitimacy to our original measure.

2.3.2.3. Employer reputation

Employer reputation is the key endogenous variable in the proposed model. It is a single-measure construct calculated as the natural logarithm of the firm's score for employer reputation, collected from the Actualidad Economica database in 2015. Because CSR activities can take time to affect employer reputation, we lagged the measure for CSR activities one year.[2] The Actualidad Economica database includes the 100 best firms in which to work in Spain in 2015, based on a fine-grained examination of overall employer reputation for each firm. The database assigns the firm an employer reputation score ranging from 0 to 1000, determined by examining compensation, talent management, work environment, training, and employee opinion. In our sample, the firm's employer reputation score ranged from 662 to 865. This methodology is one of the most accepted ways to measure employer branding among business executives in Spain. Our unique manipulation was to estimate the natural logarithm of the employer reputation score. Since our employer reputation score was constructed by ranking the firm's practices on compensation, talent management, work environment, training, and employee's opinion, we believe the measure represents conceptualization of employer reputation in a highly rational and appropriate way.[3]

2 We also controlled for endogeneity in the relationship between CSR activities and employer reputation, and between CSR activities and social media capability. Although we used CSR activities in 2013 as the instrument for CSR activities (measured in 2014), a series of Hausman tests did not show endogeneity problems either between CSR activities and employer reputation (χ^2 = 0.202, d.f. = 1, p = 0.653) or between CSR activities and social media capability (χ^2 = 1.328, d.f. = 1, p = 0.249). We thank anonymous Reviewer 1 for this suggestion.

3 We measured employer reputation with another alternative measure through employer reputation score in 2015, using information from the MERCO Talento database, and evaluated the relationship between the original and alternative measures. The results

2.3.2.4. Social media capability

Social media capability was operationalized as a composite second-order construct composed of three dimensions (Facebook capability, Twitter capability, and blog capability [Culnan et al., 2010; Benitez et al., 2018a]) using data collected in 2015, and as composite at first-order level (Henseler et al., 2016; Benitez et al., 2020).

We measured social media capability based on the validated measurement scheme developed by Benitez et al. (2018a) and Braojos et al. (2019). We thus measured Facebook capability as a composite first-order construct built from number of events (both past and future), experience, and updates with data gathered from the Facebook profile of the firm. We measured Facebook experience by average number of months the firm had had presence on this social platform. Updates were measured with scores from "1: Low" to "5: High" level of content updating on the Facebook page, assigning the firm a value of 1 if it had commented on Facebook more than one month ago, 2 if in the last month, 3 if two weeks ago, 4 if in the last week, and 5 if in the last two days (Benitez et al., 2018a; Braojos et al., 2019).

We measured Twitter capability as a composite first-order construct through time spent posting tweets, experience, and updates using information collected from firm's Twitter site and the Twopcharts database (*http://twopcharts.com/*). Time spent posting tweets was measured as the average number of hours the firm spent posting tweets. The other two indicators

show that both measures correlate significantly ($\beta = 0.232$, $p_{one\text{-}tailed} < 0.001$), providing additional validity and consistency to our original measure.

(i.e., experience and updates) were measured following the process used for the Facebook capability indicators on experience and updates (Benitez et al., 2018a). Blog capability is a composite first-order construct determined by firm's experience and updates on its corporate blogs (Braojos et al., 2019). Blog experience and updates were assessed following the same process as Facebook and Twitter, using data gathered from the firm's blog site(s).

Social media capability indicates the firm's proficiency in selecting, using, and leveraging Facebook, Twitter, and corporate blogs to implement business activities (Benitez et al., 2018a; Braojos et al., 2019). Our measures of social media capability have been proposed and validated in prior IS research (Benitez et al., 2018a; Braojos et al., 2019), and are consistent with conceptualization of social media capability. Facebook, Twitter, and blogs are three very important external social media that companies use and leverage for implementing business initiatives (Culnan et al., 2010; Braojos et al., 2015). Similarly, at first-order construct level, we measured Facebook, Twitter, and blog capabilities through number of events, time invested in using social media, degree of experience, and firm's update capabilities—all very plausible ingredients of companies' Facebook, Twitter, and blog capabilities (Benitez et al., 2018a). Table 2.1 presents the conceptualization and measures of the constructs.

2.3.2.5. Control variables

We controlled for the following variables: firm size, industry, firm age, and advertising spending on employer reputation. Since larger firms are more likely to have more financial resources to invest in employer reputation

activities (Fombrun & Shanley, 1990), employer reputation may depend on firm size. Because larger firms tend to be better known, their practices usually also have higher impact and spread faster in society. Thus, best-in-class human resources management practices tend to be more developed and to have a higher impact on employer reputation in large firms than in small ones. We therefore controlled for firm size in employer reputation, computing firm size as the natural logarithm of number of employees per firm (Benitez & Walczuch, 2012), using information collected in 2015 from the COMPUSTAT database.

We also controlled for industry on employer reputation, measured through a dummy variable where 0 corresponds to "Manufacturing firm", and 1 to "Service firm" (Liu et al., 2013), using data gathered from the firm's website. We controlled for firm age on employer reputation. Older firms have more experience designing, executing, and leveraging human resources management practices to build employer reputation than do younger firms, and time and experience can be critical in building trust and reliability among firms and their environment (Rhee & Valdez, 2009). Firm age was measured as the natural logarithm of the number of years the firm had operated in its industry in 2015 (Thornhill & Amit, 2003), using data collected from the SABI *(https://sabi.bvdinfo.com/)* database, which provides information on financial characteristics of Spanish and Portuguese firms (Benitez et al., 2018b, 2018c).

It is reasonable to think that firms that spend more money on advertising improve their employer reputation through better brand image and corporate reputation. We thus controlled for advertising spending on employer reputation, measured through expenditure per employee on advertising, using data gathered from SABI and COMPUSTAT databases (Benitez et al., 2018b).

Table 2.1: Construct conceptualization and measures

Construct name	Conceptualization	Measure	Source
CSR activities	CSR activities are social, environmental, ethical, and philanthropic activities that the firm performs voluntarily to meet the expectations of individuals and society (Lai et al., 2010; Shum & Yam, 2011)	Natural logarithm of the firm's score for CSR activities, based on ethical commitment, transparency and good governance, employee relations, environmental and climate change commitment, and community contribution	MERCO database
Employer reputation	Employer reputation is the firm's image as perceived by potential applicants and current employees (Stahl et al., 2012; Benitez et al.,2018b)	Natural logarithm of the firm's score for employer reputation, based on compensation, talent management, work environment, training, and employee opinion	Actualidad Economica database
Social media capability	Social media capability refers to the firm's ability to use and leverage social media to develop business activities (Benitez et al., 2018a)	Second-order construct composed by Facebook capability, Twitter capability, and blog capability	
Facebook capability	Facebook capability refers to the firm's ability to use and leverage Facebook to develop business activities (Benitez et al., 2018a)	Construct composed of number of events, experience, and updates	Firm's Facebook site
Twitter capability	Twitter capability refers to the firm's ability to use and leverage Twitter to develop business activities (Benitez et al.,2018a)	Construct composed of time spent posting tweets, experience, and updates	Firm's Twitter site and Twopcharts database
Blog capability	Blog capability refers to the firm's ability to use and leverage corporate blog(s) to develop business activities (Benitez et al., 2018a)	Construct composed of experience and updates	Corporate blog

2.4. Empirical analysis and results

To test the research model, we ran partial least squares (PLS) path modeling (Ringle et al., 2012) with the statistical software *"ADANCO 2.0. Professional"* for Windows *(http://www.composite-modeling.com*) (Henseler & Dijkstra, 2015). PLS is suitable in this research primarily for the following reasons. First, PLS is a "full-fledged" structural equation modeling (SEM) approach appropriate for testing exact model fit in both confirmatory and explanatory research (Hair et al., 2012; Henseler et al., 2016; Benitez et al., 2020). Second, since all constructs were specified as composite, PLS is optimal in that it produces consistent estimations of composite models (Henseler et al., 2014; Rigdon et al., 2014). Third, PLS obtains more accurate results when evaluating complex models than do covariance-based SEM techniques (Ajamieh et al., 2016). Fourth, PLS performs component-based SEM, which does not require data to follow a multivariate normal distribution (Chin et al., 2003). Finally, PLS is a well-known method and has been used primarily in IS (Ringle et al., 2012; Chen et al., 2015, 2017). We ran a 5000-subsample bootstrap analysis to assess significance of the weights, loadings, and path coefficients (Hair et al., 2011).

A prior statistical power analysis confirmed that the proposed model has a maximum of seven predictors (number of links in the structural model proposed for employer reputation). Since we anticipate a large effect size (f^2 = 0.350), this model requires a minimum sample of 48 to obtain a power of 0.800 and a 0.05 alpha level (Cohen, 1988). As our sample is composed of 100 firms, the sample size was large enough to evaluate the proposed model, suggesting enough statistical power to identify the theorized effects (Benitez et al., 2020).

2.4.1. Measurement model evaluation

2.4.1.1. Confirmatory composite analysis

We ran a confirmatory composite analysis to test whether the composite structure measures at first- and second-order levels were statistically correct in terms of overall fit of the saturated model (Benitez et al., 2020). To do so, we evaluated the inconsistency between the two correlation matrixes, the empirical and the model-implied matrices at both first- and second-order levels (Henseler, 2015; Benitez et al., 2020). This examination evaluates the competence of the composite structure to detect possible model misspecification, such as incorrect assignment of indicators to constructs, or incorrect number of constructs (Henseler et al., 2014). We also evaluated the standardized root mean squared residual (SRMR), unweighted least squares distance (d_{ULS}), and geodesic distance (d_G) (Henseler et al., 2016). Table 2.2 presents the outcome of this analysis for the saturated model at first- and second-order level. The lower the SRMR is, the more accurate the fit between the proposed measurement model and the data (Henseler & Dijkstra, 2015). Overall, for good fit of the proposed measurement model (saturated model) to the data, the SRMR should not exceed 0.080 (Henseler et al., 2014) and the SRMR, d_{ULS} and d_G (discrepancies) should not exceed the 95%-quantile of the bootstrap discrepancies (Henseler et al., 2016). The SRMR was 0.044 for the first-order constructs and 0.038 for the second-order construct—below the recommended threshold of 0.080 (Henseler et al., 2014). The SRMR, d_{ULS}, and d_G were also within the 95%-quantile of the bootstrap discrepancies (Henseler et al., 2016; Braojos et al., 2019; Benitez et al., 2020), indicating empirical support for the composite structure, and thus good general measurement properties for the proposed model. Table 2.3 shows

the results for evaluation of the measurement model. We can now evaluate the measurement properties of the constructs included in the research model.

Table 2.2: Confirmatory composite analysis results

Discrepancy	First-order level			Second-order level		
	Value	HI95	Conclusion	Value	HI95	Conclusion
SRMR	0.044	0.220	Supported	0.038	0.045	Supported
d_{ULS}	0.106	2.667	Supported	0.014	0.020	Supported
d_G	0.068	14.075	Supported	0.005	0.008	Supported

2.4.1.2. Evaluation of measurement properties of the constructs

We assess content validity, multicollinearity, weights, loadings, and their level of significance for the constructs in the conceptual model (Petter et al., 2007; Ajamieh et al., 2016). Prior to data collection, we tested every variable in the model for content validity, leveraging measures validated in previous studies when possible (Pavlou & El Sawy, 2006). We ensured that our data did not suffer from multi-collinearity by evaluating the variance inflation factors (VIFs) at first- and second-order levels. The first-order VIFs ranged from 1.052 to 2.300, and the second-order VIFs from 1.130 to 1.526. All values are well below the accepted threshold of 10 (Petter et al., 2007; Benitez et al., 2018c), suggesting that our data do not suffer from multicollinearity. In any

case, multicollinearity is not usually a problem when composite constructs are estimated in mode A, as in our study (Benitez et al., 2020).

Based on the strategy developed by Cenfetelli and Bassellier (2009) to validate composite constructs (executed in important subsequent IS research, e.g., Benitez et al. [2018c]), we tested the significance level of weights and loadings for both indicators and dimensions. All indicator weights were significant (from 0.315*** to 0.579***), as were all indicator loadings (from 0.278** to 0.935***), except the weight of one indicator of Facebook capability (number of events on Facebook: 0.079). Despite its nonsignificance, we kept this composite indicator because its loading was (0.278**) (Cenfetelli & Bassellier, 2009). All dimension weights (from 0.294* to 0.687***) and dimension loadings (from 0.619*** to 0.847***) were also significant, suggesting that our variables possess very good measurement properties.

2.4.2. Structural model evaluation

To evaluate the structural model, we assessed the beta coefficients and their significance level by executing a 5000-subsample bootstrap analysis. We also assessed the effect size (f^2) and R^2 values of the proposed relationships (Henseler et al., 2016), evaluating three models. To test the relationship between CSR activities and employer reputation (H1), we considered a baseline model that describes the direct effect on the relation between CSR activities and employer reputation. This baseline model also included the control variables but not the moderator variable (social media capability). Model 1 added social media capability to the baseline model, and Model 2 added the interaction effect to Model 1 to test the potential amplifier function

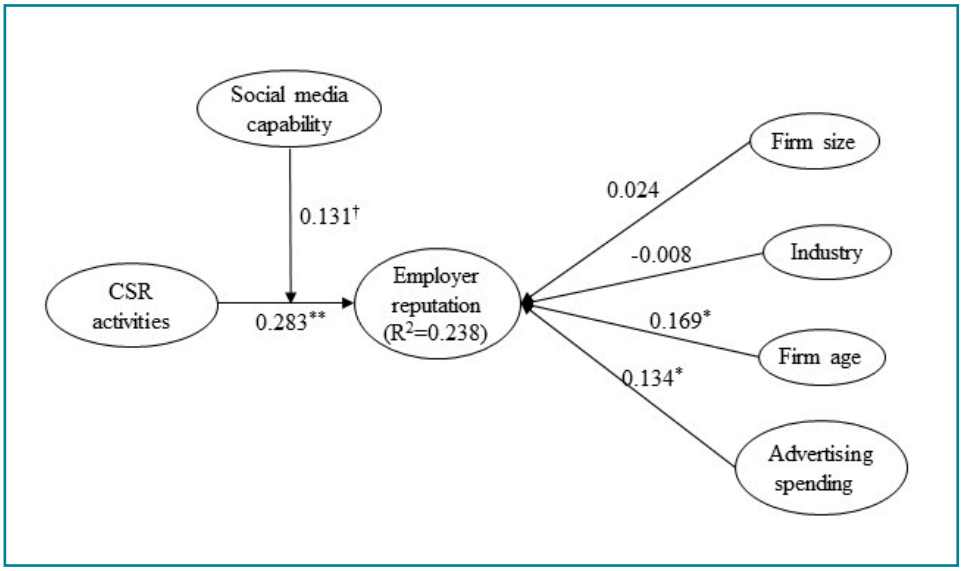
of social media capability in the relationship between CSR activities and employer reputation (H2). The empirical analysis supported H1, suggesting that CSR activities enable employer reputation ($\beta = 0.348$, $p_{one\text{-}tailed} < 0.001$). We also found some support for H2, suggesting a stronger relationship when firms leverage social media for business goals ($\beta = 0.131$, $p_{one\text{-}tailed} < 0.10$).

Figure 2.2 depicts the results for Model 2, and Figure 2.3 the interaction effect graph. The latter shows how social media capability moderates the relationship between CSR activities and employer reputation. The steepest slope—that is, the strongest positive relationship between CSR activities and employer reputation—occurs when firms have higher social media capability. The flattest slope—the graph with the weakest positive relationship—occurs when firms have lower social media capability. Social media capability thus strengthens the relationship between CSR activities and employer reputation, supporting H2. The f^2 values of the hypotheses theorized were 0.147 for baseline model, 0.100 for Model 1, and 0.020 and 0.088 for Model 2. The R^2 value for employer reputation was 0.207 for the baseline model, 0.222 for Model 1, and 0.238 for Model 2. Overall, the research model shows good structural results and all three models had very good model fit, suggesting that the proposed theory explains how part of the corporate world (employer reputation and social media capability) functions (Table 2.4).

Table 2.3: Evaluation of measurement model at first- and second-order level

Construct/indicator	Mean	S.D.	VIF	Weight	Loading
CSR activities	8.519	0.322			
Employer reputation	6.609	0.059			
Social media capability (mode A)					
Facebook capability: Firm's Facebook activity in reference to (mode A):			1.395	0.339*	0.619***
Number of events	12.750	39.873	1.080	0.079	0.278**
Experience	50.036	19.027	2.300	0.527***	0.933***
Updates	4.409	1.048	2.183	0.527***	0.923***
Twitter capability: Firm's Twitter activity in reference to (mode A):			1.526	0.294*	0.708***
Time spent writing tweets	89.644	202.762	1.052	0.315***	0.491***
Experience	58.263	17.315	1.759	0.543***	0.893***
Updates	4.703	0.752	1.700	0.437***	0.825***
Blog capability: Firm's blog activity in reference to (mode A):			1.130	0.687***	0.847***
Experience	38.395	25.972	2.003	0.502***	0.912***
Updates	3.395	1.605	2.003	0.579***	0.935***
Firm size: Number of employees, measured in natural logarithm	10.669	1.302			
Industry: Manufacturing firm vs. service firm	0.630	0.485			
Firm age: Number of years operating the firm, measured in natural logarithm	3.682	0.730			
Advertising spending: Advertising expenditure per employee	0.384	0.690			

Figure 2.2: Tests on results of hypotheses



*Note: †p < 0.10, *p < 0.05, **p < 0.01, ***p < 0.001 (one-tailed test). CV = control variable*

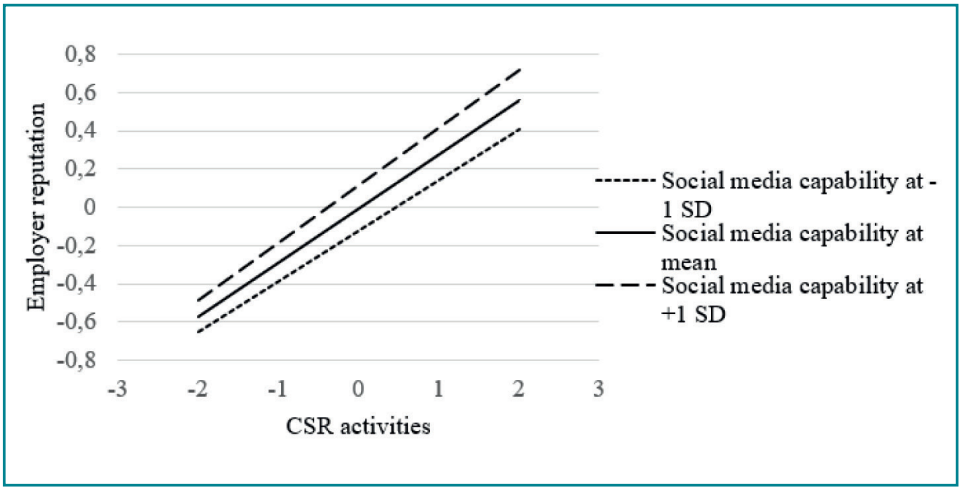
Table 2.4: Results of structural model evaluation

Beta coefficient	Baseline model	Model 1	Model 2
CSR activities → Employer reputation (H1)	0.348***	0.302***	0.283**
CSR activities * Social media capability → Employer reputation (H2)			0.131†
Social media capability → Employer reputation		0.137	0.119
Firm size → Employer reputation (CV)	0.010	0.020	0.024
Industry → Employer reputation (CV)	0.022	0.009	-0.008
Firm age → Employer reputation (CV)	0.159*	0.172*	0.169*

Advertising spending → Employer reputation (CV)	0.168*		0.147*		0.134*	
R^2 employer reputation	0.207		0.222		0.238	
Discrepancy	**Value**	**HI95**	**Value**	**HI95**	**Value**	**HI95**
SRMR	0.000	0.000	0.048	0.108	0.072	0.133
$\mathbf{d_{ULS}}$	0.000	0.000	0.105	0.526	0.409	1.383
$\mathbf{d_G}$	0.000	0.000	0.036	0.207	0.093	0.482
f^2						
CSR activities → Employer reputation (H1)	0.147		0.100		0.088	
CSR activities * Social media capability → Employer reputation (H2)					0.020	
Social media capability → Employer reputation			0.020		0.015	
Firm size → Employer reputation (CV)	0.000		0.000		0.001	
Industry → Employer reputation (CV)	0.001		0.000		0.000	
Firm age → Employer reputation (CV)	0.028		0.034		0.033	
Advertising spending → Employer reputation (CV)	0.032		0.024		0.020	

Note: $^{\dagger}p < 0.10$, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$ (one-tailed test). CV = control variable

Figure 2.3: Interaction effect graph



Note: $\eta = \beta 0 + \beta 1 \cdot \mathcal{E} + \beta 2 \cdot \mu + \beta 3 \cdot \mathcal{E} \times \mu + \beta 4 \cdot £ + \beta 5 \cdot g + \beta 6 \cdot \tau + \beta 7 \cdot \upsilon$

$\eta = -0.0043 + 0.2826 \cdot \mathcal{E} + 0.1190 \cdot \mu + 0.0172\, \mathcal{E} \times \mu$

$+ 0.0240 \cdot £ - 0.0080 \cdot g + 0.1685 \cdot \tau + 0.1338 \cdot \upsilon$

PLS path modeling provides the standardized path coefficient. We obtained by dividing its standardized path coefficient by its standard deviation (SD). We divided social media capability by taking its mean value and plus/minus its SD. We fixed the value of the control variables at the mean to prevent any variation in control variables from affecting the dependent variable (employer reputation).

2.4.3. Multi-group analysis: Firms with less- vs. more-developed social media capability

Since H2 was only supported at 0.10 level and was supported generally in the interaction effect graph, we perform an additional general multi-group analysis to re-test for potential differences (statistically significant) between firms with less- vs. more-developed social media capability. To divide the sample into these two groups, we calculated the mean value of the latent variable score for social media capability as benchmark.[4] Firms with values below the mean were assigned to the group with less-developed social media capability, and firms above the mean to the high social media capability group. Analyzing whether the two groups were random samples from a common population indicates that these differences are statistically significant (Table 2.5), suggesting that the positive influence of CSR activities on employer reputation occurs only when the firm has high social media capability. For firms with low social media capability, the effect of CSR on employer reputation was not significant. This analysis supports H2. Overall, based on testing of H2, analysis of the interaction effect graph (Figure 2.3), and this multi-group analysis, we argue that the empirical analysis supports H2.

4 This procedure for subsample analysis has been used extensively in prior IS research (e.g., Ray et al., 2005).

Table 2.5: Multi-group analysis

Coefficient	Firms with less-developed social media capability (n = 56)	Firms with more-developed social media capability (n = 44)	Are there statistically significant differences among the beta coefficients?
CSR activities →Employer reputation (H1)	0.017	0.451***	Yes ($p < 0.05$)
Firm size → Employer reputation (control variable)	0.181†	-0.121	Yes ($p < 0.10$)
Industry → Employer reputation (CV)	-0.195†	0.156	Yes ($p < 0.05$)
Firm age → Employer reputation (CV)	0.235*	0.103	No (not significant)
Advertising spending → Employer reputation (CV)	-0.078	0.297*	Yes ($p < 0.05$)

2.4.4. Post-hoc comparative analysis: Social media vs. advertising spending

Drawing on Mithas et al. (2012), we conducted a post-hoc analysis to compare the amplifier role of social media capability (Model 2) to the potential moderating role of advertising spending (advertising spending model in Table 2.6) in the relation between CSR activities and employer reputation. This analysis enabled us to compare the role of new communication media (social media) to traditional media (advertising). Model 2 controlled for advertising spending in employer reputation. The advertising spending

model controlled for social media capability in employer reputation. The beta coefficient of the interaction term CSR * Advertising spending was 0.018 and its f^2 0.000, indicating that advertising spending does not amplify the effect of CSR activities on employer reputation. As theorized, social media capability amplifies this relationship. These findings constitute the paper's key theoretical contribution and empirical evidence.

2.4.5. Robustness test

Our findings may be biased by the time chosen to measure the study constructs (Braojos et al., 2019). To test the robustness of time selection, we estimated an additional model (see Figure 2.2 and Table 2.4). Since we measured employer reputation through a construct composed of the natural logarithm of the firm's score for employer reputation in 2015, 2016, 2017, and 2018, we collected information from the Actualidad Economica database during these years. This robustness test confirms that the empirical analysis supports our theory. We also repeated the comparative sub-group analysis from subsection 2.4.4. (social media vs. advertising spending) with a composite for employer reputation for the years 2015-2018. The difference between the beta coefficient for firms with less-developed social media capability (β = -0.072, $p_{one\text{-}tailed} > 0.10$) and the beta coefficient for firms with more-developed social media capability (β = 0.403, $p_{one\text{-}tailed} < 0.01$) is statistically significant. The results of these additional analyses are almost identical to the results obtained in the base analyses (Figure 2.2 and Table 2.4, Table 2.6), adding robustness to the empirical analysis and indicating that time selection bias is not a concern in our research.

Table 2.6: Post-hoc comparative analysis

Beta coefficient	Model 2		Advertising spending model	
CSR activities → Employer reputation (H1)	0.283***		0.303**	
CSR activities * Social media capability →Employer reputation (H2)	0.131†			
CSR activities * Advertising spending → Employer reputation			0.018	
Social media capability → Employer reputation	0.119		0.137	
Firm size → Employer reputation (control variable)	0.024		0.021	
Industry → Employer reputation (control variable)	-0.008		0.008	
Firm age → Employer reputation (control variable)	0.169*		0.172*	
Advertising spending → Employer reputation (control variable)	0.134*		0.133	
R^2 employer reputation	0.238		0.222	
f^2 interaction effect	0.020		0.000	
Discrepancy	**Value**	**HI95**	**Value**	**HI95**
SRMR	0.073	0.133	0.045	0.107
$\mathbf{d_{ULS}}$	0.355	1.164	0.113	0.630
$\mathbf{d_G}$	0.070	0.366	0.047	1.277

2.5. Discussion and conclusions

How do social media affect the relationship between CSR activities and employer reputation? Social media can be a double-edged sword if wrongly leveraged. They may exert negative, positive, or no influence on the impact of CSR activities on the firm's reputation. Motivated by controversy over the role of social media in the firm's value generation from CSR activities, this study hypothesized that firms that perform CSR activities can improve their employer reputation, and that this positive relationship may be stronger when firms leverage social media. We confirmed our conceptual model on a sample of large firms. The empirical analysis suggests that CSR activities enable firms to build greater employer reputation. CSR includes social, environmental, and ethical activities that job seekers perceive as a signal of better employer reputation and core values that fit well with job seekers' and current employees' values, building affiliation to the organization and social identity. Potential applicants thus perceive socially responsible firms as more attractive to work for and choose these firms over others. Similarly, current employees feel more identified with socially responsible companies and perceive them as better workplaces.[5] The business value of employer reputation is very high because it reduces talent hiring and retention costs.

5 One may question the usage, application, and demonstration of social identity theory in the context of this study whether the people involved in answering questions on employer reputation were not all believers of CSR. To address this concern, we measure the firm's CSR score (ranging from 0 to 50) with information collected from the Actualidad Economica database (i.e., a different database that the one we use to measure CSR activities) in 2015, 2016, and 2017. As the firm's employer reputation includes the opinion of current and future employees, we use the above mentioned firm's CSR score in 2015 as a proxy of the degree of belief in CSR (i.e., score equal or higher to 30 out of 50) of the current employees, and we use the firm's CSR score in 2016 and 2017 as a proxy of the degree of belief in CSR of the current and future employees of the companies included in the sample. Based on these scores/

We also found that social media capability behaves as an amplifier in this equation, strengthening the impact of CSR activities on employer reputation when the firm is proficient in using social media to accomplish business goals (social media capability). The firm can use social media to increase *social visibility* and *credibility* of its CSR activities in the market and improve its employer reputation. Social media capability can thus create business value for firms. Although social media capability amplifies the relationship between CSR activities and employer reputation, advertising spending does not. IT-enabled channels such as social media make reaching customers and potential employees faster, cheaper, and more interactive, forging stronger ties with these groups (Mithas et al., 2012). Such faster, cheaper, stronger engagement with customers and potential applicants gives the firm's CSR activities and employer reputation higher *visibility* and *credibility*, an effect unlikely with traditional advertising spending. Social media capability is thus a more efficient tool than advertising to capitalize on the firm's investment in CSR activities.

This study makes four contributions to IS and Business Ethics. First, very few studies (Turban & Greening, 1997; Dogl & Holtbrugge, 2014) analyze the impact of CSR on employer reputation. Our study provides new empirical evidence that better employer reputation derives from the firm's investment

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proxies, we can conclude that for the firms of the sample, 100% of the current employees were believers of CSR activities in 2015, and 100% of the current/future employees were believers of CSR activities in 2016 and 2017. In this sense, we believe the usage and application of the social identity theory seems rational in this context. We thank anonymous Reviewer 1 for this suggestion.

in CSR activities. Our study extends research on CSR activities and employer reputation (employee perspective), where understanding lags behind that of CSR's impact on brand equity/corporate reputation (customer perspective). This contribution advances knowledge in Business Ethics.

Second, we study CSR activities and employer reputation in an IS context, a field in which this topic remains underdeveloped. Our study pioneers in theorizing how social media capability positively increases the impact of CSR activities on employer reputation. The topic and problem are fresh, novel, and relevant to the IS community. To the extent of our knowledge, research on the firm's use of social media platforms to accomplish business goals (beyond marketing purposes) is in its infancy (Aral et al., 2013; Braojos et al., 2019; Song et al., 2019). It lacks theoretical and empirical studies explaining how social media capability enables firms to generate business value (social business value). Our study sheds light on this gap by theoretically explaining and empirically demonstrating how social media capability generates the firm's business value by amplifying the positive effect of CSR activities on employer reputation. Social media capability provides a more visible, trustworthy, and far-reaching (open) platform to enable CSR activities to impact employer reputation more strongly. Social media generate talent touchpoint capability used by firms to engage potential talent and by current employees to build and enhance employer reputation. Social media capability thus maximizes the role of CSR activities in building employer reputation. This conclusion is the primary contribution of our research and its first contribution to IS.

Third, signaling theory suggests that firms signal their core values, strategic plan, and business activities such as CSR activities to the talent market. Social identity theory suggests that current employees and potential applicants use these signals to evaluate person-firm fit and their current/potential organizational affiliation. This study contributes to developing both theories by adding social media capability as a capability that strengthens the firm's ability to amplify signals and their potential use to evaluate perceived organizational affiliation, which in turn affects employer reputation. This contribution advances the conversation on the business value of technology and constitutes the paper's second contribution to IS.

CSR activities include social, environmental, and ethical activities. Our review of the IS literature shows that prior IS research on the impact of IT on environmental sustainability focuses on the following lines of research: 1) the role of IT as the problem and solution for environmental sustainability, and IT's impact on the firm's environmental management activities (e.g., Melville, 2010; Watson et al., 2010; Benitez & Walczuch, 2012; Wang et al., 2015); 2) study of the influence of green IT practices on the firm's environmental performance and financial performance (Hanelt et al., 2017; Teo et al., 2017; Khuntia et al., 2018). Drawing on this prior IS research, we find that social media capability (potentially an IT capability) amplifies the impact of CSR activities on employer reputation. We thus advance IS research on the impact of IT on social and environmental activities by explaining how IT capabilities help firms to capitalize on investments in CSR activities to create business value (in terms of employer reputation). This is the paper's third contribution to IS research.

This study has some limitations, which can generate further research opportunities. First, since the concept of complementary capabilities is often framed in a particular context, we cannot conclude that this complementary relationship will be optimal under all contingencies (Flynn & Flynn, 2004). Future IS research should explore whether our theory is supported in other European countries. Second, although this paper focuses on the most commonly used external social media sites (Culnan et al., 2010; Benitez et al., 2018a), firms use other external (e.g., LinkedIn) and internal social media platforms (e.g., Microsoft Yammer) to execute and disseminate their business activities. Future research could extend the firm's social media portfolio to LinkedIn and internal social media platforms. Third, although the sample size had sufficient statistical power to test the effects studied (Benitez et al., 2020), we recognize that is relatively small. Further IS research should repeat our study with a larger sample.

The results of this study provide two critical lessons for executives. First, CSR activities enable firms to enhance their reputation as employers to attract and retain talent. Managers should understand that CSR activities serve as signals to the talent market, as a source of information for potential talent and current employees. This information affects the firm's ability to attract and retain talent, thus reducing the cost of hiring and retaining talent. Second, the firm's usage, presence, and leveraging of social media gives its CSR activities more *social visibility* and *credibility*, and higher visibility results in stronger employer branding, maximizing the business value obtained from CSR activities. Moreover, perceived interactivity on social media strengthens behavior towards

firms and increases these messages' credibility. Because such messages open the firm to potential criticism, they create a greater impression of trust (Eberle et al., 2013). Applicants and current employees feel prouder working for a socially responsible firm (Jones et al., 2014) that communicates through social media, enabling more socially embedded and open dialogue. Investments in social media are more profitable than advertising spending to enhance employer reputation from CSR activities. These implications of our study can help IT and business managers to understand how investments in social media and CSR activities generate business value.

To conclude, this study theorized that the firm's involvement in socially responsible activities increases its probability of being perceived as a better employer and that this relationship is stronger when the firm leverages social media technologies. We can explain this strengthening role of social media through the greater *social visibility* and *exposure/credibility* these technologies facilitate, and empirical analysis of a sample of Spanish firms supports our theory. This paper contributes to IS research by theorizing and empirically demonstrating that ability to use social media generates business value by maximizing the positive impact of CSR activities on the firm's employer reputation. Social media are one critical ingredient of the firm's digital resource portfolio in the era of digital business transformation. Digital technology matters. Quo Vadis?

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3 IMPACT OF IT INTEGRATION ON THE FIRM'S KNOWLEDGE ABSORPTION AND DESORPTION

3. Impact of IT integration on the firm's knowledge absorption and desorption

Abstract

This paper examines the impact of the integration of IT systems with other organizations (IT integration) on the knowledge absorption and desorption of the focal firm. We ran an empirical study in Spain and found that IT integration enables the firm to absorb and desorb knowledge with other organizations, which in turn improves firm performance. This research provides two key contributions to the IS discipline: 1) We introduce the concept of *desorptive capacity* in the IS research and provide a scale for its measure, 2) we provide a theory of IT integration impact on the firm's knowledge absorption and desorption.

Keywords: *IT integration capability, knowledge absorptive capacity, knowledge desorptive capacity, IT-enabled organizational capabilities, business value of IT*

3.1. Introduction

Worldwide IT investment is projected to total $3.8 trillion in 2019, an increase of 3.2% from the expected investment of $3.7 trillion in 2018 (Gartner, 2018). A significant percentage of this worldwide investment is the firm's IT investments at the supply chain level (Rai & Tang, 2010). As the global competition among firms has been focused at the supply chain level (instead of the focal firm), the firm's integration of IT systems with other organizations (IT integration) has become a critical IT capability to create business value (Rai et al., 2006). The construct IT integration has been examined in IS research in the different contexts: mergers and acquisitions (Benitez et al., 2018a), supply chain (Ward & Zhou, 2006; Lai et al., 2008), and IT outsourcing (Ceci et al., 2019). We focus on IT integration capability in the supply chain[1], which is conceptualized as the firm's ability to integrate IT systems of the firm and IT systems of other organizations to coordinate activities with external agents (e.g., suppliers, customers, public institutions, competitors, etc.) (Bharadwaj et al., 2007; Rai & Tang, 2010).

Currently, firms across industries are increasingly opening up their innovation processes by exchanging their knowledge with external agents (Chesbrough, 2006; French et al., 2017; Roldan et al., 2018). A firm that consistently creates and sustains close relationships with suppliers or customers is in a better position to identify and assimilate new external knowledge (e.g., technological advancements, regulation changes, and customers' preferences) and therefore be able to use this knowledge to increase

1 This study focuses on IT integration capability and its role on the firm's knowledge absorption and desorptieon. However, we use the terms IT integration capability and IT integration interchangeably for the sake of brevity. The terms capability are also used interchangeably in this paper.

firm performance (Kostopoulos et al., 2011; Setia & Patel, 2013). Consequently, firms require certain organizational capabilities like abilities to manage internal and external knowledge (knowledge management) to respond effectively to the market (Tanriverdi, 2005; Malone et al., 2011). In this sense, the organizational capabilities associated to knowledge management remain critical for firms to be able to compete in the era of digital disruption and supply chain management-based competition (Grant, 1996; Lichtenthaler & Lichtenthaler, 2009). How does the firm's IT integration capability affect knowledge management capabilities to create business value? This is the general research question this study aims to examine and answer.

We distinguish and focus on two critical knowledge management capabilities: knowledge absorptive capacity (Cohen & Levinthal, 1990) and knowledge desorptive capacity (Lichtenthaler & Lichtenthaler, 2009). Knowledge absorptive capacity refers to the firm's ability to acquire, assimilate, transform, and exploit external core/primary knowledge for commercial ends (Cohen & Levinthal, 1990; Zahra & George, 2002). Knowledge desorptive capacity refers to the firm's ability to identify and transfer *superficial/secondary (i.e., less important) knowledge*[2]

2 This study uses the term core knowledge and primary knowledge interchangeably. Core knowledge refers to knowledge that can make the firm special for the costumer. Examples of this core knowledge are knowledge on innovative processes and products, know-how, distribution, logistics, and on a disruptive technology. Similarly, this research uses superficial and secondary knowledge interchangeably. Secondary knowledge refers to knowledge that does not have the potential to make them firm special for the costumer. Examples of this secondary knowledge are knowledge on operation routines, scheduling, soft technology, and nonrelevant products and suppliers. Our research was developed under the theoretical assumption tha organizations exhibit an opportunistic behavior because they play "the game of cooperation" with other organizations by trying to absorb core knowledge but only desorbing secondary knowledge. Our assumptio is consistent with the work of Gupta and Govindarajan (2000). Although this assumption might be difficult to

to external partners (e.g., suppliers, customers, public institutions, competitors, etc.) (Lichtenthaler & Lichtenthaler, 2009; Lichtenthaler & Lichtenthaler, 2010). Companies may not be interested in desorbing core knowledge that can hamper their future strategic positions, but may be interested in desorbing superficial/secondary knowledge while protecting their primary knowledge to obtain incomes, developing partnerships, or entering new markets. While knowledge absorptive capacity covers the outside-inside primary knowledge transfer process, knowledge desorptive capacity refers to an inside-outside secondary knowledge transfer process (Mortara & Minshall, 2011; Hu et al., 2015). In this sense, this study covers the key knowledge transfer activities of the continuum for the focal firm and its supply chain. How does the firm's IT integration capability affect the firm's knowledge absorption and desorption? This is the idiosyncratic and specific research question this study aims to examine and answer.

Prior IS research has focused on studying the impact of IT on knowledge absorption (Roberts et al., 2012). This body of research has been studied from a wide range of theoretical approaches such as knowledge management (Alavi & Leidner, 2001; Felipe et al., 2016), IT governance (Limaj et al., 2016), IT innovation (Joshi et al., 2010; Carlo et al., 2012), and business value of IT (Bhatt & Grover, 2005). Liu et al. (2013) examined the effect of IT capabilities on firm performance through absorptive capacity. Joshi et al. (2010) considered absorptive capacity as an IT-enabled knowledge capability and examine how it was able to increase innovation outputs. Limaj et al. (2016) argue that social information systems act as antecedents of absorptive capacity and that

prove empirically, we believe it is very rational given the hypercompetition of the current business landscape.

the combination of both enables the firm to generate innovation outcomes. Therefore, prior IS research has argued the impact of IT investments on the development of knowledge absorptive capacity to achieve business goals. However, although prior IS research has not examined whether IT integration may influence the development of knowledge absorptive capacity, we believe it is a critical aspect to shed light given the new rules of the business landscape: the supply chain-based competition/coopetition.

Similarly, prior IS research has not paid enough attention to the role of IT (neither IT integration) in the knowledge desorption, although IT integration might become a foundational capability to create and appropriate business value. Firms can be interested in transferring secondary knowledge (e.g., soft technology) to other external organizations to obtain a licensing income, entry into a foreign market, or access to core knowledge from these external partners (Lichtenthaler & Lichtenthaler, 2010; Roldan et al., 2018).

In the current business landscape, firms cannot operate isolated, but depend on external resources and partners (Rai & Tang, 2010). However, alliances are not always easy to manage because many of them face strong difficulties in benefiting from the management of knowledge, having doubts about the effectiveness of knowledge exchange, and therefore, becoming reluctant to involve in these processes (Kostopoulos et al., 2011). The failure in managing knowledge can lead to disastrous outcomes ultimately hampering the competitive position of the firm. Given the huge investment firms are making on IT, this is a good opportunity to show whether leveraging a critical IT capability such as IT integration matters in the management of

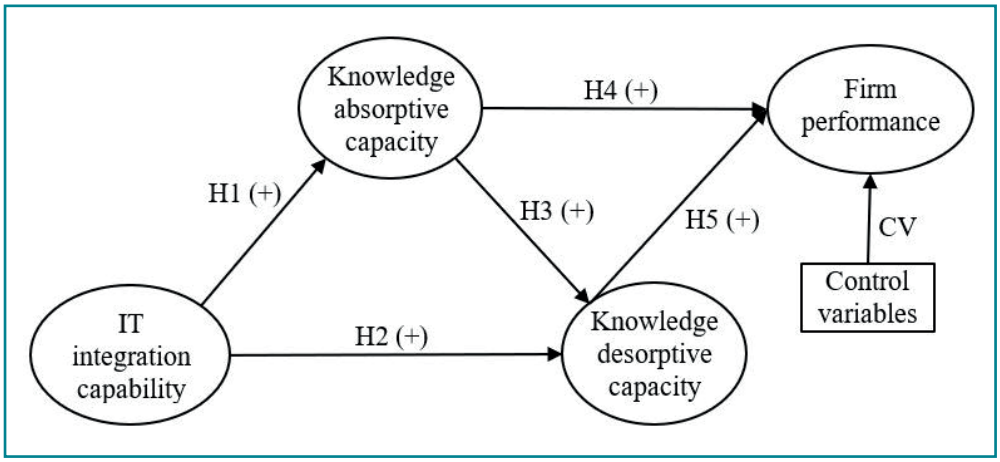
knowledge and may be key to the successful building of capitalization of knowledge. Integrated IT systems offer technical platforms and capabilities to build knowledge management capabilities. This has become critical as competition is now at the inter-organizational (instead of firm) level through the supply chain and alliances with others companies.

We introduce conceptually the construct of *knowledge desorptive capacity* to IS research and examine the impact of IT integration capability on the firm's knowledge absorption and desorption. Our central proposition is that the firm's ability to integrate IT systems of the firm and IT systems of external partners (IT integration capability) enables the focal firm to coordinate their business activities with external partners in a better way, which in turn facilitates to absorb core knowledge and transfer superficial knowledge with external partners to increase its business benefits.

We ran an empirical study in Spain to test our proposed theory. We find that IT integration capability enables the firm to absorb and desorb knowledge with other organizations, which in turn improves firm performance. In this sense, the empirical analysis supports our theory. Figure 3.1 shows the proposed research model. This research provides two key contributions to the IS research: 1) We introduce the concept of *knowledge desorptive capacity* in the IS research and provide a scale for its measure, 2) we provide and test a theory of IT integration impact on the firm's knowledge absorption and desorption.

The paper continues as follows: 1) the next section presents the theoretical framework, the conceptualization of key constructs, and hypotheses development, 2) the third section explains the research design, 3) the fourth section exposes the empirical analysis and results, 4) the fifth section incorporates the discussion and conclusions.

Figure 3.1: The research model



3.2. Theory, the conceptualization of key constructs, and hypotheses development

3.2.1. IT-enabled organizational capabilities perspective

Business value of IT is one of the golden lines of IS research that captures much attention from IS scholars. Grounded in the resource-based theory and the organizational capabilities theory, the so-called IT-enabled organizational capabilities have emerged as the dominant and well-established perspective to explain how the firm's IT resource investments

influence firm performance. IT-enabled organizational capabilities perspective has been proven to be one of the strongest and more evidenced bodies of IS research to disentangle the IT productivity paradox. This perspective suggests that IT resources and capabilities influence firm performance through the development of business/organizational capabilities, thus emphasizing the enabling role of IT (the mediation hypothesis) in creating business value (Benitez & Walczuch, 2012). Prior IS research consistent with this perspective has found that organizational learning, knowledge management (Tanriverdi, 2005; Pavlou & El Sawy, 2006), corporate entrepreneurship (Chen et al., 2015), and business flexibility (Chen et al., 2017; Benitez et al., 2018a; 2018b) are intermediate processes/organizational capabilities through which IT influences firm performance. We draw on this perspective to propose an indirect impact of IT integration capability on firm performance through knowledge absorptive and knowledge desorptive capacities.

The organizational capabilities theory suggests that variance in performance comes from three types of organizational capabilities: dynamic capability, operational capability, and dual-purpose capability (Helfat & Winter, 2011; Benitez et al., 2018a). Dynamic capabilities refer to the ability of the firm to build, integrate, and reconfigure internal and external resources/capabilities, and developing new ones to respond to changes in the environment (Teece, 2007). Operational capabilities refer to the ability of the firm to execute operational routines required to perform operational activities (Wu et al., 2010; Benitez et al., 2018c). Dual-purpose capabilities refer to organizational capabilities that can be used at corporate

and operational level, then being dynamic as well as operational (Helfat & Winter, 2011; Benitez et al., 2018a). Knowledge absorptive capacity and knowledge desorptive capacity have been extensively proposed in prior literature as dynamic capabilities that assist in managing knowledge (Zahra & George, 2002; Malhotra et al., 2005; Lichtenthaler, 2007). In this sense, we use organizational capabilities theory to conceptualize knowledge absorptive and knowledge desorptive capacities and to explain their causal influence on firm performance.

3.2.2. Conceptualization of key constructs

The key concepts examined in this study are IT integration capability, knowledge absorptive capacity, knowledge desorptive capacity, and firm performance. IT integration capability is the firm's ability to integrate its IT systems and the IT systems of external partners (e.g., suppliers, customers, public institutions, competitors, etc.) to coordinate business activities with the external partners and provide consistent access to relevant information (Bharadwaj et al., 2007; Rai & Tang, 2010; Setia & Patel, 2013). IT integration provides an integrated and consistent access and sharing to order, production, customer (e.g., service contracts, feedback) and market-related data (Bharadwaj et al., 2007; Chong et al., 2014).

Knowledge absorptive capacity refers to the firm's ability to acquire, assimilate, transform, and exploit external core knowledge for commercial ends (Cohen & Levinthal, 1990). Knowledge absorptive capacity is composed of four ingredients: knowledge acquisition, knowledge assimilation,

knowledge transformation, and knowledge exploitation. Knowledge acquisition refers to the firm's ability to gather and identify internal (i.e., within the firm) or external (e.g., market) knowledge about process, product, logistics, and distribution related to innovation. It also involves the development of new knowledge or insights that have the potential to influence the development of new products (Setia & Patel, 2013). Knowledge assimilation refers to the analysis, interpretation, and understanding of the information and knowledge obtained. Knowledge transformation refers to the transformation of existing information into new knowledge and to the integration of the new information and knowledge acquired with the existing knowledge of the firm. Finally, knowledge exploitation refers to the ability of exploiting the new integrated information and knowledge into concrete applications or products while constantly considering better ways to exploit knowledge (Zahra & George, 2002).

Zahra and George (2002) recognized absorptive capacity as a dynamic capability categorized into two main subsets: potential and realized. Potential absorptive capacity enables a firm's receptiveness to external knowledge (i.e., acquire and assimilate knowledge), while realized absorptive capacity reflects a firm's capacity to leverage absorbed knowledge and transform it into innovation outcomes (i.e., transform and exploit knowledge). Potential absorptive capacity is conceptually covered in our study through knowledge acquisition and knowledge assimilation. Realized absorptive capacity is captured in our investigation through knowledge transformation and knowledge exploitation. We conceptualized and operationalized absorptive capacity

as second-order construct composed of four dimensions (knowledge acquisition, knowledge assimilation, knowledge transformation, and knowledge exploitation). This choice was preferred to operationalize knowledge absorptive capacity as two second-order constructs (potential and realized absorptive capacities) as we believe it is theoretically clear, statistically more parsimonious, and consistent with prior research.[3]

Knowledge desorptive capacity refers to the firm's ability to identify and transfer superficial knowledge to external partners (e.g., suppliers, customers, public institutions, competitors, etc.) (Lichtenthaler & Lichtenthaler, 2009; Lichtenthaler & Lichtenthaler, 2010). We argue that desorptive capacity has two main components: knowledge identification and knowledge transfer. Knowledge identification refers to the firm's ability to identify external knowledge opportunities that could be relevant to suppliers, customers, or other external organizations (e.g., public institutions and competitors). Knowledge transfer involves the transfer of superficial knowledge (e.g., consultations on product design ideas, production processes, and routines for efficiency, schedule, or technical problems) to external agents (Dyer & Hatch, 2006; Lichtenthaler & Lichtenthaler, 2009; Potter & Lawson, 2013).

3 We repeated the empirical analysis by operationalizing knowledge absorptive capacity as two second-order constructs (potential and realized absorptive capacities) where potential absorptive capacity leads to realized absorptive capacity but every other relationship is kept the same as in the proposed reasearch model. We obtain very similar results (β Potential absorptive capapcity→ Realized absorptive capacity=0.692***), which suggests the operationalitazion of knowledge absorptive capacity does not affect the results, findings, and contributions of the study.

The process of desorbing constitutes the opposite direction of absorbing (Lichtenthaler & Lichtenthaler, 2009; Lichtenthaler, 2013). That is, knowledge desorptive capacity refers to an inside-outside secondary knowledge transfer process (Mortara & Minshall, 2011; Hu et al., 2015). There are some contradictory interests when transferring knowledge. On one hand, core knowledge is understood as a source of power and competitive advantage and therefore, firms may be reluctant to share (core) knowledge that has a strategic value for their position in the market (Chiambaretto et al., 2019). On the other hand, firms can have some benefits and strategic interests when transferring superficial knowledge (i.e., reducing costs, sharing risks, obtaining licensing incomes, entering into a foreign market, or exploiting innovative solutions from combining knowledge) (Lichtenthaler & Lichtenthaler, 2010). In this sense, organizations can protect from spilling over strategic/core knowledge and can prevent imitation by transferring superficial knowledge. First, organizations can deliver knowledge with a delay that allows the firm to maintain the first-mover advantage (Chiambaretto et al., 2019). Second, organizations can use causal ambiguity by transferring complex or noncodified knowledge that makes it difficult to understand the causes and effects (Dyer & Hatch, 2006; Potter & Lawson, 2013). Third, organizations can share redundant or supplementary knowledge that overlaps with the receiver's knowledge (Knudsen, 2007).

Although value creation has been typically related to cooperation, and value appropriation to competition, firms may be involved in the so-called coopetition phenomenon. Aggressive and disruptive companies (Ajamieh et al., 2016) play often the game of coopetition to finally compete, that is,

they cooperate with external competing organizations (e.g., competitors) to capture core knowledge but only giving superficial knowledge (Hoffmann et al., 2018) and then "attacking" in the market. This is what we call opportunistic behavior, a key assumption of our study. Companies play to say that they cooperate to at the end compete and attack. World-class companies have begun to desorb knowledge as a part of their corporate strategies. For example, based on a strong knowledge desorptive capacity with its suppliers' network, Toyota improved their productivity and quality from transferring production knowledge. Because of this transferring of knowledge, Toyota's suppliers were able to learn how to manufacture better products for Toyota. However, this suppliers' learning was only suitable to Toyota's routines and policies, making it difficult to spill over knowledge to benefit Toyota's competitors. As a result, Toyota's vehicles had 40% fewer defects than their competitors with the same supplier network (Dyer & Hatch, 2006). Finally, we focus on overall firm performance in terms of innovation, marketing, and financial facets (Pavlou & El Sawy, 2006; Braojos et al., 2019). Table 3.1 presents the definition, dimensions, and informing source of our key constructs.

3.2.3. IT integration capability and knowledge absorptive capacity

IT integration capability may affect knowledge absorptive capacity. The integration of IT systems of the focal firm and the IT systems of its external partners help the focal firm to acquire, assimilate, transform, and exploit core knowledge from them. First, IT integration enables a firm to exchange rich information in real time (e.g., changes in plans for production and

new trip schedule) and consequently facilitates the process of knowledge acquisition (Rai & Tang, 2010; Ngai et al., 2012). For example, Cisco created an e-hub connecting suppliers and the company through Internet, allowing all firms to have the same demand and supply data to respond quickly to demand changes (Lee, 2004). Second, integrated IT platforms span the organization boundaries connecting experts across organizations. When experts across organizations have access to and share uniform knowledge, interpretation, and analysis of this knowledge are likely to converge, then assimilation becomes easier (Setia & Patel, 2013; Liu et al., 2016). Third, IT integration enables coordination and discussion among external agents, becoming easier for firms to compare and integrate new and existing knowledge (Setia & Patel, 2013). For instance, an integrated IT platform that supports electronic meetings makes the discussion of new market trends and the interpretation of existing knowledge in a different manner more likely to occur (Bharadwaj et al., 2007). Last, integrated IT platforms facilitate not only information flow across departments, but also information transparency, which allows a consistent view of the information and facilitates the refinement of existing and new core knowledge to exploit it. Integrated cross-boundary technologies such as e-commerce or social media technology leads to exchange relationships building across the firm and the external partners, allowing the firm to consider new ways of exploiting knowledge and competitive information (Li et al., 2018; Song et al., 2019). In sum, IT integration capability enables knowledge exchange with internal and external agents, enhancing knowledge acquisition, assimilation, transformation, and the exploitation of core knowledge. Therefore, we hypothesize that:

H1: *There is a positive relationship between IT integration capability and knowledge absorptive capacity.*

Table 3.1: Definition of key constructs

Construct	Definition	Dimensions	Informing source
IT integration capability	Firm's ability to integrate IT systems of the firm and IT systems of external partners to coordinate business activities	Extent to which an IT system facilitate integrated access and sharing to order, production, customer, and market data	Bharadwaj et al. (2007), Rai & Tang (2010), Setia & Patel (2013)
Knowledge absorptive capacity	Firm's ability to acquire, assimilate, transform, and exploit external core knowledge for commercial ends	**Knowledge acquisition:** Ability to capture, identify, and develop new relevant core knowledge from external agents **Knowledge assimilation:** Ability to absorb, analyze, interpret, and understand new core knowledge **Knowledge transformation:** Ability to combine existing with new core knowledge for future use **Knowledge exploitation:** Ability to leverage new and existing knowledge to achieve the firm's goals	Zahra & George (2002), Pavlou & El Sawy (2006), Teece (2007), Liu et al. (2013)

Knowledge desorptive capacity	Firm's ability to identify and transfer superficial knowledge to external partners	**Knowledge identification:** Ability to identify opportunities to transfer superficial knowledge to external partners **Knowledge transfer:** Ability to transfer superficial knowledge to external organizations	Lichtenthaler & Lichtenthaler (2009, 2010)
Firm performance	Overall firm performance in terms of innovation, marketing, and financial dimensions	Extent to which the firm has achieved a superior innovation, marketing, and financial performance compared with direct competitors	Pavlou & El Sawy (2006), Fang et al. (2008), Kim & Atuahene-Gima (2010)

3.2.4. IT integration capability and knowledge desorptive capacity

We propose that IT integration capability may enable the firm to develop a knowledge desorptive capacity. IT integration capability facilitates communication and information sharing along the supply chain of the firm while spanning organizational boundaries, providing access to external agents' information and data, and improving the visibility of this information (Lichtenthaler, 2007; Liu et al., 2013), which in turn may enable the focal firm to identify opportunities inside and outside its market to desorb superficial knowledge to external partners. Thus, we expect that the integration of the IT systems of the focal firm with the IT systems of its partners, enable the focal firm to identify knowledge desorption opportunities. On the other side, IT integration capability may

enable the focal company to transfer superficial knowledge. Integrated IT systems are likely to become a common digital platform shared by the focal firm and its supply chain, allowing the firm to transfer superficial knowledge about nonrelevant products, suppliers, customers, markets, or technology (Pinjani & Palvia, 2013). Therefore, if the firm is able to have better and more integrated IT systems with its partners, this will enable the transfer/desorption of knowledge (Bharadwaj et al., 2007). In summary, IT integration capability enables an organization to identify opportunities to desorb knowledge and transfer internal secondary knowledge to an external partner. Therefore, we hypothesize that:

H2: *There is a positive relationship between IT integration capability and knowledge desorptive capacity.*

3.2.5. Knowledge absorptive capacity and knowledge desorptive capacity

This study proposes that the firm's knowledge absorptive capacity is positively related to the firm's knowledge desorptive capacity. First, prior IS research on organizational ambidexterity has found an activity sequence between knowledge/business opportunities exploration and knowledge/business opportunities exploitation (Benitez et al., 2018b; 2018d) in a way that exploration precedes exploitation. Drawn on this prior IS research, we argue that knowledge absorptive capacity may be an antecedent of knowledge desorptive capacity[4].

4 Based on Lichtenthaler's (2009) work, they argue that while knowledge absorptive capacity is mainly related to exploration activities, knowledge desorptive is mainly related to exploitation activities (e.g., business benefits and entering into a new market). However,

Second, firms exhibit an opportunistic behavior and it is rational to expect they focus more on knowledge absorption than on knowledge desorption. Thus, a firm may be interested in identifying knowledge transfer opportunities and transferring superficial knowledge to external partners (knowledge desorptive capacity) once has guaranteed the sufficient level of core knowledge internally to survive and compete in the market (Lichtenthaler & Lichtenthaler, 2009), and ensuring the company is special for customers. Hu et al. (2015) found that the number of in-licensing deals with external partners leads to a higher number of out-licensing deals. For example, the Fiat Research Centre (CRF), in a period of recession, decided to take an open innovation perspective. It was achieved, first, through the influx of resources from outside the Fiat Group to jointly develop know-how, and secondly, transferring technologies to industries other than the automotive. The revenues from the transfer of CRF technologies to external customers and cash flows resulting from CRF's participation in public-funded research projects allowed CRF to continue investing in the area of fuel-efficient engine technologies (Di Minin et al., 2010). This example illustrates that in some companies knowledge absorption can be an antecedent (and can be associated) with a subsequent knowledge desorption. Therefore, we hypothesize that:

H3: *There is a positive relationship between knowledge absorptive capacity and knowledge desorptive capacity.*

we recognize that both exploration and exploitation activities might exist in both knowledge absorptive capacity and knowledge desorptive capacity. This would potentially suggest that different levels of ambidexterity might exist in companies in different organizational capabilities such as knowledge absorptive capacity and knowledge desorptive capacity (please see our future research directions on this topic). We thank the anonymous Reviewer 4 for his/her recommendations on the issue.

3.2.6. Knowledge absorptive capacity and firm performance

This study proposes a positive relationship between knowledge absorptive capacity and firm performance based on the following arguments. First, firms with the ability to acquire and assimilate new core knowledge such as know-how, customer knowledge, core technologies, operational or market knowledge can rapidly detect new business opportunities (Benitez et al., 2018b). This capability helps firms to envision and identify customer preferences and new tendencies more easily, being easier to understand the market, and pioneering in the development of new products/services, hence improving firm performance (Engelen et al., 2014; Leal et al., 2014). For example, Air Products and Chemicals (a global corporation that sells gases and chemical products for industrial purposes) uses strategies like external partnering or Internet-based knowledge providers to identify external ideas that make the innovation process to work faster (Gronlund et al., 2010). Second, firms with the ability to transform and exploit new knowledge are more likely to respond to changes and effectively shape their internal processes to exploit new opportunities (Liu et al., 2013; Setia & Patel, 2013). Firms with the ability to integrate new and existing knowledge may easily respond to changes and generate innovation outcomes (Leal et al., 2014). For example, to make snacks more novel and fun, Procter & Gamble came up with the idea of printing pop culture images on Pringles. To do so, they used their absorptive capacity to find and exploit an ink-jet method developed by a small bakery in Italy for printing edible images, leading to an important sales growth (Huston & Sakkab, 2006). In conclusion, the ability to monitor, assimilate, and leverage external core knowledge provide firms up-to-date critical knowledge on customers and markets, which will

improve innovation, marketing, and financial firm performance (Zahra & George, 2002). Then, firms with superior knowledge absorptive capacity are more likely to exhibit higher firm performance (Pavlou & El Sawy, 2006; Benitez et al., 2018d). Therefore, we hypothesize that:

H4: *There is a positive relationship between knowledge absorptive capacity and firm performance.*

3.2.7. Knowledge desorptive capacity and firm performance

This study proposes that a positive relationship exists between knowledge desorptive capacity and firm performance. Firms may have different motivations to desorb superficial knowledge with the final-end to increase firm performance. First, firms may transfer superficial knowledge to external organizations established in different product markets to access these new/foreign markets to compete and increase market share, revenues, and profitability, thus improving firm performance (Lichtenthaler & Lichtenthaler, 2010). For example, in the case of technology transfer, firms usually avoid transferring technology to firms within the same industry because of the existence of competitive threats, but instead, they prefer distant markets. This setting constitutes the first motivation to desorb superficial knowledge and improve firm performance: desorbing knowledge in a foreign market to make an entry into this market.

Second, another motivation for firms to identify knowledge transfer opportunities and transferring knowledge to external partners is to

have access to the core knowledge from the external partner and thus increase firm performance. For example, in the bio-pharmaceutical industry the out-licensing is of particular importance to have access to the intellectual property of partners such as university know-how that may enhance the research productivity of private firms, and therefore its firm performance (Hu et al., 2015). This is the second mechanism through which knowledge desorptive capacity may influence firm performance. Finally, firms can also desorb knowledge to obtain a licensing income and generate business benefits. In summary, knowledge desorptive capacity can improve performance when firms are able to identify opportunities to exploit its superficial knowledge to obtain monetary gains (e.g., licensing) and strategic or noneconomic gains (e.g., having access to more critical knowledge or establishing in new markets) (Roldan et al., 2018). Therefore, we hypothesize that:

H5: *There is a positive relationship between knowledge desorptive capacity and firm performance.*

3.3. Research design and execution

3.3.1. Sample and data

Because the measures for the constructs studied in this research are not available directly in archival data, we decided to run a survey. The survey instrument was developed following the guidelines provided in prior research (Pavlou & El Sawy, 2006; Benitez et al., 2018a). We started the data collection

by using the list of the 5000 most admired large firms in Spain included in the Actualidad Economica database in 2015 *(http://www.actualidadeconomica.com/)*. Actualidad Economica is a Spanish business magazine that annually publishes a ranking with the most admired firms in Spain based on sales and other business variables (e.g., innovation activity and employer brand value) (Benitez & Walczuch, 2012; Benitez et al., 2018a; 2018b; 2020a). We selected the Spanish market for the following reasons: 1) Spain represents one of the top five economies of the European Union in terms of the gross domestic product, 2) Spain is an important worldwide market for IT investments, with a forecast of total IT investments of 41,600 million Euros in 2018 (IDC Spain, 2017), and 3) digitization of the supply chain is one of the priorities of Spanish companies (Patwardhan et al., 2018).

This is one of the two studies of a broader research project that aims to examine the impact of technology (IT systems and social media) on a critical portfolio of organizational capabilities and firm performance. Prior to the survey administration, we selected a group of industries that is highly active in new product development (Pavlou & El Sawy, 2006) and that usually invested in IT and social media (Kane et al., 2014) from the 5000 most admired firms included in the Actualidad Economica database in 2015: consumer goods, manufacturing, automotive, entertainment, chemical, information and communications, healthcare services, education, and professional services. In this sense, a population of 1826 large Spanish firms was selected. From the list of 1826 firms, 934 were contacted by phone through a well-established consulting vendor. The consulting vendor finally received 151 valid questionnaires from April 5, 2016 to May 18, 2016, giving an effective response

rate of 16.167%, which is similar to the response rate obtained in prior IS research (Benitez et al., 2018a) can be considered as satisfactory especially if we recognize the cost and degree of difficulty of accessing top IT and business executives. In this regard, the sample of this study is composed by 151 firms from seven industries: 47 firms (31.130%) operated in the consumer goods, 32 (21.190%) in manufacturing, 21 (13.910%) in automotive, 19 (12.580%) in entertainment, 13 (8.610%) in chemical, 11 (7.280%) in information and communications, and the rest (eight firms, 5.300%) in other industries (i.e., healthcare services, education, and professional services). Non-response bias was assessed by verifying that early and late respondents did not differ in their responses. We considered as early respondents any of the firms that responded to the questionnaire in the first four weeks. All possible t-test comparisons between the means of the two groups of respondents showed nonsignificant differences. On average, the total revenues of the sample firms in 2016 were 121.080 million Euros, and they had about 677 employees.

The questionnaire was designed by adapting scales from prior literature and pretested with seven IT/business executives. As prior literature had not developed and studied a scale for knowledge desorptive capacity, we carefully developed a new scale. In fact, this is one of the potential contributions of this paper. We employed a key knowledgeable informant per firm to answer the questions included in the questionnaire (Table 3.A1 in the appendix). Questionnaires were completed by senior marketing executives (Chief Marketing Officer, Marketing Vice President, Marketing Manager, and Community Manager) (50.330%), IT executives (Chief Information Officer, IT Vice President, and IT Manager) (23.180%), and other

business executives (New Product Development Executive, Chief Executive Officer, Operations Vice President, Corporate Development Officer, and Human Resource Manager) (26.500%). We also asked the key informants for a self-evaluation of their degree of knowledge in answering the survey. The item "How knowledgeable did you feel in answering all the questions included in this questionnaire?" (1: Very low, 5: Very high) was included at the end of the questionnaire (Tanriverdi, 2005). The average value for this item was 3.830 (S.D.: 0.810), which suggests that the key informants had a high level of competence to answer the questions included in the survey.

Before performing the empirical analysis, we checked the minimum sample size required to test the proposed research model. Assuming an anticipated medium effect size, a statistical power level of 0.800, an alpha of 0.05, and nine indicators (i.e., the largest number of structural paths directed to firm performance in our mediation model), the minimum required sample size to test the statistical significance of the relationships of the research model is 114 (Nitzl, 2016). As our sample size is 151, we have an acceptable sample size to test the proposed research model.

We use survey data to measure IT integration capability, knowledge absorptive capacity, knowledge desorptive capacity, firm performance, firm age (control variable), IT investment (control variable), innovation investment (control variable), and quality management investment (control variable). Firm size and industry (control variables) were measured with archival data collected from Actualidad Economica database in 2015.

3.3.2. Measures

Constructs can be operationalized as emergent variables (i.e., composite model) or latent variables (i.e., factor model) (Benitez et al., 2020b). Latent variables are variables that are not directly observed but inferred through a measurement model from other variables that are observed (directly measured) (Borsboom et al., 2003). These types of variables can be operationalized as reflective and causal-formative (Henseler, 2017a). Latent variables are usually used in behavioral research to operationalized concepts such as attitudes or personality traits (Henseler, 2015). The causal-formative measurement model changes the direction of causality between the indicators and the construct. In this type of measurement model, contrary to the reflective measurement model, indicators cause the latent variable. On the other hand, composite modeling is the usual way to model artifacts. Composites are applied to model abstractions of artifacts as a combination of ingredients where the indicators make up the construct (they do not cause the artifact) (Henseler, 2015; 2017a; Benitez et al., 2020b). Artifacts are usually objects that are created by managers, staff or firm, representing emergent, strong, complex, and "firm-made" concepts (Benitez et al., 2018a; 2018d; 2020b). Based on these distinctions, we conceptualized and operationalized all the constructs included in the research model as emergent variables, thus generating a composite model.

3.3.2.1. IT integration capability

IT integration capability was measured as a composite first-order construct composed of five items by adapting the scale from Setia and Patel (2013). This scale evaluates in a five-point Likert scale the extent to

which the firm's integration of IT systems facilitates integrated access and sharing of data with external partners.

3.3.2.2. Knowledge absorptive capacity

Knowledge absorptive capacity was measured as a second-order composite construct composed by four first-order dimensions: knowledge acquisition, knowledge assimilation, knowledge transformation, and knowledge exploitation (Zahra & George, 2002; Pavlou & El Sawy, 2006; Liu et al., 2013). We used a well-established and validated scale by adapting the scales from Pavlou and El Sawy (2006), Liu et al. (2013), and Setia and Patel (2013). Knowledge acquisition evaluates in a five-item scale the ability to identify external knowledge that could be relevant to the firm (Pavlou & El Sawy, 2006; Liu et al., 2013; Setia & Patel, 2013). Knowledge assimilation measures in a three-item scale the ability to understand new knowledge (Pavlou & El Sawy, 2006; Liu et al., 2013). Knowledge transformation evaluates in a four-item scale the firm's ability to combine new and existing knowledge (Liu et al., 2013; Setia & Patel, 2013). Knowledge exploitation measures in a four-item scale the firm's ability to use external knowledge to achieve business' goals (Liu et al., 2013; Setia & Patel, 2013). The four dimensions of knowledge absorptive capacity are specified as composite at first-order level.

3.3.2.3. Knowledge desorptive capacity

Knowledge desorptive capacity is a new developed scale that measures the firm's ability to identify and transfer superficial knowledge to external partners

(e.g., suppliers, customers, public institutions, competitors, etc.) (Lichtenthaler & Lichtenthaler, 2009; Lichtenthaler & Lichtenthaler, 2010). We generated the items based on prior theoretical literature (Lichtenthaler & Lichtenthaler, 2009; 2010) that proposes desorptive capacity as composed by two key ingredients (i.e., identification and transfer of knowledge). The measurement was driven by theory and some cautions were taken into consideration to ensure content validity. We reviewed the seminal theoretical desorptive capacity literature to generate an initial pool of items. All items were measured on a scale from 1 to 5 (1: Strongly disagree, 5: Strongly agree). The list of items was sent to four scholars to verify whether they measured what they were supposed to measure. Valuable comments were used to refine the list of items and a pretest with seven IT/business executives was performed to ensure validity and reliability. As a result, we conceptualize the construct of knowledge desorptive capacity as a second-order composite construct composed by two first-order constructs: knowledge identification (three items) and knowledge transfer (five items). Knowledge identification measures the firm's ability to recognize and gather external knowledge that could be of interest for external organizations (e.g., suppliers, customers, public institutions, competitors), while knowledge transfer measures the firm's ability to transfer superficial knowledge to external agents. The two dimensions were specified as composite at first-order level.

3.3.2.4. Firm performance

Firm performance was measured with five items in terms of innovation, marketing, and financial facets in the last two years by adapting the scales of Pavlou and El Sawy (2006) and Kim and Atuahene-Gima (2010).

3.3.2.5. Control variables on firm performance

Differences in firm performance can be attributed to differences in the portfolio of resources possessed by the firm, firm age, industry, total IT investment (Benitez & Walczuch, 2012), investment in innovation activities, and the implementation of quality management programs (Benitez et al., 2018b). We thus controlled for the effect of firm size, firm age, industry, IT investment, innovation investment, and quality management investment on firm performance as they can directly affect firm performance. We also controlled for these variables to check whether the impact of IT integration on firm performance, and the effect of knowledge absorptive and knowledge desorptive capacities on firm performance are kept after including these control variables. Firm size was measured by the natural logarithm of the number of employees in 2016 with information collected from Actualidad Economica database (Mithas et al., 2011; Benitez & Walczuch, 2012). Firm age was measured through the natural logarithm of the number of years the firm has been in the market in April-May 2016 (Mithas et al., 2011; Benitez et al., 2018b) by including a single-item question in the questionnaire about the number of years the firm has been in the market. Interindustry differences can also have an impact on the performance of the firm. We thus controlled for industry by measuring industry as a composite construct as follows. We classified industries in seven groups and identified the most important industry as the reference group (Benitez et al., 2018a; 2020b). This group of reference was consumer goods. Then, we created for each observation six dummy indicators (industry group) giving the value 0 if it does not pertain to this industry, and 1 if it does. Thus, industry was computed as a first-order composite construct composed by six indicators, that is, six group of industries

(Henseler et al., 2016; Benitez et al., 2020b). We measured IT investment and innovation investment by asking each company the degree of annual IT investment and innovation investment on total turnover in the focal firm (1: Very low, 5: Very high). Quality management investment was measured with a single-item question that refers to the degree of implementation of quality management systems into the firm (1: Low implementation degree, 5: High implementation degree) (Benitez et al., 2018b).

3.3.3. Prevention and the test of common method variance

We also prevent and conduct the test of potential common method variance, although composite measures are unlikely to suffer from this bias (Ronkko & Ylitalo, 2011). First, we tried to prevent the appearance of common method variance in the research design. To do so, we guaranteed confidentiality and anonymity in the survey administration, respondents were not allowed to come back to prior questions, questions were not tagged, and were not given in the order hypothesized in the model (Podsakoff et al., 2003). Second, we checked the correlation matrix to prevent high correlation among key variables ($r > 0.90$) (Bagozzi et al., 1991). The highest correlation is 0.659.

Third, we checked variance inflation factor (VIF) values at construct level, given that VIF larger than 3.3 at construct level may alert about potential common method variance (Kock & Lynn, 2012). We estimated the VIF values at construct level by performing a full collinearity test. Values range from 1.055 to 1.961 for all constructs included in the model (Table 3.2). This suggests that it is unlikely that our research model

suffers from common method variance (Kock & Lynn, 2012). All these tests taken together suggest that potential common method variance does not seem to be a problem in our study.

Table 3.2: Full collinearity test

Construct	VIF values
IT integration capability	1.757
Knowledge absorptive capacity	1.792
Knowledge desorptive capacity	1.961
Firm performance	1.373
Firm size	1.133
Firm age	1.131
Industry	1.223
IT investment	1.914
Innovation investment	1.881
Quality management investment	1.055

3.4. Empirical analysis and results

The proposed research model was empirically tested by performing a partial least squares (PLS) path modeling. PLS can test for exact overall model fit, and it is a full-fledged estimator in the family of variance-based structural equation modeling (SEM) (Henseler et al., 2016; Rueda et al., 2017; Benitez et al., 2020b). Using the PLS estimator is appropriate for the following reasons:

1) PLS is suitable to estimate composite models (as our proposed research model) (Henseler et al., 2014; 2016; Rigdon et al., 2014; 2016); 2) PLS is particularly advisable for models that contain multidimensional constructs (as knowledge absorptive capacity and knowledge desorptive capacity in our study) (Hair et al., 2012; Hair et al., 2019); 3) PLS is suitable when using new developed scales, as is the case in this study (knowledge desorptive capacity) (e.g., Chau, 1997; Tiwana & Konsynski, 2010). Advanced Analysis for Composites (ADANCO) 2.0.1 Professional *(http://www.composite-modeling.com/)* was the statistical software used to estimate the measurement and structural models (Henseler & Dijkstra, 2015). This software for variance-based SEM is able to model different types of constructs (i.e., composites, common factors, and single-indicator constructs) while facilitating both causal and predictive modeling (Rueda et al., 2017). Bootstrapping algorithm with 5000 subsamples was performed to obtain the level of significance of weights and loadings for each item and dimension, and to obtain the level of significance of path coefficients.

3.4.1. Confirmatory composite analysis

Every construct of the model (at first- and second-order level) was specified as composite. We used the weighting schemes of correlation weights (mode A) and regression weights (mode B) to estimate the research model. Both mode A and mode B create composite proxies (Becker et al., 2013; Sarstedt et al., 2016). Correlation weights ignore collinearity among predictors; therefore it generates better estimations when there is a strong correlation between indicators (Becker et al., 2013; Rigdon, 2016). A composite-formative does not

necessarily need to be estimated on mode B as there are certain conditions (e.g., multicollinearity) under which using mode A generates better weight estimations (Becker et al., 2013). Therefore, we used mode B for composites with noncorrelated indicators and mode A for composites with correlated indicators or unexpected signs in weights (Benitez et al., 2020b).

We performed a confirmatory composite analysis, which checks the adequacy of the measurement structure by comparing the empirical correlation matrix and the model-implied correlation matrix (Henseler et al., 2014; Benitez et al., 2018b; 2020b). It provides an overall model fit for the measurement structure at first- and second-order level by estimating the standardized root mean squared residual (SRMR), unweighted least squares discrepancy (d_{ULS}), and geodesic discrepancy (d_G) (Henseler et al., 2014; 2016). SRMR is a proxy of the discrepancy between the empirical and the model-implied correlation matrix. The saturated model has good overall fit when SRMR is below 0.800. d_{ULS} and dG are exact measures of the overall model fit. The lower d_{ULS} and d_G are, the better the model fit (Benitez et al., 2018a). d_{ULS} and d_G values below the 99%-quantile of the bootstrap discrepancy shows acceptable fit between the model and the data (Henseler, 2017b; Benitez et al., 2020b). Table 3.3 shows results of the confirmatory composite analysis, which with 1% of probability gives support to the structure of our measures. Then, we proceed with the evaluation of the measurement model.

Table 3.3: Results of the confirmatory composite analysis

Discrepancy	First-order constructors			Second-order constructors		
	Value	HI99	Conclusion	Value	HI99	Conclusion
SRMR	0.064	0.064	Supported	0.023	0.050	Supported
d_{ULS}	2.450	2.499	Supported	0.011	0.052	Supported
d_G	1.037	1.526	Supported	0.010	0.032	Supported

3.4.2. Measurement model evaluation

As knowledge absorptive capacity and knowledge desorptive capacity are two second-order constructs, we estimated the research model with the two-step approach (Chin, 2010). From the first step, latent variables' scores of the dimensions of knowledge absorptive capacity and knowledge desorptive capacity are obtained by freely correlating the first-order constructs and the dimensions of the second-order constructs (i.e., knowledge acquisition, knowledge assimilation, knowledge transformation, knowledge exploitation, knowledge identification, and knowledge transfer). We estimated the research model in the second step by using the latent variables' scores as the measures of the constructs knowledge absorptive capacity and knowledge desorptive capacity (Chin, 2010).

We validated composite constructs by evaluating content validity, multicollinearity, and the significance of weights and loadings (Cenfetelli &

Bassellier, 2009; Benitez et al., 2018b). First, we ensured content validity by using previously validated scales whenever possible (e.g., Pavlou & El Sawy, 2006; Chen et al., 2017). This study develops a new scale of knowledge desorptive capacity using the information we extracted from seven interviews we did with IT/business executives as well as the preliminary conceptual foundations proposed in prior research (Lichtenthaler & Lichtenthaler, 2009; 2010).

We also evaluated multicollinearity and the significance of weights and loadings at first- and second-order levels. Multicollinearity may become a serious problem in the data if VIFs of indicators and dimensions are greater than 3.3 for constructs estimated in mode B (Diamantopoulos & Siguaw, 2006). VIFs values for constructs estimated in mode B range from 1.545 to 2.626 at first-order level and range from 1.129 to 1.986 at second-order level, below the threshold of 3.3. We checked for the level of significance of indicator/dimension weights and loading. Composite indicators/dimensions can be retained as dropping indicators/dimensions may alter the composite's meaning (Henseler, 2017a). Every first- and second-order loadings were significant at 0.001 level. This analysis suggests good measurement properties. Table 3.A1 (in the appendix) shows the measurement model evaluation. Next, we proceed with the evaluation of the structural model.

3.4.3. Structural model evaluation

3.4.3.1. Overall fit of the estimated model

As in the confirmatory composite analysis, the goodness of model fit for the structural model (estimated model) was evaluated by examining

the SRMR, d_{ULS}, and d_G (Benitez et al., 2020b). The SRMR value for the base model (i.e., excluding the direct effects of the mediation analysis) is 0.065, and discrepancy values are below the 95%-quantile of the bootstrap discrepancies, which suggests our base research model should not be rejected based on the alpha level of 0.05. Overall, the proposed research model shows good structural model fit, which indicates the research model has the potential to be a good theory to explain how IT integration capability influences firm's knowledge absorption and desorption. After that, we can proceed with the evaluation of the structural model.

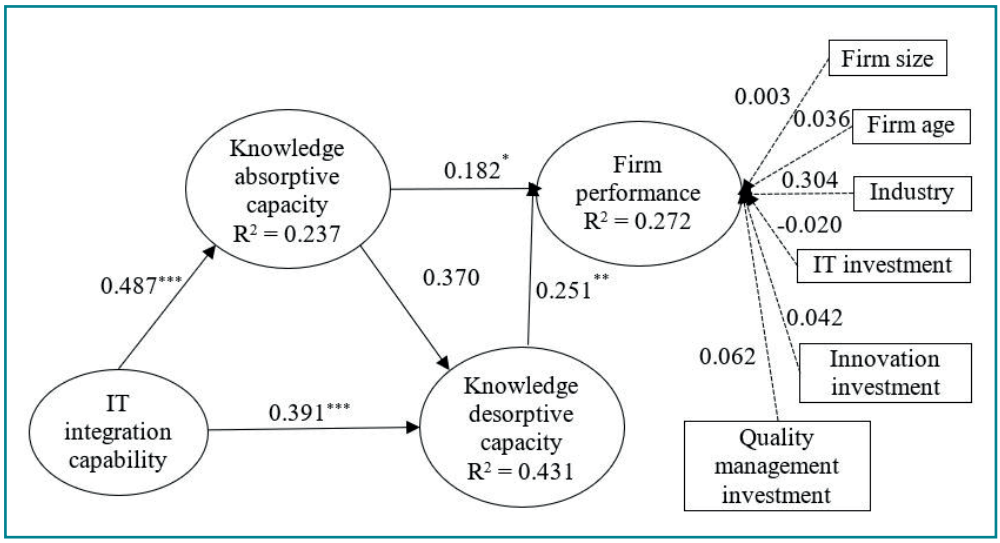
3.4.3.2. Evaluation of the structural model

We evaluated path coefficients, the level of significance, R^2, adjusted R^2, and f^2. We estimated two models: 1) the base model, which only includes the hypothesized relationships; and 2) the mediation model, where we add to the base model the direct effect of IT integration capability on firm performance. In the base model, we found support for hypotheses H1, H2, H3, H4, and H5, indicating that IT integration capability facilitates the development of a knowledge absorptive capacity (H1) ($\beta = 0.487$, $p_{one\text{-}tailed} < 0.001$), and knowledge desorptive capacity (H2) ($\beta = 0.391$, $p_{one\text{-}tailed} < 0.001$) to improve firm performance (H4) ($\beta = 0.182$, $p_{one\text{-}tailed} < 0.01$) and (H5) ($\beta = 0.251$, $p_{one\text{-}tailed} < 0.05$). H3 is also supported, indicating that knowledge absorptive capacity facilitates the development of knowledge desorptive capacity (H3) ($\beta = 0.370$, $p_{one\text{-}tailed} < 0.001$). The effect of firm size, firm age, industry, IT investment, innovation investment, and quality management investment (control variables) on firm performance was not significant. However, the inclusion of

these control variables gives additional credibility to the empirical analysis as it rechecks whether the effects of IT integration capability, knowledge absorptive capacity, and knowledge desorptive capacity on firm performance are sustained after controlling for these control variables.

The R^2 values range from 0.237 to 0.431, which suggests a good explanatory power of the endogenous variables. The adjusted R^2 values range from 0.231 to 0.423. The effect size value indicates the relative size of including each additional relationship to the model (Benitez et al., 2020b). f^2 values of the hypothesized relationships range from 0.028 to 0.311, indicating weak-medium to large effect sizes in the research model (Cohen, 1988; Benitez et al., 2020b). Figure 3.2 and Table 3.4 present the results of the test of hypotheses.

Figure 3.2: Results of the PLS estimation



*Note: †p < 0.10, *p < 0.05, **p < 0.01, ***p < 0.001, one-tailed test for the hypothesized relationships, two-tailed test for the control variables.*

Table 3.4: Evaluation of the structural model

Beta coefficient	Basel model	Mediation model
IT integration capability → Knowledge absorptive capacity (H1)	0.487*** (6.378) (0.000) [0.354, 0.613]	0.488*** (6.405) (0.000) [0.359, 0.614]
IT integration capability → Knowledge desorptive capacity (H2)	0.391*** (5.150) (0.000) [0.262, 0.512]	0.392*** (5.165) (0.000) [0.260, 0.510]
Knowledge absorptive capacity → Knowledge desorptive capacity (H3)	0.370*** (6.071) (0.000) [0.273, 0.470]	0.369*** (6.092) (0.000) [0.272, 0.469]
Knowledge absorptive capacity → Firm performance (H4)	0.182* (1.724) (0.042) [-0.001, 0.354]	0.192* (1.844) (0.033) [0.011, 0.360]
Knowledge desorptive capacity → Firm performance (H5)	0.251** (2.561) (0.005) [0.089, 0.411]	0.266* (2.231) (0.013) [0.070, 0.455]
IT integration capability → Firm performance		-0.039 (-0.334) (0.739) [-0.264, 0.194]
Control Variables		
Firm size → Firm performance (control variable)	0.003 (0.044) (0.965) [-0.124, 0.142]	0.001 (0.012) (0.990) [-0.131, 0.140]
Firm age → Firm performance (control variable)	0.036 (0.476) (0.622) [-0.101, 0.179]	0.029 (0.404) (0.686) [-0.107, 0.177]

Industry → Firm performance (control variable)	0.305 (0.493) (0.368) [-0.100, 0.182]		0.300 (0.897) (0.370) [-0.467, 0.451]	
IT investment → Firm performance (control variable)	-0.020 (-0.204) (0.839) [-0.219, 0.175]		-0.012 (-0.122) (0.903) [-0.211, 0.181]	
Innovation investment → Firm performance (control variable)	0.042 (0.455) (0.649) [-0.139, 0.221]		0.039 (0.425) (0.671) [-0.142, 0.220]	
Quality management investment → Firm performance (control variable)	0.062 (0.909) (0.364) [-0.077, 0.196]		0.065 (0.935) (0.350) [-0.075, 0.199]	
R^2	**R^2**	**Adjusted R^2**	**R^2**	**Adjusted R^2**
Knowledge absorptive capacity	0.237	0.232	0.234	0.233
Knowledge desorptive capacity	0.431	0.423	0.431	0.423
Firm performance	0.272	0.231	0.273	0.226
Discrepancy	**Value**	**HI95**	**Value**	**HI95**
SRMR	0.065	0.069	0.065	0.068
d_{ULS}	1.619	1.793	1.609	1.734
d_G	0.451	0.600	0.450	0.595
f^2				
IT integration capability → Knowledge absorptive capacity (H1)	0.311		0.312	
IT integration capability → Knowledge desorptive capacity (H2)	0.205		0.206	

Knowledge absorptive capacity → Knowledge desorptive capacity (H3)	0.183	0.183
Knowledge absorptive capacity → Firm performance (H4)	0.028	0.029
Knowledge desorptive capacity → Firm performance (H5)	0.054	0.052
Firm size → Firm performance (control variable)	0.000	0.000
Firm age → Firm performance (control variable)	0.001	0.001
Industry → Firm performance (control variable)	0.117	0.112
IT investment → Firm performance (control variable)	0.000	0.000
Innovation investment → Firm performance (control variable)	0.001	0.001
Quality management investment → Firm performance (control variable)	0.005	0.006

*Note: †p < 0.10, *p < 0.05, **p < 0.01, ***p < 0.001, one-tailed test for hypothesized relationships and two-tailed test for the other relationships.*

3.4.3.3. Post-hoc mediation analysis

To reanalyze the mediating role of knowledge absorptive and knowledge desorptive capacities in the proposed research model, we performed a post-hoc mediation analysis. We evaluated the indirect effects involved in the proposed research model by adding a link[5] from IT integration capability to firm performance (Felipe et al., 2020).

5 The beta coefficient between IT integration capability and firm performance (-0.039), and the correlation between both variables (0.201) have different sign, which reflects random fluctuations around zero (Falk & Miller, 1992).

The indirect effect is significant (0.246, $p_{one\text{-}tailed} < 0.001$), while the direct effect is not. The support to all the hypothesized relationships is kept in the mediation model, which strengths the results of the test of hypotheses (Zhao et al., 2010). Results suggest an indirect-only mediation between IT integration capability and firm performance. This mediation analysis shows that IT integration capability affects firm performance through knowledge absorptive capacity and knowledge desorptive capacity.

There are multiple mediators on this indirect effect (i.e., knowledge absorptive and knowledge desorptive capacities); therefore, a multiple mediation analysis can be used to clarify the effect of each variable on the mediation (Cepeda et al., 2017). Results indicate that there is indirect effect through knowledge absorptive capacity (β = 0.094, CI[6] [0.006, 0.181]) and knowledge desorptive capacity (β = 0.104, CI [0.024, 0.201]). The indirect effect of IT integration capability on firm performance through knowledge absorptive capacity [variance accounted for (VAF) = 0.453)] and through knowledge desorptive capacity (VAF = 0.504) demonstrates the great majority of the total indirect effect (VAF = 1.189). Additionally, we compared the two indirect effects (through knowledge absorptive capacity and through knowledge desorptive capacity) in a comparison analysis (Table 3.7). There are no significant differences between the two effects. This analysis suggests that the effects of knowledge absorptive capacity and knowledge desorptive capacity support the mediation equally. Tables 3.5, 3.6, and 3.7 provide additional details of the mediation analysis.

6 CI: Confidence interval. The beta/effect is significant when zero is not included in the CI.

Table 3.5: Mediation analysis

Relationship	Direct effect	Indirect effect	Total effect
IT integration capability → Firm performance	-0.039 (-0.334) (0.739) [-0.264, 0.194]	0.246** (3.227) (0.001) [0.130, 0.367]	0.207* (2.488) (0.006) [0.068, 0.343]

*Note: †p < 0.10, *p < 0.05, **p < 0.01, ***p < 0.001, one-tailed test for the indirect and total effect, two-tailed test for the direct effect.*

Table 3.6: Multiple mediation effects

		Coefficient	Bootstrap 90% CI				VAF
			Percentile		Biased corrected (BC)		
Direct effects	a1	0.488	0.357	0.612	0.359	0.614	
	a2	0.392	0.257	0.507	0.260	0.510	
	a3	0.369	0.276	0.473	0.272	0.469	
	b1	0.192	0.009	0.358	0.011	0.360	
	b2	0.266	0.071	0.456	0.070	0.455	
Indirect effects	a1xb1	0.094	0.005	0.179	0.006	0.181	0.453
	a2xb2	0.104	0.024	0.200	0.024	0.201	0.504
	a1xa3xb2	0.048	0.012	0.092	0.011	0.092	0.232
	Total indirect effect	0.246	0.129	0.366	0.130	0.367	1.189

Note: c': IT integration capability → Firm performance; a1xb1: IT integration capability → Knowledge absorptive capacity → Firm performance; a2xb2: IT integration capability → Knowledge desorptive capacity → Firm performance; a1xa3xb2: IT integration capability → Knowledge absorptive capacity → Knowledge desorptive capacity → Firm performance.

Table 3.7: Indirect effects comparison

Differential effect	Coefficient	Bootstrap 95% CI			
		Percentile		BC	
M1 - M2 = a1xb1 - a2xb2	-0.011	-0.192	0.153	-0.188	0.157

3.4.3.4. Test of robustness

Our PLS estimation of the proposed research model can be complemented with a test of robustness to examine alternative relationships and conceptual models. We checked for the robustness of the proposed research theory by considering an alternative model in which knowledge desorptive capacity influences knowledge absorptive capacity but every other relationship remains the same. Results of this alternative model yield similar results to those obtained in the proposed model. The alternative model indicates that knowledge desorptive capacity is positively related to knowledge absorptive capacity ($\beta = 0.419^{***}$). This result indicates that it is also rational to think that firms may want to identify and transfer secondary knowledge first, and then, absorb core knowledge from the external firm as a knowledge management strategy. This phenomenon can be explained by a situation in which the firm has to transfer some superficial knowledge to be able to obtain in return some core knowledge (again, pure opportunistic behavior). Table 3.A3 shows the details of this test of robustness.

That being said, we argue and propose in the proposed research model that companies with a leading IT integration capability should have developed a knowledge absorptive capacity prior to developing a knowledge desorptive capacity. Companies can develop the proficiency to identify superficial

knowledge that can be useful and transferable to external partners once they have been created and stored in a substantial core and superficial knowledge base. The selection of superficial knowledge from a knowledge base also requires experience and a solid knowledge absorptive capacity. Anyway, this conceptual debate can be a "chicken-egg problem" theoretically. Statistically, as our proposed research model (the model of Figure 3.2) does not have a statistically worse overall fit for the estimated model than the overall fit of the estimated alternative model (the model of the test of robustness), the alternative model is not preferred to our proposed research model (Benitez et al., 2020b).

Finally, we also estimated a model where knowledge absorptive capacity and knowledge desorptive capacity freely correlate in the proposed research model (i.e., no relationship between knowledge absorptive capacity and knowledge desorptive capacity was included), and a model in which knowledge absorptive and knowledge desorptive capacities shape a third-order construct called knowledge management capability (Tanriverdi, 2005). These models yield similar results to those obtained in the proposed model (β IT integration capability → Knowledge management capability = 0.602***, β Knowledge management capability → Firm performance = 0.383***). In conclusion, the results of this test of robustness provide additional credibility to the support of our research model and the findings presented in this study.

3.4.3.5. Importance-performance map analysis

We performed an importance-performance map analysis (IPMA) at construct and dimension level to identify the antecedents that may have a high importance (i.e., those that have a strong total effect) for our key outcome construct (i.e., firm performance) and a high performance (i.e., those companies that perform well) (Ringle & Sarstedt, 2016). At construct level, we find knowledge absorptive capacity and knowledge desorptive capacity in very similar positions. Both constructs have similar performance values[7] and above average importance values. That is, in absolute terms, when knowledge absorptive capacity is increased by one, firm performance will increase by the construct's importance (i.e., 0.314) (ceteris-paribus). In a similar way, when knowledge desorptive capacity is increased by one, firm performance will increase by 0.280 (ceteris-paribus).

At the dimension level, we find that knowledge transfer capability (i.e., one of the dimensions of knowledge desorptive capacity) has high importance value (i.e., above average), while it has the lowest performance value (68.155). That means companies need to improve the performance of knowledge transfer capability given that its importance for firm performance is significant. We also find knowledge acquisition capacity and knowledge exploitation capacity (i.e., two dimensions of knowledge absorptive capacity construct) and knowledge identification capacity (i.e., one dimension of knowledge desorptive capacity construct) in the high performance and high importance values quadrant, which indicates that they have important and significant effect on firm performance. Finally,

7 Given that both knowledge absorptive capacity and knowledge desorptive capacity are located close to the horizontal center line, we should regard these placements cautiously and not as definite (Henseler, 2021).

we find knowledge assimilation capacity and knowledge transformation capacity (i.e., two dimensions of knowledge absorptive capacity) in the quadrant with low importance values and low performance values (i.e., below average), deriving that those variables are not a priority for companies due to the low significant effect on firm performance. Figures 3.3 and 3.4 show the IPMA at both constructs and dimension levels.

Figure 3.3: IPMA analysis at construct level

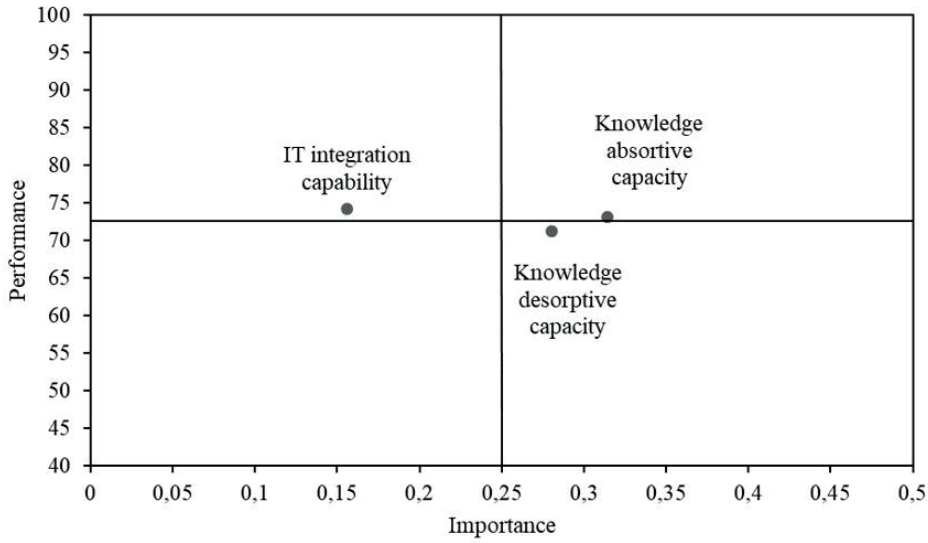
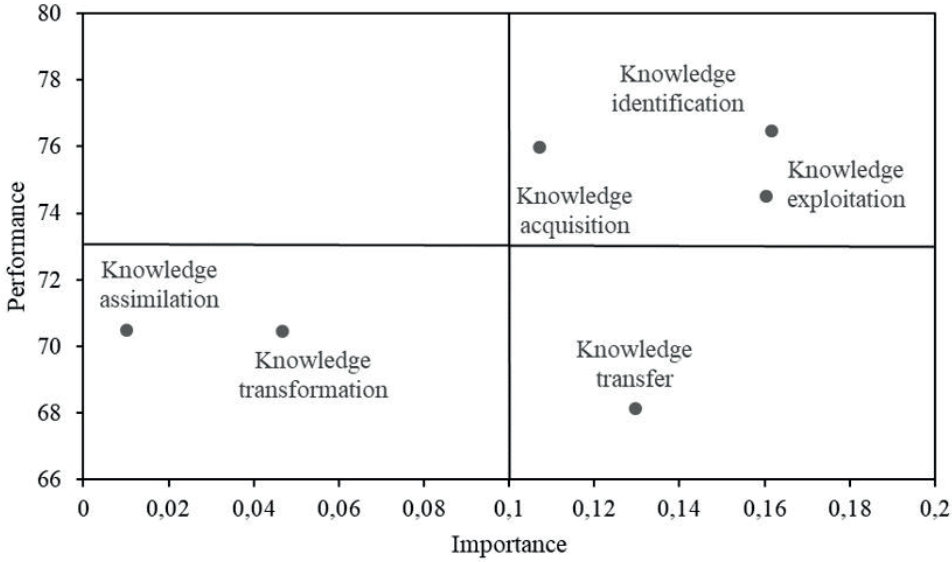


Figure 3.4: IPMA analysis at dimension level



Note: The IPMA uses the unstandardized total effects to create the x-axis, while it uses the latent variable scores rescaled on a range from 0 to 100 to create the y-axis (Ringle & Sarstedt, 2016).

3.5. Discussion and conclusions

How does the firm's IT integration capability in the supply chain affect knowledge absorption and desorption of the focal firm? This is the cutting edge and idiosyncratic research question this study aims to study theoretically and investigate empirically. Drawn from prior IS research on IT and knowledge management (Tanriverdi, 2005; Dong & Yang, 2015) and on the IT-enabled organizational capabilities perspective (Mithas et al., 2011; Benitez et al., 2018a; 2018d), we theorized that the firm's ability to integrate its IT systems with the IT systems of external partners (IT integration capability in an interorganizational relationships context)

enables the focal firm to absorb core knowledge and desorb superficial knowledge to generate business benefits. The proposed theory was tested on a sample of firms in Spain. The empirical analysis gave support to the proposed theory.

Prior research lacks the overall understanding about how IT matters in the key knowledge management capabilities for the focal firm and its supply chain. Specifically, research has been limited to study how desorptive capacity contributes to supply chain competitiveness (Roldan et al., 2018) or how IT capabilities affect absorptive capacity either directly or indirectly (Liu et al., 2013; Limaj et al., 2016), lacking to show how firm's IT investments affect the whole picture of knowledge management activities.

How does a firm's IT integration capability affect knowledge management capabilities to create business value? The IT integration capability enables the focal firm the development of knowledge absorptive capacity and knowledge desorptive capacity, which in turn helps the focal firm to improve firm performance. The integration of the IT systems of the focal firm with the IT systems of others organizations of the firm's supply chain facilitates the integration of supply chain information, and access and sharing of order-related data, production-related data, customer-related data, and market-related data as well as the coordination of the business activities between the focal firm and the external organizations. This information integration, data access and sharing, and business activity coordination enables the knowledge acquisition, assimilation, transformation, and exploitation of external

core knowledge (knowledge absorption of the focal firm) for commercial ends (Cohen & Levinthal, 1990; Zahra & George, 2002). Once the focal firm has absorbed sufficient degree of external core knowledge is interested in transferring superficial knowledge to other external organizations to obtain a licensing income, entry into a foreign market, or access to future core knowledge from these external partners. In this sense, we argue that knowledge absorption leads to knowledge desorption. Both knowledge absorption and knowledge desorption improve firm performance and create business value. The investments in IT integration capability are thus converted into business benefits through the absorption and desorption of knowledge, which is consistent with the prior theory building on the IT-enabled organizational capabilities perspective.

This research provides two key contributions to the IS discipline. First, this study introduces the construct of knowledge desorptive capacity in the IS research and provides a scale for its measure. Knowledge desorptive capacity is the ability of the firm to identify and transfer its knowledge to external partners (Lichtenthaler & Lichtenthaler, 2010). The concept of knowledge desorptive capacity was presented by Lichtenthaler and Lichtenthaler (2009). We develop theoretically this construct by adding the superficial/secondary nature of the knowledge desorbed by firms. We argue that firms should not be interested in desorbing core knowledge. In addition, this construct lacked a set of validated measures. We introduce the construct of knowledge desorptive capacity to IS research into a business value of IT conversation, and provide a set of calibrated measures at first- and second-order level that can be used by future IS scholars. This is the primary contribution of this paper to IS research.

Second, this research provides and demonstrated a theory of IT integration impact on the firm's knowledge absorption and desorption, and their impact on firm performance. Prior IS research has focused on studying the impact of IT on knowledge absorption (e.g., Joshi et al., 2010; Liu et al., 2013), but the focus on the role of IT in knowledge desorption has not been examined. We develop the body of IS research on IT and knowledge management activities at firm level (Tanriverdi, 2005; Pavlou & El Sawy, 2006) by both theorizing and testing empirically the impact of IT integration capability on both knowledge absorption and desorption. The findings of our study also have core theoretical implications for IS research on business value of IT and the IT-enabled organizational capabilities perspective. Our theory building sets IT integration capability effects on firm performance through the capability development of knowledge absorption and knowledge desorption. In this sense, knowledge absorptive capacity and knowledge desorptive capacity are two intermediate organizational capabilities through which IT affects firm performance. This is the second primary contribution of this research to IS research.

This study has also limitations. First, as business value of IT studies is mostly focused in U.S. and U.K. firms (e.g., Benitez et al., 2018a), and because Spain is a critical market of the European Union with a high volume of firm's IT initiatives, this study was contextualized in large firms in Spain. For this reason, the results should only be generalized to large firms in Spain. Future research should explore whether our findings are also valid in other markets worldwide, and whether this theory is supported in small and medium firms. Second, the key endogenous variable was assessed through a perceptual

measure of firm performance. Although our empirical analysis was prevented and checked from potential common method bias, we encourage IS scholars to continue this line of research by measuring business benefits with archival data. Although using two key respondents per firm has been suggested to rigorously execute IS research on business value of IT, this kind of research design is often very difficult to obtain and very costly. Third, in regard to most of the research projects and estimations, our study was developed with assumptions. Based on Gupta and Govindarajan's (2000) work, our study assumes that organizations exhibit an opportunistic behavior because they play "the game of coopetition" with other organizations by trying to absorb core knowledge but only desorbing secondary knowledge. Future IS research could examine if this assumption is correct. We also recognize that the relationship between knowledge absorptive capacity and knowledge desorptive capacity may suffer from a "chicken-egg problem." However, our empirical analysis and findings are not affected if the opposite effect (Knowledge desorptive capacity → Knowledge absorptive capacity) is included in the model; similarly, the results obtained in this research are not affected when we allow these two constructs to be freely correlated. Future IS research should focus specifically in discovering the preferred sequence companies follow in absorbing and desorbing knowledge.

IS research on knowledge desorption is extraordinarily scarce. In this sense, this topic presents different avenues for future research: First, firms and executives have received high pressure from competitors, employees, and customers to implement digital transformation programs, which represents a good opportunity for companies to absorb and desorb critical

knowledge from their innovation ecosystem. Future IS research could examine the role of knowledge absorptive and knowledge desorptive capacities of the focal firm for the successful implementation of the digital transformation programs. We believe this line of IS research will bring very promising research results, theory building, and success to IS scholars. Second, firms may participate in collaboration networks (with competitors and the competitor's allies) to compete better by absorbing core knowledge and desorbing secondary knowledge. However, this implies an opportunistic behavior that can be deployed only for a limited period of time until other organizations discover this opportunistic behavior. We encourage IS scholars to explore how this past opportunistic behavior driven by the simultaneous usage of knowledge absorption and desorption affects the firm's reputation in a collaborative network and future business benefits of the focal firm.

Finally, organizational ambidexterity implies the firm's ability to simultaneously explore and exploit the knowledge (Benitez et al., 2018d) of business opportunities (Benitez et al. 2018b). Knowledge absorptive capacity implies both the acquisition and exploitation of knowledge (Zahra & George, 2002), which suggests a certain degree of ambidexterity. At the same time, once firms have absorbed a sufficient degree of external core knowledge, they are interested in desorbing and commercializing with secondary knowledge to better exploit and capitalize their knowledge base and maximize business benefits. The findings that are derived from our research may suggest in a preliminary way that there can exist several levels of organizational ambidexterity in the firm, that is, different degrees of ambidexterity in different types of organizational capabilities, as illustrated in this study in

knowledge absorptive capacity and knowledge desorptive capacity. Future IS research should examine this preliminary insight, which seems to be an excellent avenue for future empirical IS research. All these IS topics promise to come with excellent research questions, challenging research designs, and potentially interesting discussions for the IS research community.

Worldwide IT investment is projected to total $3.8 trillion in 2019 and a significant percentage of this worldwide investment is firm's IT investments at the supply chain level. As companies and top IT executives need to motivate and show the return from their IT investments, this study provides three very useful lessons to IT executives. First, firms can capitalize their investments in IT systems integration in the supply chain because it facilitates the focal firm to absorb core knowledge and desorb secondary knowledge from other organizations to generate business benefits. In this sense, assuming an opportunistic behavior of the focal firm in its knowledge transfer activities, we show how firms can create business value from IT integration through knowledge absorption and desorption. Second, this study also focuses and shows IT executives how critical it is to purposely design first the firm's absorption activities of core knowledge, and therefore focusing on the firm's desorption activities of secondary knowledge. Finally, this study also provides IT executives the guidelines and measures to evaluate their degree of knowledge absorptive capacity by providing a set of calibrated fine-grained measures of knowledge absorptive capacity.

As final concluding remarks, this research examines how the firm's IT integration capability in the supply chain affects knowledge absorption and

desorption. We theorized that the IT integration capability enables the focal firm to absorb core knowledge and desorb secondary knowledge, which in turn improves firm performance. Our proposed research theory assumes an opportunistic behavior among companies that try to absorb primary knowledge but transfer secondary knowledge. We tested the proposed theory with a sample of large firms in Spain. After preventing and checking for common method variance, and testing several alternative research models, the empirical analysis gives support to our theory. This paper develops IS research on business value of IT by introducing the construct of knowledge desorptive capacity (and a set of calibrated measures), and by providing and testing a theory on the role of IT integration in knowledge absorption and knowledge desorption. In this sense, IT does matter because it creates business value. It is a great time to be an IS scholar but a challenging/changing/disruptive time to be an IT executive. Quo Vadis?

3.6. References

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3.7. Appendix

Table 3.A1: Detailed information on survey items

Construct/indicator: Except where otherwise indicated below, the possible range for measures was from 1 to 5 (1: Strongly disagree, 5: Strongly agree)	**VIF**	**Weight**	**Loading**
IT integration capability (composite, mode A)			
Our IT systems enable us integrated access and sharing of all order-related data (e.g., order status, handling requirements, etc.)	1.576	0.203***	0.716***
Our IT systems enable us integrated access and sharing of all production-related data (e.g., resource availability, quality, etc.)	1.989	0.255***	0.820***
Our IT systems enable us integrated access and sharing of all customer-related data (e.g., service contracts, feedback, etc.)	2.187	0.193***	0.767***
Our IT systems enable us integrated access and sharing of all market-related data (e.g., promotion details, future forecasts, etc.)	2.839	0.297***	0.875***
To what extent do your IT systems facilitate coordinated activities with external agents (e.g., suppliers, customers, other organizations)? (1: Very low, 5: Very high)	1.776	0.300***	0.793***
Knowledge absorptive capacity (second-order construct, composite, mode A)			
Knowledge acquisition (composite, mode A)	1.709	0.289***	0.197***
We are effective in developing new knowledge or insights that have the potential to influence new product development	1.272	0.207***	0.606***
Our employees are engaged in cross-functional teams	1.772	0.211***	0.758***

We are able to organize special meetings with suppliers, customers, or third parties to acquire new knowledge on process, product, logistics and distribution related to innovation	2.618	0.240***	0.853***
We are able to identify and acquire internal (i.e., within the firm) and external (e.g., market) knowledge	2.434	0.307***	0.856***
We are successful in learning new things	1.501	0.322***	0.763***
Knowledge assimilation (composite, mode A)	1.697	0.298***	0.787***
We quickly analyze and interpret changing market demands	2.674	0.342***	0.901***
We have adequate routines to analyze the information and knowledge obtained	3.317	0.352***	0.926***
We have adequate routines to assimilate new information and knowledge	3.138	0.394***	0.929***
Knowledge transformation (composite, mode A)	2.455	0.326***	0.881***
We are effective in transforming existing information into new knowledge	3.802	0.311***	0.880***
We can successfully integrate the new information and knowledge acquired with our existing knowledge	4.200	0.327***	0.912***
Our firm quickly recognizes the usefulness of new external knowledge to existing knowledge	1.953	0.269***	0.823***
Our firm periodically meets to discuss consequences of market trends and new product development	1.460	0.286***	0.720***
Knowledge exploitation (composite, mode B)	1.986	0.301***	0.820***
We can successfully exploit the new integrated information and knowledge into concrete applications	1.573	0.454***	0.848***

Our firm has a clear division of roles and responsibilities	2.626	0.085	0.791***
We are effective in applying knowledge into new products	2.601	0.319*	0.855***
We constantly consider better ways to exploit knowledge	2.917	0.316*	0.872***
Knowledge desorptive capacity (second-order construct, composite, mode B)			
Knowledge identification (composite, mode B)	1.129	0.754***	0.906***
We often scan the environment to identify knowledge that could be relevant to our suppliers	2.143	0.217	0.781***
We often scan the environment to identify knowledge that could be relevant to our customers	1.545	0.638***	0.922***
We often scan the environment to identify knowledge that could be relevant to other organizations (e.g., public institutions and competitors)	2.115	0.302*	0.801***
Knowledge transfer (composite, mode A)	1.129	0.449***	0.704***
We provide sufficient support for an adequate transfer of knowledge to external agents (e.g., suppliers, customers, other organizations)	1.759	0.331***	0.770***
We often transfer recommendations about internal processes to external agents (e.g., suppliers and customers)	1.945	0.223***	0.790***
We often transfer information about our strategies to external agents (e.g., suppliers and customers)	2.764	0.237***	0.815***
We often transfer information about the product or the market to external agents (e.g., suppliers and customers)	3.619	0.206***	0.820***
The transfer of knowledge to external agents (e.g., suppliers, customers, and other organizations) is organized well	3.046	0.240***	0.861***

Firm performance: Rate the extent to which the firm has achieved the following outcomes during the last two years (composite, mode A)			
Product development was clearly superior to competitors in meeting customer's needs	1.329	0.241***	0.623***
Sales relative to objectives	2.673	0.244***	0.869***
Market share relative to objectives	2.460	0.205***	0.823***
Profit margin relative to objectives	4.104	0.263***	0.907***
Return on assets relative to objectives	3.497	0.265***	0.869***

*Note: †p < 0.10, *p < 0.05, **p < 0.01, ***p < 0.001, two-tailed test.*

Table 3.A2: Correlation matrix

Construct	1	2	3	4	5	6	7	8	9	10
1. IT integration capability	1.000									
2. Knowledge absorptive capacity	0.487	1.000								
3. Knowledge desorptive capacity	0.571	0.560	1.000							
4. Firm performance	0.201	0.366	0.382	1.000						
5. Firm size	0.114	0.179	0.210	0.030	1.000					
6. Firm age	-0.226	0.043	-0.168	-0.004	-0.014	1.000				
7. Industry	-0.028	0.112	0.104	0.344	-0.186	0.008	1.000			
8. IT investment	0.312	0.306	0.248	0.122	0.182	-0.039	-0.007	1.000		
9. Innovation investment	0.241	0.294	0.198	0.120	0.140	-0.101	-0.054	0.659	1.000	
10. Quality management investment	0.082	0.013	-0.020	0.040	-0.056	-0.066	-0.074	-0.003	0.118	1.000

Table 3.A3: Results of the test of robustness

Beta coefficient	Basel model	Mediation model
IT integration capability → Knowledge absorptive capacity (H1)	0.248** (2.681) (0.004) [0.090, 0.398]	0.248** (2.696) (0.004) [0.093, 0.400]
IT integration capability → Knowledge desorptive capacity (H2)	0.571*** (9.847) (0.000) [0.465, 0.665]	0.572*** (9.871) (0.000) [0.465, 0.664]
Knowledge desorptive capacity → Knowledge absorptive capacity (H3)	0.419*** (6.380) (0.000) [0.310, 0.528]	0.418*** (6.378) (0.000) [0.308, 0.529]
Knowledge absorptive capacity → Firm performance (H4)	0.182* (1.724) (0.042) [-0.003, 0.353]	0.192* (1.844) (0.033) [0.020, 0.359]
Knowledge desorptive capacity → Firm performance (H5)	0.251** (2.561) (0.005) [0.090, 0.411]	0.266* (2.231) (0.013) [0.065, 0.458]
IT integration capability → Firm performance		-0.039 (-0.334) (0.739) [-0.264, 0.194]
Control Variables		
Firm size → Firm performance (control variable)	0.003 (0.044) (0.965) [-0.130, 0.139]	0.001 (0.012) (0.990) [-0.131, 0.140]
Firm age → Firm performance (control variable)	0.036 (0.493) (0.622) [-0.100, 0.182]	0.029 (0.404) (0.686) [-0.107, 0.177]

Industry → Firm performance (control variable)	0.304 (0.900) (0.368) [-0.475, 0.459]		0.300 (0.897) (0.370) [-0.467, 0.451]	
IT investment → Firm performance (control variable)	-0.020 (-0.204) (0.839) [-0.219, 0.175]		-0.012 (-0.122) (0.903) [-0.211, 0.181]	
Innovation investment → Firm performance (control variable)	0.042 (0.455) (0.649) [-0.139, 0.221]		0.039 (0.365) (0.671) [-0.142, 0.220]	
Quality management investment → Firm performance (control variable)	0.062 (0.909) (0.364) [-0.078, 0.196]		0.065 (0.935) (0.350) [-0.075, 0.199]	
R^2	**R^2**	**Adjusted R^2**	**R^2**	**Adjusted R^2**
Knowledge absorptive capacity	0.355	0.347	0.356	0.347
Knowledge desorptive capacity	0.327	0.322	0.327	0.323
Firm performance	0.272	0.231	0.273	0.226
Overall model fit of the estimated model	**Value**	**HI95**	**Value**	**HI95**
SRMR	0.065	0.069	0.065	0.068
d_{ULS}	1.619	1.794	1.610	1.734
d_G	0.451	0.599	0.450	0.595
f^2				
IT integration capability → Knowledge absorptive capacity (H1)	0.064		0.064	
IT integration capability → Knowledge desorptive capacity (H2)	0.485		0.486	

Knowledge desorptive capacity → Knowledge desorptive capacity (H3)	0.183	0.183
Knowledge absorptive capacity → Firm performance (H4)	0.028	0.029
Knowledge desorptive capacity → Firm performance (H5)	0.054	0.052
Firm size → Firm performance (control variable)	0.000	0.000
Firm age → Firm performance (control variable)	0.002	0.001
Industry → Firm performance (control variable)	0.117	0.112
IT investment → Firm performance (control variable)	0.000	0.000
Innovation investment → Firm performance (control variable)	0.001	0.001
Quality management investment → Firm performance (control variable)	0.005	0.006

*Note: †p < 0.10, *p < 0.05, **p < 0.01, ***p < 0.001, one-tailed test for hypothesized alternative relationships and two-tailed test for other relationships.*

4 SHAPING EMPLOYEE PERFORMANCE THROUGH DIGITAL INNOVATION INITIATIVES:

AN EMPIRICAL INVESTIGATION

4. Shaping employee performance through digital innovation initiatives: An empirical investigation

Abstract

With the increased use and ubiquity of technologies, it is becoming imperative for employees to constantly innovate, engage with digital technologies, and adapt to new functionalities and applications to carry out a wide variety of work-related tasks. Digital innovation has emerged as the new norm in workplaces to thrive and survive in the digital economy. This study follows current research on the bright side of IT and digital innovation literature to propose that digital innovation initiatives can positively transform and impact the employee experience. Prior research has ignored how digital innovation may impact the employee experience. This is especially important as digital innovation initiatives occur inside the firm, transforming the workplace into a *digital workplace*. Using a sample of 134 large firms in Spain, we found that digital innovation initiatives are able to enhance job performance by improving job satisfaction, employee engagement, and reducing turnover intention. We discuss theoretical implications for innovation and information systems research.

Keywords: *digital innovation initiatives, job satisfaction, employee engagement, turnover intention, job performance, digital workplace*

4.1. Introduction

In recent years, the advent of digital technologies such as social media, big data analytics, mobile technology, or cloud computing has radically changed the way firms connect, collaborate, and conduct business (Sebastian et al., 2017; Castillo et al., 2021b; Lin et al., 2021). This has resulted in a wide range of organizational benefits. For example, prior research has revealed some social media usage benefits such as better knowledge management (Castillo et al., 2021a), improvement of employer reputation (Benitez et al., 2020a), and enhancement of team performance (Song et al., 2019). Similarly, big data analytics has become a revolution in the way large volumes of unstructured data are processed, enabling improvements in business processes, firm productivity, and innovation outcomes (Mikalef & Krogstie, 2020; Cheng et al., 2021).

With the increased use and ubiquity of technologies, it is also becoming imperative for employees to constantly innovate, engage with these technologies, and adapt to new functionalities and applications to carry out a wide variety of work-related tasks (Ayyagari et al., 2011; Avgar et al., 2018). This situation has resulted in negative patterns of work and employee behaviors, or what the information systems (IS) discipline has established as the "dark side" of technology (Zhang et al., 2019; Califf et al., 2020; Cheng et al., 2021). This line of research has identified job burnout (Shih et al., 2013), work exhaustion (Moore, 2000), technostress (Ayyagari et al., 2011), or job dissatisfaction (Ragu-Nathan et al., 2008) as the most significant manifestations of the negative aspect of IT use. This research stream argues that some of the features that make IT useful (e.g., reliability, usefulness, portability, user-friendliness, and

fast processing) may also threaten employee productivity and well-being due to IT-induced stress, technology addiction, or IT misuse (Tarafdar et al., 2010).

In spite of that, current organizational environments are characterized by an enormous dependence on technology (e.g., collaborative work, enterprise applications) and a constant introduction of updated versions of software and hardware (Maruping & Magni, 2015; Colbert et al., 2016). In such environments, employees are required to constantly interact with technology, aggravating the potential negative, but also the positive effects associated with their use. In the same way that it is important to understand what drives the dark side of technology and its consequences, it is equally relevant to identify how digital technologies may positively transform the employee experience. This is what the IS discipline has referred to as the "bright side" of technology (Cheng et al., 2021). This research proposes digital innovation as a key driver in which digital technologies may shape employee work-related outcomes and improve employee job performance. Digital innovation is understood as "*the use of digital technology during the process of innovating*" (Nambisan et al., 2017, p. 223). The rapid evolution of digital technologies has fundamentally changed innovation activities and strategies (Schneckenberg et al., 2021). However, recent IS research on innovation has considered digital innovation as an outcome (Hensen & Dong, 2020; Karhade & Dong, 2021) or has limited its study to its impact on firm performance (Hanelt et al., 2021).

Therefore, this study follows current research on the bright side of IT and digital innovation literature to propose that digital innovation initiatives can positively transform and impact the employee experience. Prior research on

the bright side of IT has been limited in scope as it has mainly focused on specific technologies in isolation (Zhang et al., 2019; Song et al., 2019; Hornyak et al., 2020). For example, Hornyak et al. (2020) explored and empirically tested how effective use of enterprise systems impacts user satisfaction and job effectiveness. However, prior literature has acknowledged that the number of digital technologies that individuals use in their work has increased significantly and that technologies do not work in isolation (Gerlach & Cenfetelli, 2021). In an attempt to overcome prior research limitations, this research examines whether and how a comprehensive and updated portfolio of digital innovation initiatives can improve employee job performance.

To assess how digital innovation initiatives affect employee job performance, we consider job satisfaction, employee engagement, and turnover intention, as these three variables can play a critical role in mediating the impact of system use on job performance (Au et al., 2008). Contrary to the stream that postulates that the workforce will exhibit low productivity given the repetitive adoption of new systems (Ragu-Nathan et al., 2008), this study proposes that digital innovation initiatives will improve employee job satisfaction, employee engagement, reduce turnover intention, and consequently, improve employee job performance. To narrow this research gap, we test the proposed research model with a sample of 134 large Spanish firms. We find that digital innovation initiatives positively affect job satisfaction, which has a positive impact on employee engagement and a negative impact on turnover intention. We also find that employee engagement enhances job performance. This study makes several contributions to the IS and innovation research. First, we extend prior work

on digital innovation research (Nambisan et al., 2017) by examining the exploratory power and impact of digital innovation initiatives on employee job performance. Second, this study contributes to overcoming the single-IS paradigm in IS research by considering interactions between multiple technologies that are relevant to the phenomenon of digital innovation. Third, we theoretically explain and empirically demonstrate that digital innovation initiatives positively affect employee job performance by improving job satisfaction, and employee engagement.

4.2. Theoretical background and conceptualization of constructs

4.2.1. The dark and bright side of technology

Organizational use of IT has become a complex, real-time, ubiquitous, and pervasive task, often overwhelming, frustrating, and compromising employees' well-being (Tarafdar et al., 2010). The constant and accelerated pace at which technology is used and adopted in the workplace has led to negative behaviors toward IT among employees in terms of technological burden and elevated levels of technostress (Califf et al., 2020). These negative consequences of IT usage are critical as they can directly affect work-related outcomes, generating decreased job satisfaction and organizational commitment, and low employee productivity (Tarafdar et al., 2007). Consequently, these negative aspects of IT usage have been acknowledged as the "dark side" of technology (Cheng et al., 2021). Prior research on the dark side of technology has revealed that technostress

reduces users' satisfaction and performance (Ayyagari et al., 2010), increases turnover intention (Moore, 2000), and also affects the degree of usage of IT for productivity and innovation tasks (Tarafdar et al., 2010).

However, organizations have also gained great organizational benefits in productivity, flexibility, and efficiency through the implementation and use of technology. These benefits are represented by the "bright side" of IT (Cheng et al., 2021) and are included within the business value of IT literature. Prior IS research on the bright side of IT has also recognized the positive effects of technology usage at an individual level. Employee satisfaction, organizational commitment, employee creativity, and employee job performance have received most of the attention (Jimenez-Castillo & Sanchez-Perez, 2013; Zhang et al., 2019; Wang et al., 2021). However, this line of research presents two main limitations. First, prior research has mainly focused on how specific technologies in isolation (e.g., social media, mobile technologies, big data analytics) may affect employee work-related outcomes (Song et al., 2019; Zhang et al., 2019). For example, Zhang et al. (2019) found that social media usage improves employees' job satisfaction and reduces turnover intention through the improvement of their engagement and Chung et al. (2014) examined and found that organizational workers can improve their perceived job performance through the use of mobile enterprise systems. Second, some emerging and relevant technologies are missing in current research about the bright side of IT. For example, prior studies have not incorporated artificial intelligence (AI) or the internet of things (IoT) as key factors of digital innovation, although both technologies are becoming an active ingredient in fostering innovative initiatives (Lusch & Nambisan, 2015; Sebastian et al., 2017).

4.2.2. Job satisfaction, employee engagement, and turnover intention in IS research

While commitment has been largely explored in the IS domain, job satisfaction and turnover have been relatively ignored (Chen et al., 2014). Employee job satisfaction is one of the prominent topics in Management and Human Resource (HR) literature and has been considered a key aspect affecting a firm's operating effectiveness and performance (Sainju et al., 2021). However, recent IS research has recognized that "t*here is still a lack of studies on identifying employees' job satisfaction factors*" (Jung & Suh, 2019, p. 1). Although prior IS research has mainly focused on studying the driving factors of job satisfaction among IT workers (Thatcher et al., 2002), or in an educational context (Rueda et al., 2017; Scaringella et al., 2022), Psychology and Management fields have shown how well job satisfaction correlates with employee performance, employee turnover, employee engagement, and organizational success (Griffeth et al., 2000; Harter et al., 2002; Ray et al., 2014).

Engagement is a widely studied variable within the IS field that has adopted multiple shapes: product engagement, community engagement, consumer engagement, social commerce engagement, and student engagement (Rueda et al., 2017; Hur et al., 2019; Castillo et al., 2021b). No matter the shape, engagement has been characterized by attitudes of energy, involvement, attention, focus, and curiosity (Saks, 2006; Rich et al., 2010). However, when it comes to employee engagement, research has been relatively limited, especially within the IS field. Prior IS research has mainly focused on the engagement of the user with a specific system (Kim et al., 2013; Suh et al., 2017). For example, Kim

et al. (2013) developed and proposed a mobile user engagement model to explain mobile user engagement with users' motivations, perceived value, satisfaction, and engagement intention.

Turnover intention is a relevant HR variable because turnover intention provides powerful explanations for employee retention levels and has been identified as the most immediate antecedent to turnover (Thatcher et al., 2002). Prior IS research has mainly focused on IT worker or IT executive turnover and how to reduce it (McKnight et al., 2009; Li et al., 2021). However, in current working environments, not only IT workers are exposed to an increasing pervasiveness and dependence on technology, but all the employees are. In this sense, limited research has explored how technologies may reduce turnover intention in the workplace (Zhang et al., 2019).

Overall, relatively little IS research has simultaneously examined job satisfaction, employee engagement, and turnover intention, especially when internal work environment factors are considered. To understand how IT can affect these variables, research in organizational behavior suggests linking internal or external factors to employee variables (Griffeth et al., 2000). Therefore, this study proposed a research model where job satisfaction and turnover intention are controlled by some key internal work environment conditions. Job design theory assumes that some job characteristics are key to improving and contributing to employee job satisfaction and reducing turnover intention (Kiggundu, 1981; McKnight et al., 2009). We consider the alignment between employee and firm values,

the degree of job autonomy, and degree of task variety as key motivational and internal work environment conditions that may affect employee job satisfaction values and turnover intention (Morris & Venkatesh, 2010).

4.2.3. Digital innovation

Innovation research has always been a predominant and relevant topic within the IS field (Jha & Bose, 2016). IS scholars have widely acknowledged the positive relationship between IT and innovation outcomes in one way or another (Joshi et al., 2010; Kleis et al., 2012; Benitez et al., 2018a), to the extent that innovation constitutes of the major motivations for managers to invest in technology (Gibson, 2017). However, the rise of digitization and digital disruption has provoked a change in the nature of innovation, causing a transition from innovation to digital innovation (Benner & Tushman, 2015) and calling for more and better theories on the phenomenon of digital innovation (Nambisan et al., 2017). Nambisan et al., (2017) conceptualize digital innovation as "*the creation of (and consequent change in) market offerings, business processes, or models that result from the use of digital technology*" (Nambisan et al., 2017, p. 224). According to Nambisan et al. (2017), this conceptualization of digital innovation involves a wide range of innovation outcomes such as new products, new platforms, new services, or even new customer experiences. However, they also stated that there might be other value pathways as long as they are facilitated by the use of digital technologies. In this sense, we argue that digital innovation initiatives can transform the employee experience and enhance employee job performance.

IS scholars and practitioners are increasingly concerned with digital innovation and how it can enrich the current innovation discourse (Yoo et al., 2010; Fichman et al., 2014; Vega & Chiasson, 2019). On the one hand, extant research on digital innovation has often focused on the enabling role of digital tools in facilitating innovation processes (Nambisan, 2003; Dougherty & Dunne, 2011). For example, the manufacturing or the automotive sector has leveraged and embedded digital technologies such as sensors, RFID tags, or cloud computing into physical products and traditional services to get more flexible and innovative production processes (Svahn et al., 2017). On the other hand, a predominant number of empirical research on digital innovation have considered productivity, profitability, customer loyalty, increase in sales, higher margins, or risk mitigation as outcomes of digital innovation (Menon & Kohli, 2013; Hanelt et al., 2020). For example, Dell's IdeaStorm (an online user innovation community) has allowed Dell to introduce better products and improve firm performance (Dong & Wu, 2015). This study proposes that digital innovation initiatives can improve employee job performance, a variable that has been ignored in the innovation discourse.

4.2.4. Conceptualization of constructs

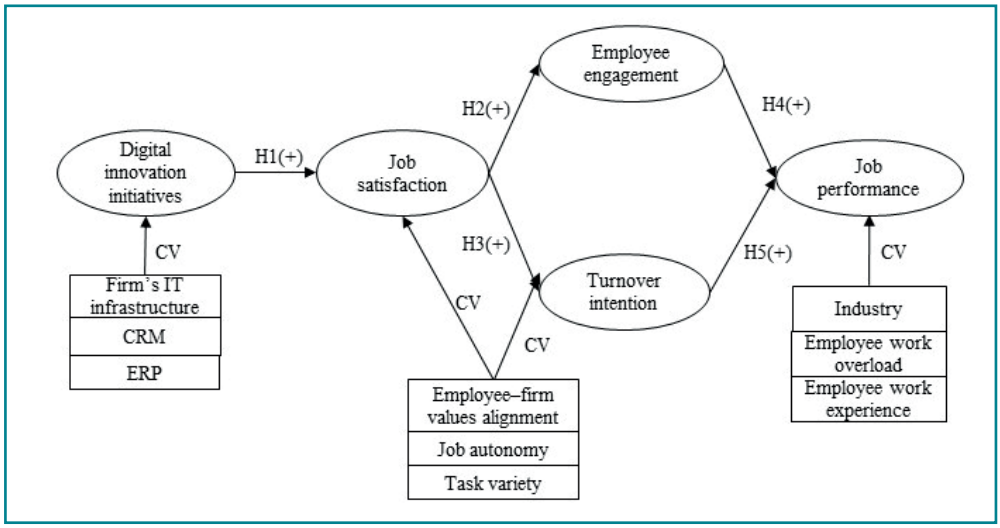
Innovation has been considered one of the most critical factors required for companies to succeed and achieve a sustained competitive advantage. Digital innovation describes new products, processes, or business models that are embodied in or enabled by digital technology (Fichman et al., 2014). Aral and Weill (2007) defined four types of IT use: infrastructural,

transactional, informational, and strategic. Following the definitions of each use, we consider that the strategic use of IT refers to the use of IT for innovation purposes. We follow this conceptualization to define digital innovation initiatives. Digital innovation initiatives include strategic organizational activities to sense and seize opportunities and maintain competitiveness through the use of digital technologies (Teece, 2007). Digital innovation initiatives are defined as the combination of a portfolio of information, computing, communication, and connectivity technologies (such as cloud computing, mobile devices, social media, or big data analytics) to create or change market offerings and support business activities (Bharadwaj et al., 2013; Nambisan et al., 2017).

This research includes four key employee work-related variables: job satisfaction, employee engagement, turnover intention, and job performance. Satisfaction has figured prominently in the literature as a surrogate for IS success (Petter et al., 2008). Job satisfaction is understood as the pleasant and positive employee state resulting from the employee's job (Morris & Venkatesh, 2010). Following Khan's conceptualization of engagement (Kahn, 1990), we define employee engagement as the physical, emotional, and cognitive involvement experienced by employees when performing a task (Rich et al., 2010). Employee engagement is therefore understood as a combination of three kinds of engagement. Turnover intention refers to employee quit intentions or thoughts of leaving the firm (Mitchell et al., 2001; Thatcher et al., 2002). Finally, job performance refers to how individuals perform in their work-related activities that are part of the job requirements and responsibilities (Williams & Anderson, 1991; Rich et al., 2010).

4.3. Hypothesis development and proposed research model

Figure 4.1: The proposed research model



4.3.1. Digital innovation and job satisfaction

Digital innovation initiatives are understood as those organizational activities where a comprehensive portfolio of digital technologies is innovatively used to support business activities or to enable the creation of new market offerings (Bharadwaj et al., 2013; Nambisan et al., 2017). Following prior research on innovation and satisfaction, results show that the most immediate outcome of innovation is customer satisfaction (Rubera & Kirca, 2017), with little research examining the relationship between innovation and job satisfaction (Zhou et al., 2005). Given that job satisfaction is a variable that may be affected by a wide range of internal and external conditions, job satisfaction is controlled by three strong internal motivational factors in order to clearly elucidate the effect of digital innovation initiatives. Therefore, we propose

that digital innovation initiatives improve job satisfaction. In a firm that embraces and fosters the innovative use of digital technologies, employees will tend to feel that the firm is full of liveliness and aware of the changing environmental conditions (Zhou et al., 2005). Under these circumstances, it is more likely that the employees are satisfied and happy at their jobs because the anxiety they may suffer from the environmental uncertainty caused by digital disruption can be reduced.

More specifically, some studies have shown that the innovative use of digital technologies such as social media may create a constructive dialogue and foster collaboration within and outside the firm. For example, Cognizant revealed that employees who blogged were more satisfied (Davenport et al., 2010). Social media enhances accessibility and efficient communication, which will lead to employees' higher job satisfaction (Zhang et al., 2019). Prior literature has also acknowledged the value that insight-generating tools such as big data analytics can have on innovation activities (Mikalef & Krogstie, 2020). We expect that the innovative use of big data analytics can bring satisfaction to employees. For example, Harrah's Entertainment employed analytics to make people's decisions knowing that happier employees create more satisfied customers. Using insights from data, they can assign the right employees to the right jobs or calculate the optimal number of employees to deal with customers at the front desk (Davenport et al., 2010). Besides, big data can allow processes to be streamlined and reduce bottlenecks, facts that are likely to impact employee job satisfaction at the workplace (Lu & Ramamurthy, 2011). There are also studies suggesting that AI can support and speed-up labor-

intensive information processes when used innovatively. Specifically, AI can overcome human information processing constraints such as speed of analysis or a combination of multiple types of information (Trocin et al., 2021). Besides, AI has the potential to accelerate the discovery process (Fleming, 2019). For example, AI is extensively used for HR tasks such as collecting interviews, scoring candidates' responses, or enabling recruiters to reach competent candidates (Daugherty et al., 2019). This will have a direct and strong impact on employee satisfaction as it involves time and effort savings. Therefore, we expect a positive relationship between digital innovation initiatives and job satisfaction, and propose the following:

Hypothesis 1 (H1): *There is a positive relationship between digital innovation initiatives and job satisfaction when strong internal motivational factors are considered.*

4.3.2. Job satisfaction and employee engagement

According to prior IS and HR literature about job satisfaction and employee engagement, satisfaction and engagement are independently positioned as important mediators of behavior (Rich et al., 2010; Ray et al., 2014). We propose that the more satisfied employees are with their job, they will be more likely to be more engaged than other employees. Being satisfied at work involves enjoying what you do and being excited at work. The joy and pleasure an employee may feel when performing a task can result in a stronger physical involvement, higher emotional connectivity to the job, the firm, and other members, and a deeper focus and attention. First, we argue that employees

will be physically, emotionally, and cognitively engaged at the job only when they feel enthusiastic, satisfied, and excited with the tasks they perform, when they feel to be part of a community, and when they can improve and develop themselves. Second, we expect individuals who like and are enthusiastic and satisfied with their job to show greater absorption and curiosity, be more present and alert, and invest their effort and energy at work, thus increasing employee engagement (Ho et al., 2011). Therefore, we hypothesize that:

Hypothesis 2 (H2): *There is a positive relationship between job satisfaction and employee engagement.*

4.3.3. Job satisfaction and turnover intention

Theory and research clearly indicate that job satisfaction is one of the main predictors of turnover intention (Griffeth et al., 2000; Mitchell et al., 2001). Following this line of research, we propose and expect that job satisfaction is negatively related to turnover intention. As job satisfaction is understood as the pleasant or positive emotional state resulting from employees' jobs (Janssen, 2001), employees that are more satisfied with their jobs will be less likely to leave the firm. We expect that when employees are satisfied and excited at their jobs, they will be more willing to continue to stay in the firm. Therefore, we expect that the more satisfied an employee is, the less likely will the intention to leave the firm be. Accordingly, we propose the following:

Hypothesis 3 (H3): *There is a negative relationship between job satisfaction and turnover intention.*

4.3.4. Employee engagement and job performance

We propose that the greater the employee engagement, the greater is the probability that the employee will achieve a better job performance (Rueda et al., 2017). Prior literature about engagement has conceptualized engagement not as an attitude, but as the degree to which an individual is attentive to and absorbed in the performance of the job (Saks, 2006). Therefore, when an employee is engaged at work, it will be more difficult to be distracted and bothered by external circumstances that arise at work, leading to better job performance. Moreover, engaged employees will be more willing to collaborate with other colleagues, improving their knowledge acquisition, and therefore their job performance (Lin & Shao, 2000). These kinds of employees will be better able to overcome obstacles (Sonnentag, 2003). For example, engaged employees will be in a better position to take control over their tasks, which will, in turn, improve their job performance (Rueda et al., 2017). Employees that are physically, emotionally, and cognitively engaged, will develop more and better ideas, detect wasteful procedures, or sense opportunities to improve the course of work (Ho et al., 2011). We expect that these factors contribute to achieving better job performance. Therefore, we expect a positive relationship between employee engagement and job performance, and we hypothesize the following:

Hypothesis 4 (H4): *There is a positive relationship between employee engagement and job performance.*

4.3.5. Turnover intention and job performance

We expect a negative relationship between turnover intention and job performance, so that the highest the turnover intention among employees, the more difficult will be to achieve a good job performance (Thatcher et al., 2002). First, employees experiencing high rates of quitting intentions will be less willing to fulfill the responsibilities of the job, probably leading to poor performance in terms of quantity and quality of work output. Second, it is also rational to expect that employees with leaving intentions will not be interested in coming up with new ideas that may improve the course of work, having some inattentive behavior instead, and making it difficult to achieve good job performance rates. Third, those employees will not be concerned with reaching personal career goals within the firm if their quitting intentions are high. Inevitably, this will lead to poor levels of job performance (Heavey et al., 2013). Therefore, we hypothesize the following:

Hypothesis 5 (H5): *There is a negative relationship between turnover intention and job performance.*

4.4. Research methodology

4.4.1. Data and sample

A survey was developed and administered to empirically test our research hypotheses. Target respondents included IT executives and business executives to ensure that a knowledgeable and competent person answers the survey questions. The survey utilized a key informant approach and was

developed following guidelines in prior research (Pavlou & El Sawy, 2006). Before sending out the survey, the questionnaire was pretested with 10 IT and business executives. Their opinions and comments were included to make minor modifications in the survey. In addition, we ask key respondents for a self-evaluation of their degree of qualification to complete the survey by including the item "How competent did you feel in answering the questions included in this questionnaire?" (1: Very low, 5: Very high) (Braojos et al., 2020). This item resulted in an average value of 3.974, which suggests that respondents were capable enough to participate in the study.

The survey was administered by a well-established market research firm in Spain. The firm collected the data via telephone calls from May to June 2019 using a database of the 5000 most important firms in Spain in terms of revenues. These kinds of databases have been used in prior research (Benitez & Walczuch, 2012; Benitez et al., 2018b; 2020a). Before collecting the data, we checked the minimum sample size required by performing a statistical power analysis. Assuming an anticipated medium effect size, a statistical power level of 0.800, 7 predictors (i.e., number of links received to job performance in the mediation analysis), and a 0.5% alpha level, the minimum sample size required should be 102 to detect the potential effects of interest (Cohen, 1988). A total of 942 firms were randomly contacted. Finally, valid and complete data were obtained from a total of 134 firms. Thus, a sample of 134 firms is enough to test the proposed research model according to the statistical power analysis. The firms in the sample come from 12 different industries, averaged 136.655 million Euros revenues in 2017, and had 728 employees on average. Non-response bias was assessed

by verifying that early and late respondents did not differ significantly in their answers. We considered as early respondents any of the 134 firms that responded to any part of the questionnaire in the first three weeks. All possible t-test comparisons between the means of the two groups of respondents showed non-significant differences.

4.4.2. Measures

The survey was designed by adapting validated scales from prior literature whenever possible. Constructs can be operationalized as emergent variables or composite constructs (i.e., composite models) or latent variables (i.e., factor model) (Benitez et al., 2020b). Digital innovation initiatives, employee engagement, and job performance were specified as composite constructs. Job satisfaction and turnover intention were specified as reflective latent variables. Composite constructs, also called artifacts or emergent variables, are understood as theoretically justified and human-made constructions that serve as a proxy for the concept under investigation (Benitez et al., 2020b; Castillo et al., 2021a; Joshi et al., 2021) Therefore, composites represent "*emergent, strong, complex, and firm-made concepts*" (Braojos et al., 2020, p. 6) where the indicators are combined to form a new entity (Henseler et al., 2016). On the other hand, the reflective measurement model (i.e., common factor model) usually represents behavioral concepts such as attitudes or personality traits (Benitez et al., 2020b). We modeled job satisfaction and turnover intention as reflective latent variables because the construct (i.e., latent variable) causes the indicators (Dijkstra & Henseler, 2015) and because prior management and IS

research have traditionally modeled both constructs as reflective (Thatcher et al., 2002). Therefore, the research model proposes a combination of both reflective and composite variables. Table 4.2 presents the survey items used to measure each construct employed in the study.

4.4.2.1. Digital innovation initiatives

Prior IS research (Sebastian et al., 2017) has referred to the portfolio of powerful and readily accessible digital technologies used by companies to support business activities as SMACIT (i.e., social, mobile, analytics, cloud, and IoT). Consistent with this work, we operationalize digital innovation initiatives as a first-order composite construct determined by the five digital technologies that the acronym includes, plus artificial intelligence to cover the entire set of powerful digital technologies. Therefore, this variable assesses the extent to which these six digital technologies are innovatively used in the company to support business activities from 1: low use, to 5: high use (Fitzgerald et al., 2013; Sebastian et al., 2017).

4.4.2.2. Job satisfaction

Job satisfaction was specified as a reflective construct and measured with four items adapting the scales of Grandey (2003), and Chen et al. (2011). This variable is measured through a five-point Likert scale, from 1: Strongly disagree to 5: Strongly agree.

4.4.2.3. Employee engagement

Employee engagement is a first-order composite construct composed of six indicators that are measured using a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). The six indicators represent the three aspects of engagement (i.e., physical engagement, emotional engagement, and cognitive engagement) (Khan, 1990). We adapted the previously validated scales of Rich et al. (2010).

4.4.2.4. Turnover intention

Turnover intention was operationalized as a reflective construct and measured with four items adapting the scales of Coyne and Ong (2007), and Chen et al. (2011). This variable is measured through a five-point Likert scale, from 1: Strongly disagree to 5: Strongly agree. The measurement of this variable is consistent with common practice in the HR and Management field (Abbas et al., 2012).

4.4.2.5. Job performance

Job performance is the dependent variable of the proposed model. Job performance is operationalized as a first-order composite composed of six items adapted from Welbourne et al. (1998) and Janssen and Van Yperen (2004). This measure evaluates the average employee performance relative to the key competitors on a scale from 1 (significantly worse) to 5 (significantly better).

4.4.2.6. Control variables on digital innovation initiatives

Digital innovation initiatives are controlled by three IT artifacts: IT infrastructure, enterprise resource planning (ERP) system, and customer relationship management (CRM) system. To keep operating in the digital era, a firm needs to have in place what is termed an "operational backbone" (Winkler & Kettunen, 2018). An operational backbone has been presented as one essential element to executing a digital strategy that consists of "*technological capabilities such as enterprise systems, which in turn enable business capabilities through processes implemented in, and supported by, these systems*" (Winker & Kettunen, 2018, p. 1). Furthermore, prior research has acknowledged that "*digital innovation requires a firm to revisit its organizing logic and its use of corporate IT infrastructure*" (Yoo et al., 2010, p. 725). Therefore, IT infrastructure, ERP, and CRM systems were chosen as key elements to enable the development and execution of digital innovation initiatives. These technologies enable business processes to be standardized and consistently used across the company (Ross et al., 2017). We recognize that digital innovation initiatives will depend on how well the company can ensure efficient, reliable, scalable, and predictable processes. We follow prior IS research on digital strategy to argue that a company that lacks an operational backbone will not be able to deliver reliable operations and thus will not be able to compete digitally (Ross et al., 2017; Sebastian et al., 2017). These three variables are measured using a single-item variable regarding the use and deployment of the firm's IT infrastructure, ERP system, and CRM system respectively to support business activities, using a scale from 1 (low use) to 5 (high use).

4.4.2.7. Control variables on job satisfaction and turnover intention

Job satisfaction and turnover intention are controlled by three key internal motivational conditions: employee-firm values alignment, job autonomy, and task variety. We expect individuals aligned with their work environment to be more satisfied than individuals who do not have this kind of fit (Downey et al., 1975) and therefore, have less intention to quit the firm. Job autonomy refers to the freedom and discretion regarding how the work is done. We expect a positive relationship between job autonomy and job satisfaction and a negative relationship between job autonomy and turnover intention (Hytti et al., 2013). Finally, task variety is concerned with the degree to which the task requires a wide range of skills, abilities, or activities. We expect a positive relationship between task variety and job satisfaction and a negative relationship between task variety and turnover intention (Morris & Venkatesh, 2010). The three variables are measured using a scale from 1 (very low) to 5 (very high) by including a single-item question per variable in the questionnaire about the degree of alignment between employees' values and organizational values, degree of job autonomy, and task variety.

4.4.2.8. Control variables on job performance

We expect to find differences in job performance due to the firm industry, the employee workload, and the degree of employee work experience in the firm (Chung et al., 2014). By including these control variables, we also verify whether the impact of digital innovation initiatives, job satisfaction, employee engagement, and turnover intention on job performance is kept

after including them. Firm industry was measured using archival data from Actualidad Economica database and converted to a dichotomic variable (0: Manufacturing, 1: Services). Employee work overload was measured by including a single-item question in the questionnaire, evaluating from 1 (very low) to 5 (very high) the average employee work overload. Finally, employee work experience in the firm was measured using a single-item question from 1 (very low working experience) to 5 (very high working experience).

4.4.3. Prevention and test of common method bias

Given that all of our constructs share a measurement method (survey instrument of one key informant), prevention and test of common method bias are needed. Minimizing the effects of common method variance can start from the study design and data collection. First, we allowed the respondents' answers to be anonymous and confidential, insisting that there were no right or wrong answers. Besides, questions were not tagged (Podsakoff et al., 2003). Second, we examined the correlation matrix to check if there was any high correlation among key variables (Bagozzi et al., 1991). The highest correlation is 0.682. Third, following Ronkko and Ylitalo (2011), we perform a PLS market variable approach. To do that, we chose a marker variable, that is, a variable that does not correlate with the study variables apart from the correlation caused by common method variance. The following market variable was chosen: Compared to the last three years, how much do you watch TV? We expect that this variable minimally correlates with the indicators of the study variables. We check the mean correlation between the marker variable item and the study items as the

primary test for method variance. The mean correlation is -0.024, which is close to zero. That means that the common method variance is most probably not an issue with the data (Ronkko & Ylitalo, 2011). Then, we built a marker variable model where the market variable is included in the original model as an exogenous variable predicting each endogenous construct. We compared the original research model with the marker variable model to check that there was no significant difference in the hypothesized relationships. As the beta coefficients were still significant and there was no big difference between both models, we can conclude that common method bias is not a problem in our data.

4.5. Empirical analysis and results

Two families of structural equation modeling (SEM) techniques prevail, covariance-based SEM and variance-based SEM (Chin, 1998). Among variance-based SEM techniques, partial least squares (PLS) has been regarded as the "*most fully developed and general system*" (McDonald, 1996, p. 240). We used PLS-path modeling (PLS-PM) to empirically test the research model. PLS is a suitable method as it can test for exact overall model fit in both confirmatory and explanatory research (Rueda et al., 2017; Benitez et al., 2020b) and is able to generate optimal estimations for composite and common factors models as in the proposed research model (Henseler et al., 2014; Benitez et al., 2020b). We used the Advanced Analysis for Composites (ADANCO) 2 Professional (http://www.composite-modeling.com/) to estimate the measurement and structural models (Henseler & Dijkstra, 2015). To obtain the level of significance of weights and loadings of each

indicator of the measurement model and the level of significance of path coefficients of the structural model, we perform bootstrapping procedure with 5,000 subsamples (Benitez et al., 2020b).

4.5.1. Confirmatory composite and factor analysis

We assess the overall fit of the saturated model, that is, "*the model in which all constructs are allowed to be freely correlated, whereas the concept's operationalization is exactly as specified by the analyst*" (Benitez et al., 2020b, p. 8). Weighting schemes of correlation weights (mode A) were used to estimate composite constructs and PLS consistent (PLSc) was used to estimate reflective constructs (Dijkstra & Henseler, 2015). A confirmatory composite and factor analysis is needed to confirm that the measures' structure is correct, comparing the empirical correlation matrix and the model-implied correlation matrix (Henseler et al., 2014). Therefore, a confirmatory composite and factor analysis is a confirmatory approach to confirm or disconfirm a researcher's theory. To assess the discrepancy between both matrices, three well-accepted measures are considered: the standardized root mean squares residual (SRMR), unweighted least squares (ULS) discrepancy, and geodesic discrepancy (d_G) (Benitez et al., 2020b). The measures' structure will be only supported and confirmed when the value of the discrepancies is lower than the 95% (or 99%) quantile of the bootstrap discrepancies (Castillo et al., 2021a) as shown in Table 4.1.

Table 4.1: Confirmatory composite and factor analysis

Discrepancy	First-order level		
	Value	HI95	Conclusion
SRMR	0.060	0.067	Supported
d_{ULS}	1.257	1.556	Supported
d_G	0.559	0.833	Supported

4.5.2. Measurement model evaluation

On the one hand, digital innovation initiatives, employee engagement, and job performance were specified as composite constructs. Therefore, multicollinearity, weights, loadings, and its level of significance were assessed (Cenfetelli & Bassellier, 2009). Although multicollinearity is not a problem for constructs estimated in mode A, we report the variance inflation factor (VIF) in Table 4.2, where none of the values exceed the most conservative threshold of 3.3 (Diamantopoulos & Siguaw, 2006). All indicators of the proposed model have significant weights and loadings. On the other hand, job satisfaction and turnover intention were specified as reflective (latent) variables. For reflective measurement models, composite reliability, convergent validity, indicator reliability, and discriminant validity should be assessed (Benitez et al., 2020b). First, composite reliability (the correlation that exists between the latent variable and the construct scores) is evaluated using Dijkstra-Henseler ρA, where a value larger than

0.707 is reasonable (Benitez et al., 2020b). Convergent validity is assessed by checking that the average variance extracted (AVE) is higher than 0.5 (Fornell & Cha, 1994). Indicator reliability is assessed through the factor loadings and their level of significance. Finally, discriminant validity should be assessed to ensure that two latent variables are statistically sufficiently different. HTMT (Henseler et al., 2015) is considered to obtain empirical evidence for discriminant validity. The HTMT of the two latent variables of our research model is 0.663, lower than the stricter threshold of 0.85.

Table 4.2: Evaluation of measurement model

Construct/indicator Except where otherwise indicated below, the possible range for measures was from 1 to 5 (1: Strongly disagree, 5: Strongly agree)							
	Mean	**SD**	**p_A**	**AVE**	**VIF**	**Weight**	**Loading**
Digital innovation initiatives: Extent to which these digital technologies are innovatively used in your company to support business activities (1: Low, 5: High) (composite, mode A)							
	3.020	1.318					
Social media	3.000	1.308			1.489	0.304***	0.712***
Mobile applications	3.075	1.380			1.780	0.257***	0.786***
Analytics	3.603	1.175			1.381	0.207***	0.645***
Cloud computing	2.920	1.323			1.459	0.255***	0.695***
Internet of things	3.308	1.448			1.384	0.200**	0.606***
Artificial intelligence	2.213	1.276			1.363	0.236***	0.633***
Job satisfaction (reflective, mode A consistent)							
	4.058	0.621	0.849	0.580			
Overall, our employees are satisfied with their job	4.007	0.619				0.285***	0.717***

Overall, our employees like working here	4.187	0.615				0.323***	0.813***
Our employees are satisfied with the kind of work they do	3.948	0.617				0.291***	0.733***
Overall, our employees are satisfied working in our firm	4.090	0.631				0.309***	0.779***
Employee engagement (composite, mode A)							
	4.013	0.678					
Our employees work with intensity in the job	4.299	0.683			2.338	0.186***	0.767***
Our employees try their hardest to perform well in the job	4.358	0.606			2.614	0.220***	0.806***
Our employees are enthusiastic in their job	3.604	0.756			1.720	0.234***	0.760***
Our employees are interested in their job	4.104	0.616			2.578	0.248***	0.862***
Our employees are curious in their job	3.799	0.744			1.780	0.208***	0.737***
Our employees are very concentrated on their job	3.917	0.666			1.580	0.191***	0.705***
Turnover intention (reflective, mode A consistent)							
	2.084	0.775	0.890	0.609			
Our employees are planning to search for a new job	2.038	0.735				0.271***	0.957***

Our employees think about leaving the job	1.932	0.712				0.328***	0.848***
It is likely that our employees leave the job when they have the opportunity	2.466	1.900				0.209**	0.540***
Our employees are making an effort to find a new job	1.900	0.786				0.276***	0.713***
Job performance (1: Significantly worse than competitors, 5: Significantly better) (composite, mode A)							
	3.900	0.784					
Our employees fulfill responsibilities specified in job description	4.122	0.703			2.444	0.263***	0.855***
Our employees meet all the formal performance requirements of the job	4.203	0.711			1.802	0.249***	0.781***
The quantity of employee work output is above average	3.823	0.909			2.313	0.192***	0.790***
The quality of employee work output is above average	3.974	0.763			2.257	0.204***	0.798***
Our employees come up with new ideas	3.641	0.905			1.582	0.224***	0.707***
Our employees reach personal career goals	3.635	0.717			1.586	0.160**	0.668***

Control variables on digital innovation initiatives							
Firm's IT infrastructure (1: Low use, 5: High use)	3.600	1.205					
Enterprise resource planning system (1: Low use, 5: High use)	3.476	1.064					
Customer relationship management system (1: Low use, 5: High use)	3.740	1.113					
Control variables on job satisfaction							
Employee and firm values alignment (1: Very low, 5: Very high)	3.893	0.750					
Degree of job autonomy (1: Very low, 5: Very high)	3.908	0.731					
Degree of task variety (1: Very low, 5: Very high)	3.917	0.731					
Control variables on job performance							
Industry (0: Manufacturing, 1: Service)	0.659	0.476					
Employee work overload (1: Very low, 5: Very high)	3.878	0.668					
Degree of employee work experience (1: Very low, 5: Very high)	4.030	0.636					

4.5.3. Structural model evaluation

4.5.3.1. Overall model fit evaluation of the estimated model

In a similar way to the confirmatory composite and factor analysis, we assess the overall goodness of model fit of the estimated model (Dijkstra & Henseler, 2015). To check the discrepancy between the empirical correlation matrix and the estimated model-implied correlation matrix, the same three well-accepted measures of the discrepancy were regarded. Overall, our proposed research model should not be rejected based on the alpha level of 0.01 given that all the discrepancies are below the 99% quantile of the bootstrap discrepancies (Benitez et al., 2020b; Castillo et al., 2021a).

4.5.3.2. Test of hypothesis

We proceed with the test of hypothesis by performing a PLS estimation, where beta coefficients, their significance, R^2 values, and effect size (f^2) were evaluated. We propose two models that are presented in Table 4.3. First, we propose a baseline model where we test the hypothesized relationship and the control variables. Results show that digital innovation initiatives is positively related to job satisfaction (β=0.195, $p_{\text{one-tailed}}$ <0.01), finding support for H1. We also found support for H2, H3, and H4. However, we didn't find support for the relationship between turnover intention and job performance (H5). Figure 4.2. shows the results of the test of hypothesis. Second, we propose a mediation model where we include two new links: the relationship between digital innovation initiatives and job performance, and between job satisfaction and job performance. Results from this mediation

model are similar to the ones obtained from the baseline model. Most of the control variables show a significant relationship with digital innovation initiatives, job satisfaction, turnover intention, and job performance in both models. R^2 values range from 0.269 to 0.498 in the baseline model and mediation model. The f^2 values for the hypothesized relationships range from 0.001 to 0.871 in the baseline model, which indicate from very weak to large effect sizes between the exogenous and endogenous variables of the model (Benitez et al., 2020b).

Table 4.3: Results of structural model evaluation

Beta coefficient	Baseline model	Mediation model
Digital innovation initiatives → Job satisfaction (H1)	0.195** (2.782) [0.055, 0.331]	0.488*** (6.405) (0.000) [0.359, 0.614]
Job satisfaction → Employee engagement (H2)	0.682*** (9.627) [0.528, 0.801]	0.682*** (9.628) [0.529, 0.801]
Job satisfaction → Turnover intention (H3)	-0.620*** (-4.279) [-0.915, -0.341]	-0.620*** (-4.281) [-0.915, -0.341]
Employee engagement → Job performance (H4)	0.291** (2.659) [0.069, 0.505]	0.292** (2.703) [0.074, 0.505]
Turnover intention → Job performance (H5)	0.027 (0.263) [-0.188, 0.222]	0.028 (0.278) [-0.181, 0.218]
Digital innovation initiatives → Job performance		0.200** (2.620) [0.056, 0.356]

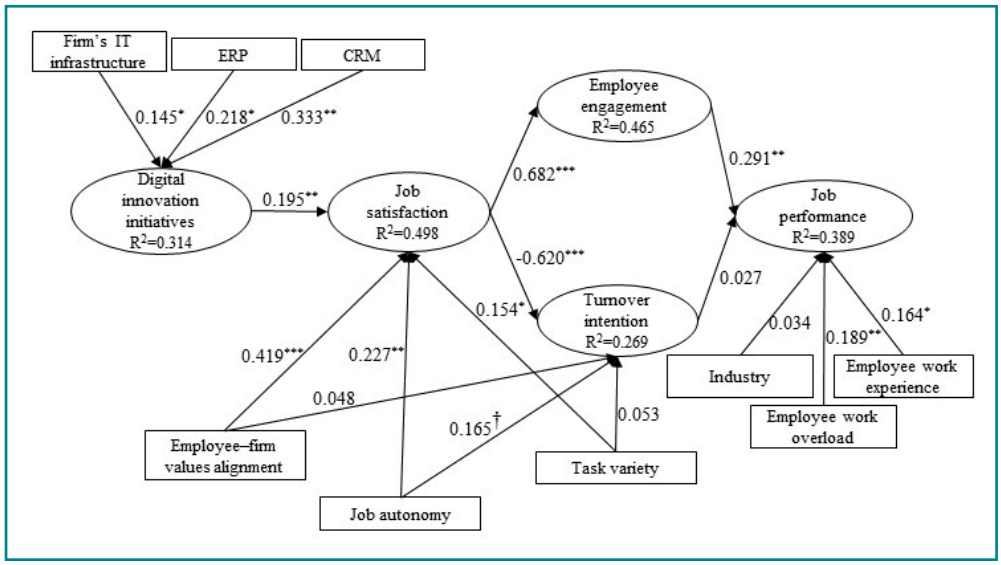
Job satisfaction → Job performance		0.169 (1.154) [-0.119, 0.463]
Firm's IT infrastructure → Digital innovation initiatives (CV)	0.145* (1.875) [-0.003, 0.299]	0.142* (1.845) [-0.005, 0.295]
Enterprise resource planning system → Digital innovation initiatives (CV)	0.218* (1.878) [-0.017, 0.438]	0.219* (1.885) [-0.016, 0.437]
Customer relationship management system → Digital innovation initiatives (CV)	0.333** (2.939) [0.109, 0.553]	0.333** (2.948) [0.110, 0.554]
Employee and firm values alignment → Job satisfaction (CV)	0.419*** (5.625) [0.262, 0.557]	0.419*** (5.613) [0.261, 0.556]
Job autonomy → Job satisfaction (CV)	0.227** (2.852) [0.069, 0.378]	0.226** (2.847) [0.068, 0.378]
Task variety → Job satisfaction (CV)	0.154* (1.789) [-0.011, 0.322]	0.154* (1.797) [-0.009, 0.324]
Employee and firm values alignment → Turnover intention (CV)	0.048 (0.454) [-0.159, 0.264]	0.048 (0.454) [-0.159, 0.264]
Job autonomy → Turnover intention (CV)	0.165† (1.639) [-0.039, 0.361]	0.165† (1.639) [-0.039, 0.361]
Task variety → Turnover intention (CV)	0.053 (0.470) [-0.162, 0.289]	0.053 (0.470) [-0.162, 0.290]
Industry → Job performance (CV)	0.034 (0.513) [-0.092, 0.169]	0.006 (0.096) [-0.119, 0.142]

Employee work overload → Job performance (CV)	0.189** (2.587) [0.043, 0.326]		0.168* (2.320) [0.023, 0.302]	
Employee work experience → Job performance (CV)	0.164* (1.825) [-0.016, 0.336]		0.184* (2.058) [0.005, 0.360]	
R^2	**R^2**	**Adjusted R^2**	**R^2**	**Adjusted R^2**
Digital innovation initiatives	0.314	0.298	0.312	0.296
Job satisfaction	0.498	0.482	0.498	0.482
Employee engagement	0.465	0.461	0.466	0.461
Turnover intention	0.269	0.246	0.269	0.246
Job performance	0.389	0.360	0.421	0.389
Discrepancy	**Value**	**HI95**	**Value**	**HI95**
SRMR	0.080	0.080	0.073	0.078
d_{ULS}	3.991	3.991	3.379	3.870
d_G	1.101	1.681	1.091	1.668
f^2				
Digital innovation initiatives → Job satisfaction (H1)	0.067		0.067	
Job satisfaction → Employee engagement (H2)	0.871		0.871	
Job satisfaction → Turnover intention (H3)	0.282		0.282	
Employee engagement → Job performance (H4)	0.071		0.075	
Turnover intention → Job performance (H5)	0.001		0.001	

Digital innovation initiatives → Job performance		0.057
Job satisfaction → Job performance		0.018
Firm's IT infrastructure → Digital innovation initiatives	0.025	0.024
Enterprise resource planning system → Digital innovation initiatives	0.044	0.044
Customer relationship management system → Digital innovation initiatives	0.113	0.113
Employee and firm values alignment → Job satisfaction (CV)	0.285	0.285
Job autonomy → Job satisfaction (CV)	0.079	0.078
Task variety → Job satisfaction (CV)	0.036	0.036
Employee and firm values alignment → Turnover intention (CV)	0.002	0.002
Job autonomy → Turnover intention (CV)	0.027	0.027
Task variety → Turnover intention (CV)	0.003	0.003
Industry → Job performance (CV)	0.002	0.000
Employee work overload → Job performance (CV)	0.056	0.046
Employee work experience → Job performance (CV)	0.034	0.045

*Note: †p < 0.10, *p < 0.05, **p < 0.01, ***p < 0.001 (one-tailed test). CV = control variable.*

Figure 4.2: Results of the PLS estimation



*Note: †p < 0.10, *p < 0.05, **p < 0.01, ***p < 0.001 (one-tailed test).*

4.5.3.3. Mediation analysis

To check the mediating role of job satisfaction, employee engagement, and turnover intention, we perform a mediation analysis. To do that, we evaluated the indirect effects of the two new links included in the mediation model proposed in the last section (Zhao et al., 2010). The indirect effect of the relationship between digital innovation initiatives and job performance is significant (0.068, $p_{one\text{-}tailed}$<0.05). We also examined the indirect effect between job satisfaction and job performance. We found a significant indirect effect (0.182, $p_{one\text{-}tailed}$< 0.05). The support for all the hypothesized relationships is kept in this mediation model. From these results, we can conclude that job satisfaction, employee engagement, and turnover intention

act as mediators of the relationship between digital innovation initiatives and job performance.

Table 4.4: Mediation analysis

Relationship	Direct effect	Indirect effect	Total effect
Digital innovation initiatives → Job performance	0.200** (2.620) [0.055, 0.355]	0.068* (2.067) [0.012, 0.137]	0.268*** (3.934) [0.137, 0.406]
Job satisfaction → Job performance	0.169 (1.154) [-0.119, 0.463]	0.182* (1.669) [-0.028, 0.405]	0.351** (2.926) [0.106, 0.574]

*Note: †p <0.10, *p <0.05, **p <0.01, ***p <0.001 (one-tailed test).*

4.6. Discussion and conclusions

4.6.1. Summary of results

Digital innovation in current workplaces and organizations has become a norm (Hanelt et al., 2020). Digital innovation refers to the creation of/change in market offerings resulting from the use of digital technologies (Nambisan et al., 2017). A great deal of companies relies on the creation of new digital products and services to thrive and survive in today's digital economy. This has led to work settings in which employees are required to be familiar with and use digital tools (Bunjak et al., 2021). For example, the use of collaborative technology in organizations and the interest of executives in big data analytics are significantly increasing (Mikalef & Krogstie, 2020). This has also led to working environments characterized by numerous work

stressors, affecting negatively key work-related attitudes and behaviors (e.g., employee satisfaction, organizational commitment, or employee performance) (Ragu-Nathan et al., 2008). This study draws upon prior literature on the bright side of IT (Cheng et al., 2021) and digital innovation to propose digital innovation as a key driver in which digital technologies may transform and impact employee work-related outcomes.

Specifically, we propose the concept of digital innovation initiatives, understood as the combination of a portfolio of information, computing, communication, and connectivity technologies (such as cloud computing, mobile devices, social media or big data analytics) to create or change market offerings and support business activities (Bharadwaj et al., 2013; Nambisan et al., 2017). We argue that digital innovation initiatives, beyond supporting business processes and activities, can also transform the employee experience and enhance employee job performance. To assess how digital innovation initiatives affect employee job performance, we consider job satisfaction, employee engagement, and turnover intention as mediators variables. First, we expect that digital innovation initiatives enhance job satisfaction. We argue that in a firm that fosters the innovative use of a comprehensive portfolio of digital technologies, employees will tend to feel that the firm is aware of the constant environmental changes, reducing the anxiety they may feel caused by the pervasiveness of the competitive landscape (Zhou et al., 2005). Furthermore, the innovative use of digital technologies in the workplace will involve time and effort savings for workers, which will have a direct impact on their job satisfaction. Second, drawing on prior HR and Management literature, we expect that

job satisfaction improves employee engagement and reduces turnover intention, which in turn positively affect employee job performance.

To empirically test the proposed research model a sample of 134 large Spanish firms was employed. We performed a PLS estimation using ADANCO to test the hypothesized relationships. Empirical results mostly support our expectations. We found that digital innovation initiatives positively affect job satisfaction. We also found that job satisfaction enhances employee engagement and reduces turnover intention. Finally, we found that employee engagement improves job performance while turnover intention didn't show a significant effect on job performance. This could be explained because quitting intention might not be a sufficient condition to decrease the level of job performance. Besides, our findings provide empirical support for the mediating role of job satisfaction, employee engagement, and turnover intention on the relationship between digital innovation initiatives and job performance.

4.6.2. Theoretical implications for IS and innovation research

This study has the potential to contribute to IS and innovation research in three significant ways. First, the increasing complexity of digital innovation processes and outcomes leads to a new way of value creation and differentiation from the competitors (Yoo et al., 2010; Nambisan et al., 2017). This study extends prior work on digital innovation research by examining the exploratory power of digital innovation initiatives in transforming the employee experience. Extant research on digital innovation has focused on the use of digital technologies in facilitating innovation processes

(Nambisan, 2003) and the innovation opportunities digital technologies create (Yoo et al., 2010). However, little is known about how a portfolio of digital innovation initiatives may shape the employee experience in current digital workplaces. We extend prior research on digital innovation by introducing, proposing, and defining the concept of digital innovation initiatives. Digital innovation initiatives include strategic organizational activities to sense and seize opportunities and maintain competitiveness through the use of digital technologies (Teece, 2007). Digital innovation initiatives are defined as the combination of a portfolio of information, computing, communication, and connectivity technologies (such as cloud computing, mobile devices, social media or big data analytics) to create or change market offerings and support business activities (Bharadwaj et al., 2013; Nambisan et al., 2017). This contribution relates to the innovation field.

Second, in an attempt to overcome prior limitations presented by the dominant single-IS paradigm, our study and findings are in line with a growing body of research that advocates a holistic perspective regarding the use of technologies (Sebastian et al., 2017; Gerlach & Cenfetelli, 2021). IS use may be the most studied variable in the IS field (Burton-Jones et al., 2017). However, individuals in current workplaces are users of a multitude of different IS, which is something not adequately reflected in the majority of IS theories. This study contributes to overcoming the single-IS paradigm in IS research by considering interactions between multiple technologies that are relevant to the phenomenon of digital innovation (Gerlach & Cenfetelli, 2021). This is the second contribution that strongly relates to the IS field.

Third, based on prior research on the bright side of IT and its effects on work-related outcomes (Zhang et al., 2019; Wang et al., 2021), this research contributes to the IS literature by theoretically explaining and empirically demonstrating whether and how digital innovation initiatives can affect the employee job performance. Prior research about digital innovation shows some limitations. This line of research has mainly considered digital innovation as an outcome or has been limited to studying the effect of digital innovation on firm performance. Furthermore, digital innovation research has been studied from a customer perspective mainly. This study shows that digital innovation initiatives can have a positive impact and enhance the employee job performance through the pathways of job satisfaction, employee engagement, and turnover intention. Our theorization received empirical support from the empirical analysis. This is the third theoretical contribution of the current study.

4.6.3. Practical implications

Our study presents some important lessons for IT and business executives. First, managerial challenges associated with digital innovation have been of great interest for both IT and business executives now that digital innovation initiatives have become the norm in many organizations. Inevitable, digital innovation initiatives require employees to be involved, which means that employee experience is directly affected by those activities. However, employee experience has been somehow ignored in prior IS literature, which has mainly focused on firm performance and how to improve it. Nevertheless, the relationship between employee happiness and customer happiness has been shown to be quite straightforward. In

this sense, our findings show that digital innovation initiatives have the ability to transform positively the employee experience, in particular, the employee job performance, through the pathways of job satisfaction, employee engagement, and turnover intention.

First, executives can learn that the deployment of digital innovation initiatives can make employees happier at their workplaces because they would feel the firm is up-to-date with the changing business environment and won't fall behind the disruptive forces of the competitive landscape. Second, this study also shows IT and business executives that job satisfaction is finally converted into greater job performance because more satisfied employees will be more physical, emotional, and cognitively engaged. Therefore, this study provides direction on how to obtain job performance gains from the development of digital innovation initiatives.

4.6.4. Limitations and future research directions

This study is not free from limitations that may lead to future research avenues for IS research. First, the generalizability of results may be limited by the context of the study (i.e., Spain). We encourage future IS research to explore if the research model is confirmed using a sample of worldwide firms or considering another context. Second, the dependent variable of our research model (i.e., job performance) was measured using self-reported data. Although we prevent and check for common method bias, we also encourage future scholars to extend this line of research using archival data. Self-reported data may be biased by subjective perceptions of the respondent. Third, the conceptualization of digital innovation provided by

prior research includes a wide range of innovation outcomes (e.g., products, platforms, processes, and even new business models) (Nambisan et al., 2017). This study didn't take into consideration the type of digital innovation initiatives that can be found in a firm. Future IS research could examine the impact of different types of digital innovation initiatives (e.g., process, product, business model) (Yoo et al., 2010) on employee performance. Indeed, there are some studies supporting the idea that some technologies need to be cultivated depending on the type of innovation capability they are targeted towards (Mikalef & Krogstie, 2020). Forth, although that was not the focus of the current study, future research could extend the proposed research model and examine how digital innovation initiatives can create business value by improving different aspects of the firm performance (i.e., innovation performance, operational performance, financial performance).

4.6.5. Concluding remarks

Digital innovation, understood as the use of digital technologies during the process of innovating, has become the norm in many organizations, which has led to digital work environments where employees are required to be familiar with and use a multitude of IS. This study draws upon the bright side of technology and digital innovation literature to propose that digital innovation initiatives can transform the employee experience by improving job satisfaction, the employee engagement, reducing turnover intention, and, finally, generating more gains in job performance. Empirical results support our theory, extending research on the innovation field and the IS discipline.

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4.8. Appendix

Table A1: Correlation matrix

Construct	1	2	3	4	5	6	7
1. Digital innovation initiatives	1.000						
2. Job satisfaction	0.372	1.000					
3. Employee engagement	0.251	0.682	1.000				
4. Turnover intention	-0.165	-0.489	-0.226	1.000			
5. Job performance	0.360	0.524	0.520	-0.222	1.000		
6. Firm's IT infrastructure	0.334	0.117	0.095	-0.058	0.186	1.000	
7. ERP	0.461	0.235	0.259	-0.156	0.354	0.422	1.000
8. CRM	0.494	0.091	0.147	-0.207	0.335	0.291	0.545
9. Alignment employee-firm values	0.216	0.595	0.375	-0.242	0.495	0.016	0.220
10. Task variety	0.306	0.437	0.207	-0.136	0.205	0.002	0.185
11. Job autonomy	0.174	0.481	0.305	-0.093	0.336	-0.014	0.154
12. Industry	0.186	0.130	0.134	-0.074	0.104	0.000	0.106
13. Employee work experience	0.070	0.402	0.310	-0.357	0.375	-0.023	0.143
14. Employee work overload	0.123	0.120	0.062	-0.011	0.263	0.004	0.064
	8	**9**	**10**	**11**	**12**	**13**	**14**
8. CRM	1.000						
9. Alignment employee-firm values	0.130	1.000					
10. Task variety	0.062	0.313	1.000				
11. Job autonomy	0.157	0.376	0.407	1.000			
12. Industry	0.288	-0.067	-0.065	0.108	1.000		
13. Employee work experience	0.143	0.309	0.231	0.266	0.009	1.000	
14. Employee work overload	0.122	-0.028	0.229	0.325	-0.005	0.165	1.000

5 CONCLUSIONES E IMPLICACIONES

5. Conclusiones e implicaciones

Introducción

En un webinar realizado en plena pandemia en abril de 2020, titulado "T*he digital challenge: How to transform your business in the midst of a crisis*", la doctora Jeanne Ross, científica investigadora principal del MIT Sloan School of Management y MIT Center for Information System Research y mujer referente en la investigación del campo de Sistemas de Información, apuntó que las tecnologías digitales han permitido aportar transparencia con respecto a lo que funciona y no funciona dentro de las organizaciones. Durante el webinar, la doctora Ross señaló que la pandemia no había hecho más que acelerar la existencia de "perdedores y ganadores" en la economía digital y que abordar las oportunidades y también los desafíos de estas tecnologías era más importante que nunca. En este sentido, mencionó que la tecnología ha pasado de ser un mero facilitador de ciertas actividades empresariales a ser una fuente de inspiración para la estrategia de negocio de la empresa, de modo que la estrategia digital se ha convertido en la hoja de ruta, no solo del departamento de TI, sino de todos los departamentos de la empresa. Esta tesis doctoral toma conciencia de las investigaciones realizadas por la doctora Ross en la disciplina de Sistemas de Información y de la siguiente reflexión: "*There are good times to be a researcher and challenging times to be a business leader*".

Siguiendo tal reflexión y con las preguntas de investigación planteadas en la presente tesis doctoral, se intenta poner de manifiesto el rol transformador de la tecnología en las organizaciones actuales y la necesidad de desarrollar capacidades tecnológicas e inversión en tecnología, aspectos liderados principalmente por la figura del CIO. Al dar respuesta a las preguntas planteadas en esta tesis doctoral, se exponen tanto las contribuciones teóricas y empíricas al campo, como las implicaciones directivas del trabajo de investigación, sus limitaciones, y las futuras líneas de investigación. Por último, el trabajo de investigación termina con unas breves consideraciones finales.

5.1. Conclusiones

La tecnología se ha convertido en un activo estratégico. Analizar el valor de las inversiones en tecnología y el potencial del portafolio de recursos y capacidades tecnológicas de la empresa para alcanzar una ventaja competitiva son aspectos críticos en el actual escenario competitivo en el que las organizaciones operan. La literatura previa sobre valor de negocio de la TI ha reconocido y demostrado que las empresas no obtienen unas ganancias de forma directa a través de la inversión en tecnología, sino que es necesario el desarrollo de otros mecanismos subyacentes que bien faciliten o interactúen en la generación de ese valor de negocio (Benitez y Walczuch, 2012; Braojos et al., 2019). La sociedad y el tejido empresarial actual han puesto de manifiesto la importancia de la tecnología para la supervivencia en los escenarios competitivos actuales. Esto ha hecho que la creación de valor de negocio mediante el uso y la inversión en tecnología se convierta en una de las líneas de investigación de mayor interés para académicos y la

práctica empresarial. A pesar de la considerable contribución por parte de diversos autores sobre el impacto positivo de la tecnología en el desempeño de la empresa, aún existen oportunidades para contribuir al campo en un entorno tan competitivo, dinámico, y digital (Mithas et al., 2012; Mithas y Rust, 2016). La presente tesis doctoral se basa en los fundamentos teóricos de la literatura sobre el valor de negocio de la TI y presenta tres artículos sobre cómo la tecnología es capaz de crear valor desde tres perspectivas distintas e inexploradas. Algunas de las preguntas de investigación a las que esta investigación pretende dar respuesta son: ¿Cuál es el rol amplificador de la capacidad de medios sociales en la relación entre actividades de responsabilidad social corporativa y reputación como empleador?, ¿cómo la capacidad de integración de la TI puede ayudar a mejorar el desempeño de la empresa a través de la gestión del conocimiento?, ¿cómo una serie de iniciativas de innovación digital puede transformar la experiencia del empleado? Cada uno de los tres artículos que componen esta tesis doctoral dan respuesta a cada una de las preguntas de investigación expuestas respectivamente. A continuación, se detallan las conclusiones principales de cada uno de los estudios de investigación que incluye esta tesis doctoral. En términos generales, podemos concluir que la relación entre tecnología y creación de valor no se genera de una forma directa, sino más bien es una relación compleja que requiere la consideración de otros mecanismos que permitan la realización de ese valor de negocio.

En primer lugar, la presente tesis doctoral explica teóricamente y examina empíricamente cómo la capacidad de medios sociales modera la relación entre actividades de responsabilidad social corporativa y el atractivo de la

empresa como empleador. En definitiva, ¿cómo los medios sociales afectan a la relación entre las actividades de responsabilidad social corporativa y la reputación de empleador de la empresa? Estudios previos han demostrado que los medios sociales pueden llegar a ser un arma de doble filo si son usados de forma errónea o ineficiente (Lyon y Montgomery, 2013). El análisis empírico de esta investigación muestra, en primer lugar, que las actividades de responsabilidad social corporativa permiten a la empresa construir una mejor reputación como empleador. En este sentido, aquellos individuos en busca de empleo percibirán de una empresa responsable en términos sociales, medioambientales y éticos, un lugar más atractivo para trabajar y lo elegirán frente a otras opciones. Por otro lado, el análisis empírico también sugiere que la habilidad de uso de medios sociales es un factor amplificador de la relación entre las actividades de responsabilidad social corporativa y la reputación como empleador. Esto se debe a la mayor visibilidad social y credibilidad de las actividades de responsabilidad social corporativa que el uso de los medios sociales permite. Además, este estudio comprueba que la misma relación no se fortalece por el gasto en publicidad tradicional. Por lo tanto, podemos concluir que aquellos canales facilitados por la tecnología, como los medios sociales, hacen que alcanzar a consumidores y a empleados potenciales sea una tarea más rápida, más económica, y más interactiva (Mithas et al., 2012).

En segundo lugar, esta tesis doctoral pone de manifiesto el rol de la tecnología en la mejora del desempeño organizativo a través de la gestión del conocimiento. En concreto, ¿cómo la capacidad de la empresa de integración de sus sistemas con los sistemas de los miembros de la cadena de suministro afecta a la absorción y desorción de conocimiento

para la creación de valor? Por un lado, esta investigación sugiere que la integración de los sistemas de TI de la empresa principal con aquellos de otras empresas miembros de su cadena de suministro permite y facilita, tanto la integración de información de la cadena de suministro, como el acceso a otro tipo de datos como los relacionados con la producción, los pedidos, los clientes o el mercado. Además, esta integración permite una mejor coordinación de las actividades de negocio entre la empresa principal y las organizaciones externas a ella. Por otro lado, la integración de esta información, el acceso a datos críticos y la coordinación de actividades, permite la adquisición, asimilación, transformación y explotación de conocimiento externo para fines comerciales. La teoría propuesta en esta investigación sugiere y muestra, además, que una vez la empresa ha absorbido suficiente conocimiento, esta puede estar interesada en transferir conocimiento secundario a otras empresas con distintos fines. Por último, el modelo de investigación sugiere que la capacidad de absorción y desorción de conocimiento mejorará el desempeño organizativo de la empresa. El análisis empírico desarrollado en esta investigación apoya el modelo propuesto, concluyendo que la capacidad de integración de la TI ayuda a mejorar el desempeño de la empresa a través de dos prácticas de transferencia del conocimiento claves: la capacidad de absorción y desorción de conocimiento.

Por último, esta tesis doctoral muestra que las iniciativas de innovación digital mejoran el desempeño de los empleados. El campo de Sistemas de Información, y en concreto, la literatura sobre creación de valor de negocio mediante la inversión en TI, ha estado muy ligada a la literatura sobre

innovación (Jha y Bose, 2016). Tal es la relación entre innovación y tecnología, que recientemente ha surgido el fenómeno de la innovación digital. El último trabajo de investigación de esta tesis doctoral pone de manifiesto tres aspectos importantes a los que se pretende contribuir y dar respuesta. En primer lugar, este trabajo intenta alejarse del paradigma actual dentro del campo que considera el uso de tecnologías de manera aislada. En este sentido, este trabajo sugiere que existen una serie de iniciativas de innovación digital representadas por un amplio portafolio de tecnologías digitales (medios sociales, tecnología móvil, computación en la nube, analítica de datos, internet de las cosas e inteligencia artificial). Estas seis tecnologías han sido consideradas como las principales tecnologías a las que las empresas tienen acceso y son capaces de integrar y adoptar en sus procesos internos (Sebastian et al., 2017). En segundo lugar, este trabajo sugiere que el fenómeno de la innovación digital se produce inevitablemente en el seno de la empresa, transformando el lugar de trabajo en un lugar de trabajo digital (Dery et al., 2017). La creación de lugares de trabajo digitales tiene un impacto directo en la experiencia del empleado y en su desempeño (van Heck et al., 2012). Por último, la literatura previa sobre innovación digital ha ignorado el impacto de este fenómeno sobre variables de empleado. En concreto, este último trabajo propone que existen una serie de iniciativas de innovación digital que influyen en el desempeño del empleado mediante el impacto en la satisfacción en el trabajo, el *engagement* del empleado y su intención de abandonar la empresa. Finalmente, el análisis empírico concluye que las iniciativas de innovación digital hacen que el empleado esté más satisfecho con su trabajo y, consecuentemente, más comprometido y con menos intención de dejar la empresa. La mejora de estas variables trae consigo un mejor desempeño del empleado en su trabajo.

5.2. Implicaciones del trabajo de investigación para el ámbito académico

Esta tesis doctoral contribuye de forma significativa y novedosa al campo sobre la que se construye, el campo de Sistemas de Información. En particular, este trabajo se encuadra dentro de la literatura sobre el valor de negocio de las tecnologías de la información. Esta línea de investigación defiende la existencia de una relación positiva e indirecta entre los recursos y capacidades de TI y el desempeño de la empresa (Pavlou y El Sawy, 2006; Joshi et al., 2022), pero también de una relación de interacción o complementariedad entre recursos de TI y recursos de negocio (Ennen y Richter, 2010). Esta investigación doctoral se ha construido siguiendo los fundamentos teóricos de ambas corrientes de pensamiento para proponer tres situaciones inexploradas en las que la tecnología es capaz de crear valor. Los resultados de este estudio son consistentes con ambas corrientes de investigación y sus postulados teóricos.

Además, esta investigación no solo contribuye al campo de Sistemas de Información, sino a otras corrientes de literatura tales como la ética, la gestión del conocimiento, o la innovación digital. En los siguientes epígrafes se concreta de forma más detallada cuáles son las contribuciones teóricas y empíricas de esta tesis doctoral.

5.2.1. Contribuciones teóricas

Esta tesis doctoral contribuye de forma significativa a la disciplina de Sistemas de Información y en concreto a la línea de investigación sobre la creación de valor de negocio de la tecnología, entre otras. Por tanto, este trabajo proporciona

nuevos argumentos teóricos que explican cómo los recursos y capacidades tecnológicas mejoran aspectos claves de la empresa. En primer lugar, se teoriza y se pone de manifiesto el rol moderador de la capacidad de medios sociales, entendida como una capacidad de TI. La investigación previa sobre el uso de medios sociales para lograr objetivos de negocio, más allá de objetivos puramente de marketing, se encuentra en un momento de expansión que ofrece diversas oportunidades de contribuir a la línea de investigación (Song et al., 2019; Lin et al., 2021). En este sentido, pocos son los estudios que han considerado la capacidad de medios sociales como una variable moderadora que es capaz de crear valor en interacción con otros recursos de TI o de negocio (Braojos et al., 2019). Este estudio explica teóricamente que la capacidad de uso de medios sociales es capaz de generar valor de negocio amplificando el efecto positivo de las actividades de responsabilidad social corporativa en el atractivo de la empresa como empleador. El argumento teórico se centra en que los medios sociales se presentan como una plataforma digital más visible, fiable, interactiva, y con un amplio alcance que permite un impacto más significativo de las actividades de responsabilidad social corporativa en el atractivo de la empresa desde el punto de vista del que emplea.

En segundo lugar, esta tesis doctoral, y en concreto, el primer artículo de investigación, supone a su vez la extensión y contribución a varias teorías organizativas. Por un lado, y de una forma directa, esta investigación doctoral amplia la teoría de la complementariedad de recursos y capacidades en la disciplina de Sistemas de Información, considerando la complementariedad entre la capacidad de medios sociales y las actividades de responsabilidad social corporativa como aspecto clave para la mejora de

la reputación como empleador (Ennen y Richter, 2010). De esta forma, se propone que la capacidad de medios sociales interactúa con las actividades de responsabilidad social corporativa de la empresa de una forma positiva. Por otro lado, el primer artículo de investigación también contribuye al desarrollo de otras dos teorías organizativas: la teoría de señales (*signaling theory*) y la teoría sobre identidad social (*social identitiy theory*). Este artículo de investigación contribuye al desarrollo de ambas teorías incluyendo la capacidad de uso de medios sociales como una habilidad que es capaz de ampliar las señales que la empresa manda al entorno y, a su vez, crear una señales más creíbles y fidedignas que permitan a futuros empleados evaluar la posible afiliación con la organización.

En tercer lugar, esta tesis introduce, conceptualiza, y operacionaliza la variable capacidad de desorción de conocimiento (*knowledge desorptive capacity*), una práctica de gestión del conocimiento crítica en los entornos de innovación abierta (Roldan et al., 2018). Esta variable se entiende como la habilidad de la empresa para identificar y transferir su conocimiento a agentes externos (Lichtenthaler y Lichtenthaler, 2010). Mientras que el grueso de la investigación sobre tecnología y transferencia de conocimiento se ha centrado en la capacidad de absorción de conocimiento, la capacidad de la empresa de transferir conocimiento a agentes externos ha sido relativamente ignorada desde un punto de vista teórico y empírico. Aunque este concepto ha sido presentado de forma conceptual en algunos estudios, no había sido desarrollado en términos teóricos de una forma adecuada. En concreto, se propone que las empresas estarán interesadas en transferir conocimiento secundario o superficial, y no conocimiento clave, para llevar a cabo el fenómeno acuñado como *coopetition*, es decir, la colaboración con los competidores.

En cuarto lugar, existen implicaciones teóricas con respecto a la perspectiva de las capacidades organizativas facilitadas por la TI (Benitez y Walczuch, 2012). Esta perspectiva se ve ampliada tras la propuesta teórica que presenta el segundo artículo de investigación de la tesis doctoral, donde se sugiere que la capacidad de integración de la TI de la empresa mejorará el desempeño organizativo de la misma a través de la absorción y desorción de conocimiento. En este sentido, se proponen la absorción y desorción de conocimiento como dos variables intermedias claves a través de las cuales la tecnología crea valor de negocio.

Por último, entender el uso de los sistemas de información ha sido uno de los principales problemas de investigación para los académicos del campo (Bayerl et al., 2016; Kim et al., 2016). De hecho, el uso de los sistemas (*IS use*) podría ser el constructo más estudiado dentro de la disciplina de Sistemas de Información (Gerlach y Cenfetelli, 2021). Esta tesis doctoral, con su último artículo de investigación, contribuye de forma teórica al actual paradigma que considera el uso de la tecnología de forma individual y aislada, proponiendo un constructo denominado *digital innovation initiatives*. En este sentido, se propone un constructo contextualizado en un entorno de innovación digital, en el que se tienen en cuenta seis tecnologías presentes en los actuales lugares de trabajo digitales (medios sociales, tecnología móvil, analítica de datos, computación en la nube, internet de las cosas, e inteligencia artificial). Este portafolio de tecnologías ha sido denominado como SMACIT, un acrónimo que incluye cinco tecnologías clave (*social, mobile, analytics, cloud, internet of things*) (Sebastian et al., 2017). La presente investigación incluye la inteligencia artifical como tecnología

emergente y clave en los lugares de trabajo digitales (Trocin et al., 2021). Además, este artículo de investigación contribuye a la literatura sobre innovación digital y su impacto en las principales variables de recursos humanos. La literatura previa sobre innovación digital ha olvidado el poder transformador de estas actividades en la experiencia del empleado, no existiendo ningún estudio que explique el posible efecto de la innovación digital en el desempeño del trabajo del empleado. Por lo tanto, la última contribución teórica amplia el actual paradigma *single-IS* del campo de Sistemas de Información y, además, contribuye y avanza en la investigación actual sobre el fenómeno de la innovación digital.

5.2.2. Contribuciones empíricas

Este trabajo de investigación también contribuye de forma significativa en términos empíricos al campo de Sistemas de Información. Las principales contribuciones empíricas de esta tesis doctoral son las siguientes.

En primer lugar, pocos han sido los estudios que han analizado el impacto de las actividades de responsabilidad social corporativa en el atractivo de la empresa como empleador (Turban y Greening, 1997; Dogl y Holtbrugge, 2014). El Capítulo 2 de esta tesis doctoral proporciona nuevas evidencias empíricas sobre la mejora de la reputación de empleador de la empresa derivado de la inversión y el desarrollo de actividades de responsabilidad social corporativa. Esta contribución empírica está directamente relacionada con la literatura sobre la Ética en los negocios.

En segundo lugar, el mismo capítulo, derivado de la falta de estudios empíricos sobre cómo la capacidad de medios sociales permite a las empresas generar valor de negocio, demuestra empíricamente que la capacidad de uso de medios sociales externos (Facebook, Twitter y blogs) genera valor de negocio mediante la amplificación del efecto positivo entre las actividades de responsabilidad social corporativa y la reputación como empleador. Es decir, se demuestra empíricamente la complementariedad existente entre la capacidad de medios sociales y las actividades de responsabilidad social corporativa. Esta demostración empírica se ha llevado a cabo usando una muestra de 100 empresas con datos secundarios de distintas bases de datos.

El conocimiento empírico sobre el impacto de capacidades de TI en el desempeño organizativo ha suscitado un creciente interés en las últimas décadas, argumentando que los mecanismos subyacentes que median esta relación no están claros. Esta investigación contribuye a esta línea de investigación demostrando empíricamente cómo las empresas mejoran su desempeño gracias a la inversión en TI a través de ciertas variables intermedias.

En este sentido, y en tercer lugar, el Capítulo 3 de la presente tesis doctoral aporta evidencias empíricas sobre cómo la capacidad de integración de la TI influye en el desempeño de la empresa a través de dos variables críticas en la transferencia de conocimiento. Este análisis empírico realizado con datos de encuesta de 151 empresas españolas sugiere que la integración entre los sistemas de la empresa principal y los sistemas de los agentes externos influye de forma indirecta en la mejora del desempeño de la empresa a través de dos variables intermedias: la absorción y desorción de conocmiento. Esta

contribución empírica contribuye a la literatura sobre la creación de valor de negocio de la TI, encontrando un efecto positivo e indirecto entre la capacidad de integración de la TI y el desempeño de la empresa. Por otro lado, el mismo capítulo desarrolla y testa empíricamente la variable capacidad de desorción de conocimiento (Roldan et al., 2018). Para ello, se ha creado una variable de segundo orden en base a la literatura previa sobre desorción de conocimiento (Lichtenthaler y Lichtenthaler, 2010). Después de la realización de un test piloto con varios investigadores del campo, los ítems de la variable fueron refinados y testados de nuevo con ejectutivos de TI y de negocio. Además, en este capítulo, la validez de la escala se confirma empíricamente, constituyendo unas de las principales contribuciones empíricas de esta tesis doctoral.

Por último, el Capítulo 4 de esta tesis doctoral contribuye a la literatura sobre innovación digital proporcionando una nueva evidencia empírica sobre el efecto positivo e indirecto de una serie de iniciativas de innovación digital sobre el desempeño en el trabajo del empleado. Este capítulo argumenta y demuestra empíricamente que esta relación se produce a través de la mejora de la satisfacción en el trabajo, del *engagement* del empleado, y de una menor intención de abandonar la empresa. Esta contribución se deriva de literatura previa que aboga que el bienestar del empleado predice un desempeño en el trabajo excepcional (Lester et al., 2022). Esta última contribución empírica supone un avance en la literatura sobre innovación digital y su impacto en los lugares de trabajo digitales, y por ende, en la experiencia del empleado (Dery et al., 2017).

5.3. Implicaciones para la práctica empresarial

Los resultados y contribuciones de esta tesis doctoral suponen implicaciones prácticas relevantes para los responsables de Sistemas de Información y los ejecutivos de negocio. Dado que las empresas invierten grandes cantidades de capital en tecnología, los responsables de TI y de negocio deben entender cómo generar valor de negocio a través de esa inversión y cuáles son los mecanismos a través de los cuales se puede generar valor. La presente tesis doctoral proporciona tres grandes implicaciones directivas que tienen la capacidad de dar respuesta a preguntas de interés para los responsables actuales en un contexto donde la tecnología es estratégica y puede ayudar a las empresas a conseguir una ventaja competitiva sostenible.

En primer lugar, esta tesis doctoral informa sobre la necesidad de gestionar adecuadamente los medios sociales, unos recursos tecnológicos de gran interés y con un gran potencial para las empresas. En este sentido, esta tesis doctoral muestra la importancia de desarrollar una capacidad de medios sociales. El uso, la presencia, y la explotación de los medios sociales externos (Facebook, Twitter y blogs) hace que las actividades desarrolladas por la empresa en términos de responsabilidad social corporativa (actividades de carácter ético, medioambiental o filantrópico) adquieran una mayor visibilidad social y credibilidad frente a agentes externos. Esta mayor visibilidad resultará en un *employer branding* más fuerte. En concreto, los responsables de TI y de negocio deben entender que los medios sociales, comparados con la publicidad tradicional, son un plataforma que permite a la empresa exponerse a posibles críticas públicas. Este aspecto es precisamente lo que genera una mayor sensación de confianza por parte de

futuros empleados y lo que hace que la empresa sea un lugar más atractivo para trabajar frente a otros.

En segundo lugar, esta investigación doctoral pone de manifiesto la importancia de desarrollar una capacidad crítica de TI en entornos de innovación abierta y colaboración con agentes externos. Dado que gran parte de la inversiones en TI se realizan al nivel de la cadena de suministro, esta tesis doctoral destaca que las empresas pueden capitalizar y justificar las inversiones que realicen para integrar sus sistemas con aquellos de los miembros de la cadena de suministro, ya que esta integración facilitará la absorción de conocimiento clave y la desorción de conocimiento secundario. Asimismo, este estudio sugiere que las empresas deben diseñar en primer lugar actividades de absorción de conocimiento clave, lo que en términos de innovación abierta se conoce como la trayectoria *outside-in*, y, en segundo lugar, diseñar actividades de transferencia de conocimiento superficial o secundario, lo que se denomina la trayectoria *inside-out*. Por lo tanto, esta investigación muestra a los responsables de TI una forma plausible de motivar y justificar las inversiones realizadas en la integración de los sistemas de empresa, ya que esta integración mejorará el desempeño de la empresa.

Por último, cabe destacar una última implicación práctica. En primer lugar, no resulta ningún secreto que el *engagement* y la satisfacción de los empleados en los lugares de trabajo actuales continúa a la baja[1]. Para los

1 https://www.gallup.com/workplace/352949/employee-engagement-holds-steady-first-half-2021.aspx

ejecutivos de negocio este dato es preocupante, ya que tener una fuerza laboral comprometida y feliz no había sido nunca tan importante como ahora. Diversos estudios han mostrado que organizaciones con un alto nivel de *engagement* de los empleados se muestran más resilientes y capaces de hacer frente a los desafíos impuestos por el entorno, lo que lleva directamente a un mejor desempeño (Cherrie, 2018). Asimismo, se ha demostrado que la satisfacción en el trabajo predice el desempeño del empleado más y mejor que cualquier factor demográfico (Lester et al., 2022). En segundo lugar, el fenómeno de la innovación digital comienza a establecerse como una norma en los actuales lugares de trabajo, dando lugar a los llamados *digital workplaces* (Dery et al., 2017). De forma inevitable, la innovación digital requiere la participación de los empleados y su compromiso, lo que implica que la experiencia del empleado estará afectada por estas actividades. Los ejecutivos de Sistemas de Información deben comprender que las iniciativas de innovación digital afectarán al desempeño de la empresa no sin antes afectar y transformar el desempeño del empleado. En este sentido, esta tesis doctoral muestra como una serie de iniciativas de innovación digital pueden mejorar el desempeño del empleado a través de la mejora de la satisfacción en el trabajo y del *engagement* del empleado.

En general, las implicaciones prácticas de esta tesis doctoral apuntan en la misma dirección que la literatura sobre *IT-business alignment*, o alineamiento entre la estrategia de negocio y la estrategia de TI, línea de investigación que aboga por la existencia de un *fit* entre ambas estrategias (Ross y Weill, 2002). Esta tesis doctoral, por tanto, anima a responsables de Sistemas de Información a trabajar conjuntamente con responsables

de negocio para co-desarrollar capacidades tecnológicas que permitan a la empresa innovar y crecer en entornos turbulenos. Según un estudio de Gartner realizado en 2019, 49% de los CEOs encuestados creen que negocio y tecnología tienen la misma responsabilidad para la creación y el desempeño de servicios y productos digitales[2].

5.4. Limitaciones y futuras líneas de investigación

A pesar de la relevante contribución, tanto en términos teóricos como empíricos, que esta tesis doctoral aporta al campo de Sistemas de Información, los resultados de la misma deben considerarse con prudencia dado que no están exentos de limitaciones. Muchas de estas limitaciones pueden considerarse como oportunidades para futuras líneas de investigación.

5.4.1. Reflexiones sobre las limitaciones en la investigación científica y precauciones metodológicas para minimizar y prevenir los sesgos

Es importante destacar que los resultados empríricos de cualquier modelo de investigación representan solamente una aproximación a la realidad objeto de estudio. En este sentido, resulta prácticamente imposible considerar todos los escenarios posibles que expliquen las relaciones existentes entre una serie de variables, o considerar todas las variables predictivas y de control que pueden afectar a una variable endógena. Esta es una de las razones por las que los trabajos presentados en esta tesis doctoral muestran los resultados del

2 https://www.gartner.com/smarterwithgartner/ceos-look-for-growth-opportunities-in-2019-ceo-survey/

denominado bondad del ajuste del modelo o *goodness of model fit* (Hubona et al., 2021). Esta medida nos permite identificar si el modelo teórico es cierto y con qué probabilidad lo es, un aspecto cada vez más importante y demandado en la disciplina de Sistemas de Información y en muchas otras más (Hair et al., 2020).

Por otro lado, muchos son los estudios de investigación que muestran que conseguir la generalización de los resultados, un modelo parsimonioso, y, a la vez preciso, es una tarea cada vez más imposible de alcanzar, siendo necesario sacrificar alguno de estos aspectos. Los trabajos presentados en esta tesis doctoral, aún intentando minimizar cualquier tipo de sesgo, han intentado primar la búsqueda de modelos parsimoniosos. La parsimonia, que no debe confundirse con simplicidad, ha sido considerada como un ingrediente muy relevante para el desarrollo teórico (Sharma et al., 2019), precisamente porque es capaz de "explicar mucho con poco" (Friedman, 1994, p. 153). Por lo tanto, a pesar de que los estudios de esta tesis doctoral son variados en términos de muestra, metodologías, y medidas, las limitaciones deben verse como algo inherente a la investigación.

Los trabajos de investigación presentados en los Capítulos 3 y 4 adoptan una serie de precauciones para minimizar y prevenir los sesgos provenientes del llamado método común o *common method bias*. Este tipo de sesgo no aparece en el Capítulo 2, ya que en este caso el modelo es testado con datos secundarios provenientes de distintas bases de datos. El sesgo el método común implica que existe un sesgo atribuido al método para la medición de las variables y no a los constructos que las medidas representan (Podsakoff et al., 2003). Las precauciones adoptadas en dichos capítulos vienen recogidas en el trabajo

seminal de Podsakoff et al., (2003). A pesar de que las variables especificadas como *composites* son improbables de sufrir dicho sesgo (Ronkko y Ylitalo, 2011), las recomendaciones para minimizarlo han estado muy presentes en la elaboración de los dos trabajos de investigación debido a que ambos usan un método común para la medición de las variables. Asimismo, el último trabajo de investigación incluye un test estadístico para comprobar dicho sesgo una vez los datos han sido recogidos. Ronkko y Ylitalo (2011) proponen el uso de una variable marcador, de modo que no existirían sesgos del método común cuando la correlación entre esta variable y las variables del modelo resulte en una cifra cercana a cero. Este test se encuentra más desarrollado en el Capítulo 4.

5.4.2. Limitaciones de esta investigación y futuras líneas de investigación

Los tres estudios de investigación que se derivan de esta tesis doctoral presentan cuatro grandes limitaciones. En primer lugar, el estudio presentado en el Capítulo 2 hace uso de una muestra de conveniencia, una práctica bastante común en la investigación en *Management* (Ferris et al., 2015). En concreto, el Capítulo 2 emplea una muestra de conveniencia de datos secundarios debido a la riqueza de la misma, que nos permitió medir la variable endógena (reputación de empleador) con los datos proporcionados por la misma muestra. Este aspecto anima a futuros investigadores a replicar el modelo propuesto con datos de encuesta. Relacionado estrechamente con esta primera limitación, el tamaño de las muestras de los tres estudios de investigación podrían ser considerados una limitación añadida. A pesar de que en los tres estudios se analiza y

se identifica el tamaño mínimo muestral necesario para obtener efectos de interés (Cohen, 1998), se reconoce que el tamaño muestral de los tres estudios – 100, 151, 134 empresas respectivamente- pueden ser relativamente pequeños.

En segundo lugar, aquellos estudios que han usado datos de encuesta (Capítulo 3 y 4), han medido las variables usando un único encuestado (*self-report*). A pesar de que numerosos estudios han usado datos de encuesta provenientes de un único informante clave por considerarse la mejor forma de medir ciertas variables y/o por no existir fuentes de datos secundarios para medirlas, la literatura previa ha recomendado el uso de múltiples fuentes en la recogida de datos para minimizar el sesgo del método común y eliminar posibles percepciones subjetivas en la medida de las variables de interés. Esto es especialmente relevante para medidas del desempeño de la empresa o del empleado, medidas que están sujetas a altas tasas de subjetividad en función de quién responda a las preguntas. Sin embargo, y aunque el uso de datos secundarios soluciona en cierta medida esta subjetividad inherente a los datos de encuesta, los datos provenientes de fuentes secundarias también presentan sus desventajas. En este sentido, los investigadores tienen que asegurarse de que los datos secundarios son un buen *proxy* para la medidición de las variables de interés y aceptar que en esos casos la medida de las variables puede presentar cierto "ruido". Por lo tanto, futuras líneas de investigación podrían considerar, por un lado, el uso de múltiples fuentes de datos, y por otro, el desarrollo de escalas que midan de forma perceptual aquellas variables medidas con datos secundarios.

Idealmente, estos estudios podrían replicarse usando dos informates clave y datos secundarios para las medidas de desempeño.

En tercer lugar, la generalización de los resultados es una de las limitaciones más comunes presentes en artículos académicos. Los estudios sobre creación de valor de negocio mediante el uso de la tecnología se han centrado principalmente en empresas estadounidenses o británicas (Benitez et al., 2018). Esta tesis doctoral usa únicamente muestras de empresas procedentes del territorio español. A pesar de que España es un contexto clave para el estudio de los objetivos propuestos en esta tesis doctoral, debido a su alto volumen de inversión en tecnología, esto supone que los resultados solo puedan aplicarse al contexto español. Teniendo en cuenta que pueden existir diferencias según el contexto geográfico en el que se realice el estudio, futuras investigaciones podrían explorar si los resultados de este estudio se sostienen y son consistentes en otros contextos geográficos y culturales.

Por último, el enfoque de esta tesis doctoral ha sido meramente cuantitativo y transversal. Por un lado, esto implica que se han obviado métodos cualitativos o mixtos que ofrecen un mayor rigor científico y un mayor realismo para evaluar las relaciones de interés (Cheng et al., 2021). El uso de estos enfoques permitiría tener una visión más holística de los fenómenos estudiados en esta tesis doctoral. Por otro lado, los datos de esta tesis doctoral se han recogido en un momento y contexto determinado, sin tener en cuenta posibles variaciones en el tiempo, aspectos que deberían analizarse en futuros estudios longitudinales. A

pensar de que se ha tenido en cuenta posibles efectos retardados de unas variables sobre otras, por ejemplo reflejado en las medidas del Capítulo 2, se reconoce que el uso de datos de corte transversal no permite detectar los cambios o evoluciones de las variables a lo largo del tiempo, lo que dificulta el poder establecer relaciones de causalidad.

5.5. Consideraciones finales

En un contexto volátil, incierto, complejo, y ambiguo (VUCA), donde hay que añadir el efecto de la disrupción digital y su poder transformador en industrias y modelos de negocio tradicionales, esta tesis doctoral justifica y pone en valor el poder de la tecnología para generar valor de negocio y mejorar el desempeño organizativo.

Basada en la perspectiva de las capacidades organizativas facilitadas por la TI (Benitez y Walczuch, 2012), la perspectiva de complementariedad entre recursos de TI y recursos de negocio (Ennen y Richter, 2010), y enriquecida con literaturas dispares externas al campo de Sistemas de Información, esta tesis doctoral es consistente con la actual literatura de valor de negocio de TI. En este sentido, los estudios presentados en esta investigación demuestran que el uso eficiente de ciertos recursos y capacidades de TI crean valor de negocio de forma positiva, pero indirecta a través de otras variables que median o moderan el proceso. Pese a las carencias detectadas en la investigación, esta tesis doctoral es un trabajo novedoso y de interés académico para la disciplina de Sistemas de Información y para la práctica empresarial.

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Cada uno a su tiempo,
Todo llega,
Para quien sabe esperar

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